



NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES

Moving Forward Together

**Triennial Report
2008 to 2010**



nwmo

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The Honourable Christian Paradis
Minister, Natural Resources Canada
Ottawa, Ontario
K1A 0A6

March 2011

Dear Minister Paradis,

We are pleased to submit to you the first triennial report of the Nuclear Waste Management Organization (NWMO) for fiscal years 2008 to 2010.

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 the 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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Corporate Overview

NWMO Mandate



The Nuclear Waste Management Organization (NWMO) is responsible for the long-term care of Canada's used nuclear fuel.

The NWMO was established in 2002 by Canada's nuclear electricity producers in accordance with the *Nuclear Fuel Waste Act (NFWA)*. The organization operates on a not-for-profit basis under Part II of the *Canada Corporations Act*.

Ontario Power Generation Inc., New Brunswick Power Corporation and Hydro-Québec are the founding Members, and along with Atomic Energy of Canada Limited, are required to fund the NWMO's operations. The Member corporations develop the underlying governance structures for the organization and also the cost-sharing provisions for

the NWMO's operating expenses.

The *NFWA* required the NWMO to provide recommendations to the Government of Canada on the long-term management of used nuclear fuel. The NWMO initiated a study in 2002, and in 2005 submitted to the Minister of Natural Resources proposed approaches for the long-term management of Canada's used nuclear fuel, comments of its Advisory Council and a recommended approach called Adaptive Phased Management (APM).

The Government of Canada selected the recommended approach in June 2007. The NWMO is now

responsible for implementing APM, subject to all the necessary regulatory approvals. We are 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.

Based on the “producer pays” principle, the *NFWA* required the nuclear fuel waste owners – Ontario Power Generation, Hydro-Québec, NB Power and Atomic Energy of Canada Limited – to establish segregated trust funds to finance the long-term management of their 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.

In 2008, as it was obliged to do 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 study, and triennial reports beginning with this 2010 report, 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 fuel bundles from Canada’s CANDU nuclear reactors are each approximately 0.5 metre long and weigh about 24 kilograms.



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 site 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 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 fuel will remain a potential health risk for many hundreds of thousands of years. For this reason, used 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 just 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 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 following table summarizes the current inventory of nuclear fuel waste in Canada as of June 30, 2010.

The inventory is expressed in terms of number of CANDU used 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.

Summary of current inventory of
nuclear fuel waste in Canada
as of June 30, 2010



Location	Waste Owner	Wet Storage (# bundles)	Dry Storage (# bundles)	Total (# bundles)	Current Status
Bruce A	OPG	364,381	46,464	410,845	2 units operational, 2 units under refurbishment (expected 2011 return to service)
Bruce B	OPG	375,566	145,912	521,478	4 units operational
Darlington	OPG	329,198	48,363	377,561	4 units operational
Douglas Point	AECL	0	22,256	22,256	permanently shut down
Gentilly-1	AECL	0	3,213	3,213	permanently shut down
Gentilly-2	HQ	29,833	86,340	116,173	operational
Pickering A	OPG	401,737	214,436	616,173	2 units operational, 2 units permanently shut down
Pickering B	OPG				4 units operational
Point Lepreau	NBPN	40,758	81,000	121,758	currently undergoing refurbishment (expected 2012 return to service)
AECL Whiteshell	AECL	0	2,268	2,268	permanently shut down (see Note 1)
AECL Chalk River	AECL	0	4,886	4,886	mostly fuel from NPD (permanently shut down) and with small amounts from other CANDU reactors (see Note 2)
TOTAL		1,541,473	655,138	2,196,611	Total of: – 17 units in operation – 3 units under refurbishment – 6 units permanently shut down

Note: Data as of June 30, 2010

AECL = Atomic Energy of Canada Limited

HQ = Hydro-Québec

NBPN = New Brunswick Power Nuclear

NPD = Nuclear Power Demonstration

OPG = Ontario Power Generation Inc.

(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) In addition to the totals shown in the table above, AECL also has 21,987 components of research and development fuels, such as fuel elements, fuel pellets and fuel debris, in storage at Chalk River.

Vision, Mission and Values



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 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



The fundamental beliefs that guide us in our work include:

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



Canada has played a leading role in investigating methods for the long-term management of used nuclear fuel. As early as the 1970s, Canadian scientists enjoyed a world-wide reputation for the quality of their research on deep disposal in a stable geologic environment.

By 1998, with the publication of the Seaborn Panel report, Canada was among the first countries to recognize the need to integrate social perspectives and technical findings in the development of plans for safely managing used nuclear fuel. In its 2002–2005 study of approaches, the NWMO incorporated both dimensions, producing a plan that is technically sound and socially acceptable.

Adaptive Phased Management is built on a foundation of values and principles with a focus on safety,

security and flexibility. These underpinnings have been identified by citizens as vital. They are the basis of the plan, and they have guided its implementation since the Government of Canada confirmed the approach in 2007. Significant progress is being made.

This document is a notable milestone. It is the first of our triennial reports, published as a requirement of the *Nuclear Fuel Waste Act*, and includes independent written comments of the Advisory Council as

Over the past three years, Canada has firmly confirmed itself again among those countries leading the way in realizing plans for the safe and secure long-term management of used nuclear fuel.



part of its responsibilities under the same legislation.

In addition to commenting on our organization's work, the Advisory Council has continued throughout the first three years of implementing Adaptive Phased Management its practice of offering valuable guidance on the NWMO's plans and processes. The broad range of expertise and experience Council members bring to their deliberations has made an immense contribution to our early progress.

Similarly, the Aboriginal Elders Forum and its working group, Niigani, have been generous in giving of their wisdom and experience. The NWMO appreciates the special relationship Aboriginal peoples have with Mother Earth and is committed to respecting Traditional Knowledge and how it can inform and enrich our efforts.

Canadians can look to the International Technical Review Group for confidence that the best scientific knowledge is being pursued and applied by the NWMO. This distinguished team was established by the Board in 2008 to annually assess the NWMO's technical program and comment on whether it is based on credible scientific approaches and methodologies and is consistent with best international practices.

Our Member companies, the used fuel owners, have consistently met their obligations, providing the necessary financial support for the NWMO's operations. In addition, the Member companies made their requisite contributions to their respective trust funds, thus ensuring that those who benefit from nuclear electricity today do not leave behind a legacy of waste for future generations.

Ken Nash and his management team have built a strong and credible organization to lead the plan's implementation. The Board continues to encourage these efforts, and in particular, to recruit and attract the highest calibre individuals so that Canada's nuclear waste management program may continue to be ranked among the best in the world.

Most important, Adaptive Phased Management is benefiting from the collaboration among the NWMO and the interested Canadian individuals and organizations who participate in its processes. Work plans are updated annually based on ongoing dialogue. Public engagement was crucial in designing a fair and ethical process for identifying an informed and willing host for a deep geological repository. Communities themselves are becoming an important focus, as several have already begun learning more about Adaptive Phased Management and the repository project. We welcome them and look forward to others considering their interest as well.

Over the past three years, Canada has firmly confirmed itself again among those countries leading the way in realizing plans for the safe and secure long-term management of used nuclear fuel. I am confident that by continuing to work with interested communities and organizations, Aboriginal peoples and potentially affected individuals, the NWMO will make steady progress towards meeting the expectations of Canadians that this generation take responsibility for the used nuclear fuel produced for its benefit. As you will see from our performance outlined on the following pages, we have made a sound start.

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

Dr. Gary Kugler
Chairman

President's Message



In 2007, the Government of Canada approved a plan for the safe, long-term management of used fuel produced by Canada's nuclear electricity generating stations. Adaptive Phased Management is the outcome of extensive research and an open, respectful collaboration among citizens, experts and Aboriginal peoples.

It is an approach that meets values and objectives Canadians believe are most important in decision-making – safety, security and flexibility. It is the plan now being carefully implemented by the NWMO in a reflective and iterative manner, as it was designed, with the benefit of ongoing dialogue and the best available social and technical research.

Collaboration is at the core of our mandate. Guidance sought and received through our relationships

with governments at all levels, industry, interest groups, young people and experts has helped design our processes and shape our work plans. A forum of Aboriginal Elders and a municipal forum have been particularly helpful in informing work at a community level.

As we begin implementing Adaptive Phased Management, an early milestone was designing a fair and open process for selecting a site for a deep geological repository.

Collaboration is at the core of our mandate. Guidance sought and received through our relationships with governments at all levels, industry, interest groups, young people and experts has helped design our processes and shape our work plans.



Following a two-year dialogue that included citizen panels, open houses, public attitude research, and numerous individual and group briefings and meetings, we collaboratively designed a process to identify an informed and willing community to host a large national infrastructure project that will safely contain and isolate used nuclear fuel. The site selection process was initiated in May 2010. A program of awareness and capacity building is underway. Already, several communities in Saskatchewan and Ontario have expressed interest in learning more.

Our technical research program is also a collaborative endeavour. Working with more than a dozen Canadian universities, and through partnership agreements with similar organizations in Sweden, Finland, Switzerland and France, we have advanced our understanding of geosciences, repository engineering and safety assessment. The NWMO has developed designs for deep geological repositories in both crystalline and sedimentary rock formations and agreed to a process for their review by the Canadian Nuclear Safety Commission.

The NWMO has refined the cost estimate for Adaptive Phased Management, and in 2009 the Minister of Natural Resources approved the funding formula we proposed to ensure that those who benefit from nuclear electricity pay for managing over the long term the used fuel that is produced. Trust funds totalling more than \$2 billion are in place, and contributions are being made annually. The cost estimates will be further refined in 2012.

The NWMO continually monitors public attitudes and preferences related to managing nuclear waste. We assess and report on energy policy discussions and emerging technologies that may affect our plans. These include the financial and technical implications of additional quantities or new types of used fuel that could arise from new reactors. We also consider the potential for future recycling of used nuclear fuel and the management of associated high-level wastes that would be created.

Over this reporting period, the NWMO grew from a small group of 27 people in 2007 to an employer in its own right with a workforce of more than 120 employees by 2010, possessing a wide range of skills needed to implement Canada's plan for long-term used nuclear fuel management. We have established a strong and accountable governance structure and management system that has been certified against the ISO 9001 Quality Management Standard. The NWMO is committed to attracting and maintaining people of the highest calibre and to continuously improving our performance.

In addition to implementing Adaptive Phased Management, the NWMO is providing technical services and other support to Ontario Power Generation (OPG) to develop and conduct the necessary work to obtain regulatory approvals, and then to construct a Deep Geologic Repository for OPG's Low and Intermediate Level Waste. The experience we are gaining from this important collaboration, applying our expertise in repository technology and safety, is providing significant value in our implementation of Canada's plan for managing used nuclear fuel.

Being accountable and involving Canadians in decision-making at every step is essential to delivering a program that meets or exceeds the high expectations of Canadians, the requirements of the *Nuclear Fuel Waste Act* and stringent regulatory standards defined through the *Nuclear Safety and Control Act*. We are proud of what the NWMO has achieved with the support and guidance of Canadians during the first three years of implementing Adaptive Phased Management, and we look forward to making steady progress through continued collaboration with all who are interested in, or potentially affected by, our work.

A handwritten signature in black ink that reads "K. E. Nash".

Ken Nash
President and CEO





2 Executive Summary

The Nuclear Waste Management Organization (NWMO) is pleased to issue its first Triennial Report.

A requirement of the *Nuclear Fuel Waste Act (NFWA)*, the *Triennial Report 2008 to 2010* reports to Canadians on the NWMO's achievements over the past three years in implementing Canada's long-term management plan for used nuclear fuel. Consistent with the requirements of the *Act*, this Triennial Report also presents the NWMO's forward-looking perspectives as set out in its strategic plan for the 2011 to 2015 period.

Following the Government of Canada's decision in 2007, selecting 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 the important first phase of work in implementing the approach.

It is against these seven strategic areas that the NWMO presents both its achievements for 2008 to 2010 and its plans for the 2011 to 2015 period in the Triennial Report.

Highlights of past progress and plans for APM implementation are presented in summary form in the sections that follow. A detailed account of the NWMO's activities and plans are provided in individual chapters and appendices of the Triennial Report.

STRATEGIC OBJECTIVES 2010

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, 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.

Overview

Since receiving Government direction in 2007 to proceed with implementing Adaptive Phased Management, the NWMO has made significant strides in moving forward Canada's plan for the long-term care of used nuclear fuel. Throughout the 2008 to 2010 reporting period, building and nurturing relationships with those potentially affected by the NWMO's work has remained an important focus, with the ongoing invitation to interested organizations and individuals to contribute to the shaping of implementation plans for the APM project. Important foundations for the APM site selection process were laid through the collaborative development of a process to identify a safe site in an informed and willing host community. A further milestone was marked with the initiation of the site selection process in 2010 and the invitation to communities to learn more about the APM project. In parallel, refinements to the technical reference designs and safety cases for the deep geological repository continued, supported by a breadth of design and development work in collaboration with international partners. The framework for financing the APM program in the future was elaborated through the funding formula developed by the NWMO and subsequently approved by the Minister of Natural Resources. All work progressed through the important lens of adaptive management, as the organization sought to stay abreast of evolving developments and expectations that may impact on future activities. The NWMO itself developed and expanded in recent years, as it transitioned into a larger implementing organization with the range of skills, oversight and governance required to capably deliver on the NWMO's mandate and earn the confidence of Canadians.

Looking to the next phase of implementation, the five-year plan proposes advancement in all seven strategic areas established to guide APM. The strategic plan for 2011 to 2015 is guided by a set of underlying reference planning assumptions. In particular, the five-year plan focuses on supporting the evolution of the APM site selection process initiated in 2010. The site selection process is, by design, a community-driven process in which potentially interested communities elect to put themselves in the process of learning more, initial screenings and feasibility studies. Such processes will necessarily evolve on timelines determined by communities, rather than schedules prescribed by the NWMO. For planning purposes, the organization has set out activities and budgets for the next five years to ensure that the NWMO is in a state of readiness to work with communities as they elect to move forward through different phases of the site selection process. As the NWMO gains experience with the site selection process, it will adapt processes as appropriate in light of new learning. Design and development of the repository will continue along with the iterative development of the safety case. As the NWMO takes the next steps in implementing APM, the organization will seek to carry forward the spirit of the plan originally proposed by Canadians and to reflect in future phases of work the NWMO's core values of integrity, excellence, engagement, accountability and transparency.

Strategic Areas of APM Implementation: Progress and Plans

Building Relationships

Adaptive Phased Management (APM) was developed with Canadians for the long-term management of Canada's used nuclear fuel. Through ongoing engagement of communities, governments, Aboriginal peoples and a diversity of interests, the NWMO continues to work collaboratively to develop and refine its plans and activities at each stage. Over the last three years, the NWMO has sought input on strategic objectives, policy and communications documents, and the collaborative development of the APM site selection process. More than 7,000 people engaged in the design of the site selection process, contributing important and diverse perspectives through such activities as public information sessions, citizen panels, multi-party dialogues, Aboriginal dialogues, e-dialogues and national surveys. The development of plans, community engagement and communications benefited from the important guidance of a forum of municipal associations and the NWMO Elders Forum and its working group, Niigani. A Youth Roundtable was convened to develop a basis for youth outreach. The NWMO met regularly with representatives and staff of the federal government and provincial governments of nuclear fuel cycle provinces to keep them informed of our plans and activities.

During 2011 to 2015, the NWMO's engagement, education, outreach and capacity-building initiatives will be expanded. An important focus will be relationship building with communities and regions potentially interested in, or affected by, the APM site selection process and the transportation of used fuel. The NWMO will work with the Elders Forum, Municipal Forum, and interested Aboriginal and community-based organizations. Working with the Canadian Nuclear Safety Commission (CNSC) through a pre-project agreement signed in 2009, the NWMO will stay abreast of evolving regulatory requirements. The NWMO will fulfill its ongoing statutory responsibility to consult Aboriginal peoples and other responsibilities outlined in its agreement with Natural Resources Canada. Engagement with regional, provincial and federal departments will be broadened to address policy and regulatory frameworks relevant to APM site selection. Ongoing involvement of citizens will ensure policies and plans continue to meet needs and expectations of Canadians. In developing and maintaining relationships, the NWMO will continue to seek and maintain confidence in the NWMO as the implementing organization for APM.

APM Site Selection Process

The NWMO developed the decision-making framework for the selection of a safe site in an informed, willing community through a two-year collaboration and dialogue in 2008 and 2009. Building on the objectives and principles advanced by the many Canadians contributing to this work, the road map outlines a community-driven process through which potentially interested communities may elect to learn more about the project, request initial screenings and participate in feasibility studies and community dialogue as they consider potential interest in hosting the repository, the centre of expertise and associated facilities. The site selection process was initiated in

May 2010 through an awareness-raising program and an invitation to communities to learn more about the project. By year-end 2010, a number of communities had requested information on the project. Some had requested initial screenings of potential geotechnical suitability for the repository and initiated activities to engage community members in a discussion of the project.

Through the 2011 to 2015 period, the NWMO will continue to work with communities that come forward to understand the project and request initial screenings of potential site suitability. For communities meeting initial screening requirements and electing to continue in the process, the NWMO will work in partnership with them in the delivery of preliminary site assessments over one to two years, examining the feasibility of sites against geoscientific safety criteria and community well-being considerations. The NWMO will work with communities to conduct regional studies and expand dialogues to include surrounding communities, Aboriginal peoples and regions that may be affected by the siting of the APM project or the transportation of used nuclear fuel to that location. The NWMO will provide resources to communities engaged in the process and those in potentially affected surrounding areas to support their consideration of the project and participation in dialogues as they explore the project fully against long-term visions for their communities and the regions. From a planning perspective, as early as 2013, the NWMO will be resourced and prepared to initiate detailed site characterization work, should one or more willing, strong candidate sites be selected to advance in the multi-year process.

Design and Safety Case for APM Deep Geological Repository

The technical research and development program is advancing to support stepwise decision-making and implementation of APM. The technical research program has two principal areas of focus: updating reference designs and safety cases for a used fuel deep geological repository and transportation system; and further increasing confidence in the deep geological repository safety case and enhancing scientific understanding of processes that may influence repository safety. Work in geosciences, repository engineering and safety assessment is underway both in-house and in collaboration with specialists and universities in Canada and with international organizations to address these two principle areas of focus. The program is reviewed annually by the Independent Technical Review Group (ITRG) that provides valuable external expertise and counsel to ensure that we adopt the best technical practices available in Canada and internationally. Work is well advanced on updating APM conceptual designs for repositories in both crystalline and sedimentary rock formations. Work has been initiated toward a pre-project review by the CNSC. This will continue in the 2011 to 2015 period, along with preparation of engineering design options for used fuel container and packaging plant technology.

Financial Surety

Canadians expect that the money necessary to pay for the long-term care of used nuclear fuel will be available when it is needed. As required by the *Nuclear Fuel Waste Act*, Ontario Power Generation (OPG), New Brunswick Power Nuclear (NBPN), Hydro-Québec (HQ) and Atomic Energy of Canada Limited (AECL) have established trust funds and make annual deposits in support of their cost shares of the APM plan. The NWMO must maintain estimates of the costs of the APM program and determine the amounts of annual contributions to trust funds required by each company. An important milestone in support of financial surety was reached with the development of a funding formula, approved by the Minister of Natural Resources in 2009, which forms the basis of trust fund contributions by industry. An update of the life cycle APM program costs is underway and will be completed by 2012. The NWMO will maintain the cost estimates and adjust the funding formula as required over time.

Adapting Plans

Adaptive processes that take into account new information and learning and provide for program flexibility are at the core of Canada's plan for used nuclear fuel. Over the past three years, the NWMO has monitored and reported regularly on the evolution of knowledge in a number of areas that may be important for future planning: evolving energy policy, technical developments on nuclear waste management, and societal expectations. Looking to the next five years, the NWMO must continue to monitor, review and discuss the potential implications of any emerging industry plans for reactor refurbishments and new nuclear units for the volumes and types of used fuel to be managed. Over the last three years, the NWMO has continued to learn from the experience of others through examination of case studies and conversations with people involved in similar processes, both in Canada and abroad. We have engaged a wide variety of specialists to explore a range of perspectives on key issues. We have also explored the expectations of Canadians through public attitude research.

Moving forward, the organization 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 and other bodies of knowledge into the implementation of APM. The organization will continue to be an active participant in committees of the Nuclear Energy Agency of the Organization for Economic Co-operation and Development, and contribute to an exchange internationally in areas of mutual interest. In the five-year planning period, the NWMO will advance its learning on such issues as retrievability, monitoring and intergenerational knowledge transfer. The NWMO will continue to engage citizens, specialists and potentially affected communities to test and confirm the social acceptability of the site selection process and other plans and processes.

Governance

The NWMO submits annual and triennial reports to the Minister of Natural Resources Canada, who maintains oversight of the NWMO as set out under the *Nuclear Fuel Waste Act (NFWA)*. The NWMO's founding Members – Ontario Power Generation, New Brunswick Power Nuclear and Hydro-Québec – maintain a membership agreement setting out roles and responsibilities in respect of the NWMO. Over the reporting period, the NWMO's Board of Directors was expanded, and three new Board committees were established to reflect the organization's evolving work program. The NWMO Advisory Council provided advice to the organization on an ongoing basis and provided independent comment on the NWMO's work. The Board expanded Council membership, adding expertise in geosciences, Aboriginal Traditional Knowledge, health physics and communications. In 2008, the Board established an Independent Technical Review Group, comprising specialists from Canada, Sweden, Switzerland and the United Kingdom, to advise on whether the APM technical program is based on appropriate scientific approaches and is consistent with best international practice. Policies, procedures and management systems have been elaborated, and quality management plans and audits instituted. Over the next five years, the NWMO will interact with the CNSC consistent with the terms of the service agreement that identifies CNSC's early involvement in the APM project prior to the NWMO submitting a licence application.

Building the Organization

Over the last three years, the NWMO made the transition from a small organization into an implementing agency with a range of capabilities required to implement the APM program. On January 1, 2009, the NWMO became an employer in its own right with the necessary supporting infrastructure including finance, legal services and human resources. Staffing levels increased from 27 at the end of 2007 to 81 a year later, with further increases to 120 by year-end 2010. The NWMO continues to recruit in a wide range of disciplines.

Over the next five years, the organization will continue to ensure resource capacity and expertise are in place to provide the foundation for progressing through each phase of planning, design and site assessments. It is anticipated that some hiring of regionally based staff will be required to support communities engaged in the APM site selection process.

Other Activities

On January 1, 2009, OPG contracted the NWMO to provide technical services and other support in order to obtain the regulatory approvals for OPG's proposed Deep Geologic Repository Project for the safe, long-term management of Low and Intermediate Level Nuclear Waste from OPG-owned or operated reactors. A second agreement (reached in February 2011) will see the NWMO design and construct the project subject to necessary regulatory approvals.

A significant benefit of the arrangement is the opportunity it provides for the NWMO to acquire direct experience in the planning and development of a deep geologic repository.

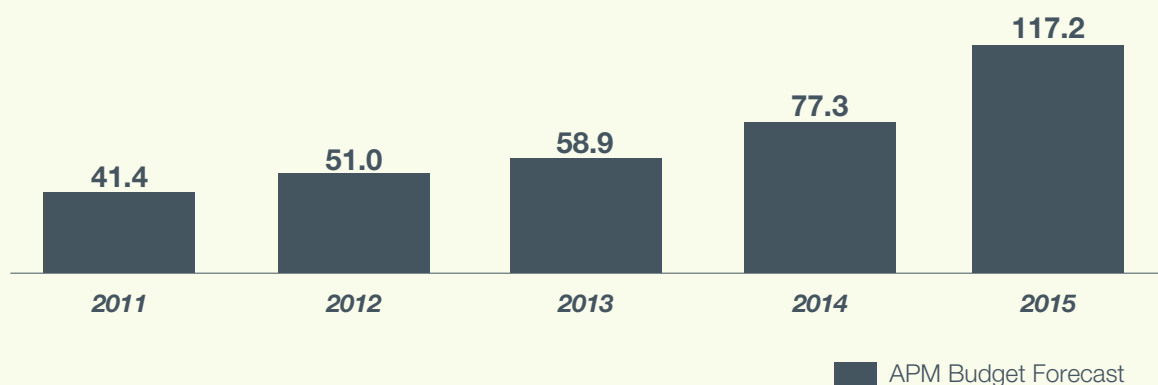
Five-Year APM Budget Forecast

In support of the strategic plan for APM implementation, a budget forecast has been prepared for 2011 to 2015.

The forecast assumes a gradual ramping up of activity as potentially interested communities elect to proceed through the phases of the site selection process. The year-over-year increases are based on the assumption that communities will, over the planning period, request to move through different phases of learning and capacity building, initial screenings and feasibility studies. The budget also makes provision to initiate work associated with detailed site characterization, should the process evolve to that stage.

The budget forecast reflects the NWMO's desire to be prepared and well-resourced to work with communities as they engage in the site selection process. Actual costs incurred will be determined by a number of factors, including the timing and nature of community involvement in the site selection process over this period. Planning assumptions underlying the budget estimate are outlined in Chapter 8, *Budget Forecast 2011 to 2015*. These annual operating costs are cost-shared by the owners of used nuclear fuel: Ontario Power Generation, Hydro-Québec, New Brunswick Power and Atomic Energy of Canada Limited.

»» 2011–2015 Budget (\$ million)



Trust Funds

The *Nuclear Fuel Waste Act* 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 *Act*, contributions have been made annually beginning in 2002.

Trust fund balances as of December 2010 are outlined below for each company. Each year, the NWMO must establish the level of trust fund deposits for each company for the upcoming year. The required level of 2011 deposits are also presented below. See Chapter 10, *Financial Reporting Requirements*.

Total Trust Fund Deposits:
Year 2011



	Trust Fund Balances as at December 2010 (\$ million)	2011 Deposits to Trust Funds Required by Waste Owners* (\$ million)
Owner	Dec 2010	2011
OPG	1,950	139
HQ	70	7
NBPN	77	5
AECL	33	2
Total	2,130	153

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

APM MILESTONE ACHIEVEMENTS 2008 TO 2010

Building Relationships

- » Engagement activities that sought input on NWMO plans and policies and strategic objectives for APM.
- » Engagement of a cross-section of Canadians (more than 7,000 people) in developing the APM site selection process through public information sessions, citizen panels, multi-party dialogues, Aboriginal dialogues, national surveys and other activities, providing a range of perspectives.
- » Establishment of a Municipal Forum and stronger liaisons with municipal associations.
- » Expanded work and collaboration with national and provincial Aboriginal organizations, NWMO Elders Forum and the Niigani working group.
- » Expanded relationships with all levels of governments.
- » Expanded suite of communication materials to support general public outreach, including enhanced website, APM exhibit on repository concept, DVDs, backgrounders and fact sheets. DVD on site selection process available in English, French and nine Aboriginal languages.
- » Youth Roundtable convened to advise on future outreach and engagement.

Site Selection

- » Two-year dialogue with Canadians (2008, 2009) to collaboratively develop a process for identifying a safe, secure location in an informed and willing community to host the deep geological repository.
- » Initiation of APM site selection process (May 2010) supported by a broad-based program of activities to raise awareness of the APM project.
- » Early interest expressed by communities in 2010 in engaging in the Learn More phase. Communities initiated participation in programs to build their understanding of APM.
- » Initial screenings requested by communities as part of this period of learning more about APM and the siting process.
- » Materials on APM and public kiosks provided to support early community information and dialogue.

Design and Safety Case for APM Deep Geological Repository

- » Update of APM conceptual designs for repositories in both crystalline and sedimentary rock formations. Work initiated towards a pre-project review by the CNSC.
- » Collaboration on technical research program with Canadian universities and international partners in Sweden, Finland, Switzerland and France.

Financial Surety

- » Approval by Minister of Natural Resources (2009) of the funding formula proposed by the NWMO, to ensure that those who benefit from nuclear energy pay for the management of used fuel and financial burdens are not passed on to future generations.
- » Initiation of process to refine and update the total cost estimate for the APM project.

Adapting Plans

- » Tracking of opinions and expectations of Canadians for APM project.
- » Tracking of emerging technologies, used fuel inventory projections and potential impacts of new nuclear build on APM program.
- » Tracking of best practices in engagement, and potential social, economic and cultural effects of APM.
- » Continued work to understand the values and ethical considerations of APM implementation.
- » Continued work to understand opportunities to interweave Aboriginal Traditional Knowledge.

Accountability and Governance

- » Expansion of Board of Directors and its committee structure.
- » Expansion of Advisory Council membership. Advisory Council provided ongoing advice to the NWMO and developed independent comments.
- » Establishment of the Independent Technical Review Group (ITRG) to review APM technical program. Annual ITRG reviews confirm that full range of relevant scientific topics is covered by the NWMO.
- » ISO 9001 certification and expanded quality assurance and management systems.
- » Agreement with CNSC signed outlining areas of pre-project review on APM design and safety case.
- » Memorandum of Understanding with Natural Resources Canada signed on consultation with Aboriginal peoples.
- » Initiation of five-year strategic plans for APM implementation.

Building the Organization

- » The NWMO became an employer in its own right with supporting legal and financial infrastructure.
- » Significant strengthening of the NWMO's capabilities through recruitment of a highly qualified, experienced multidisciplinary team: the NWMO grew from 27 employees in 2007 to 120 employees by the end of 2010.

APM STRATEGIC PLANNING MILESTONES 2011 TO 2015

Building 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 communities and regions potentially interested in, or affected by, the APM site selection process and the transportation of used fuel.
 - » Collaborative work with, and advice sought from, the NWMO Elders Forum, Municipal Forum, community-based organizations, and national and provincial Aboriginal organizations.
 - » Developing and maintaining relationships with federal, provincial, regional and local governments.
 - » Involvement of a cross-section of citizens, including youth and interested organizations, to ensure NWMO policies and plans continue to meet needs and expectations.
-

Site Selection

- » Collaborative work with communities interested in learning more about APM project.
 - » Initial screenings and preliminary feasibility studies upon request of communities.
 - » Regional engagement and studies with potentially interested communities and their surrounding communities, Aboriginal peoples and others potentially affected by the project or transportation of used nuclear fuel.
 - » Tailored communications and public engagement activities to support regional dialogue.
 - » Refined tools and methods for detailed geoscientific assessments in both crystalline and sedimentary rock, and environmental, social, cultural and economic assessment.
 - » As may be appropriate, selection of one or two candidate communities to progress to detailed site characterization work and establishment of centres of expertise.
-

Design and Safety Case for APM Deep Geological Repository

- » Completion of APM conceptual designs, cost estimates and safety cases for used fuel deep geological repositories for both crystalline and sedimentary rock and transportation system.
 - » Preparation of engineering design options for used fuel container and packaging plant technology, as well as underground layout of a deep geological repository.
 - » CNSC pre-project review of reference repository designs and safety cases.
 - » Continued NWMO involvement in joint research activities and repository development and demonstration programs with partners in Sweden, Finland, Switzerland and France.
-

Financial Surety

- » Completion of updated life cycle cost estimate for APM program.
- » Incorporation of new total cost estimate into APM funding formula.
- » Identification of implications for funding formula of potential new reactors or owners.
- » 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 new nuclear reactor units for APM plan.
- » Tracking of citizen priorities and societal expectations for APM.
- » 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.
- » Monitoring best practices in community well-being, including management of social, economic and cultural impacts.
- » Interweaving Aboriginal Traditional Knowledge in APM program implementation.

Accountability and Governance

- » 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.
- » Interaction with CNSC for regulatory information and pre-project reviews for APM.
- » Submission of annual and triennial reports to Minister of Natural Resources and the public.

Building the Organization

- » Further development of staffing capability, contractor capability, and business systems and processes. Intern program to engage young people.
- » Hiring of regionally based staff and local information offices as required to support communities engaged in the site selection process.

What We Heard as We Engaged Canadians

Over the last three years, the NWMO has had an ongoing conversation with Canadians; a conversation focusing on the values, principles and priorities that need to shape the processes and plans being developed. The input received has served to shape the NWMO's implementation activities on behalf of Canadians to date and will inform the organization's future phases of work.

Some highlights from these dialogues are provided below. A full review of the input received through public engagement and dialogue over the last three years is outlined in Chapter 9, *What We Heard on Implementing Adaptive Phased Management*.

As the NWMO invited input to guide development of its strategic plans, a number of themes emerged as people identified priorities and challenges for the NWMO's approach to its work. The organization was encouraged to provide for the early and sustained involvement of citizens, communities, Aboriginal peoples, and interested individuals and organizations. Many encouraged continued efforts to build a broad awareness and understanding of the NWMO and its APM plan. The NWMO heard that it must, on a daily basis, seek to earn and maintain the trust and confidence of citizens, and demonstrate accountability as it protects the public interest. A recurring theme of responsibility continues – underscoring that this generation should assume the social and ethical responsibility for putting the plan in place for used fuel that has been created. People spoke of used fuel management as an important intergenerational issue, encouraging the NWMO to consider the long-term issues. The NWMO was urged to learn from the wisdom of Elders while engaging and building the capacity of young people to carry on this important work in the future. Staying abreast of such priorities and expectations of Canadians for how the NWMO delivers on its mandate will continue to be important as the organization carries forward its strategic planning for future phases.

Much of the public dialogue in the last three years focused on the collaborative development of the APM site selection process. These multi-year discussions yielded a richness of guidance and direction that have shaped both the APM site selection process published in 2010 and the NWMO's engagement of communities now underway. Through these dialogues emerged principles and objectives to guide site selection, such as shared decision-making, inclusiveness, transparency, provision for independent review – and a preeminent focus on safety. Respect for Aboriginal rights and treaties was emphasized, and the commitment to seek an informed and willing community confirmed. The NWMO was encouraged to continue to learn from Aboriginal Traditional Knowledge along with other knowledge and science as it proceeds. Many spoke of the need for an early and prominent role for regulatory authorities and provincial governments in overseeing the siting process. The transportation of used fuel was identified as an important issue for the public, and one on which the NWMO is encouraged to direct significant attention as it engages with potentially affected communities and regions. Dialogues advanced important discussion on the range of potential effects of the APM project on a community's way of life and on its social, cultural or economic aspirations. This input helped to shape the emphasis on community well-being now embedded in the site selection process. The NWMO was encouraged to provide



assurance that the community that ultimately hosts the project will benefit from it, and to consider a regional focus for the assessment of sites and distribution of benefits. There was much discussion of the need for capacity-building resources, including credible information on risk, for communities and the region early in the process. Integrity of the site selection process requires that all those who are potentially affected must be involved in decision-making and have the resources required to enable their participation in a direct and sustained way in the APM site selection process.

There was much common ground identified over the course of these engagement activities. Important differences in view also came to light as people discussed how best to proceed. These differences must continue to be examined and discussed as new decision areas are considered, and the existing processes and plans are reviewed for their continued alignment with the values, priorities and concerns of Canadians.

Throughout the NWMO's dialogues with Canadians, support was voiced for the concept of adaptive management. Adapting plans and processes to embrace advances in knowledge and evolving policy and societal expectations is seen as a vital requirement of the APM plan. Many spoke of the importance for the site selection process to be adaptive in order to take advantage of new knowledge and expertise from around the world. The NWMO is committed to this continuous learning. While the APM site selection process is in its early days, the organization is actively learning from communities, Elders, municipal associations and governments in Canada, as well as organizations in other countries with important experience to share. The NWMO is honoured to be part of this mutual learning as Canada takes the next step in planning for safeguarding its used nuclear fuel. The commitment to move forward through collaboration, and with the humility to embrace change and adapt plans, will be at the forefront of implementing APM.





3

Guide to Triennial Report

The *Nuclear Fuel Waste Act (NFWA)* (an Act respecting the long-term management of nuclear fuel waste) was brought into force by the Government of Canada in November 2002.

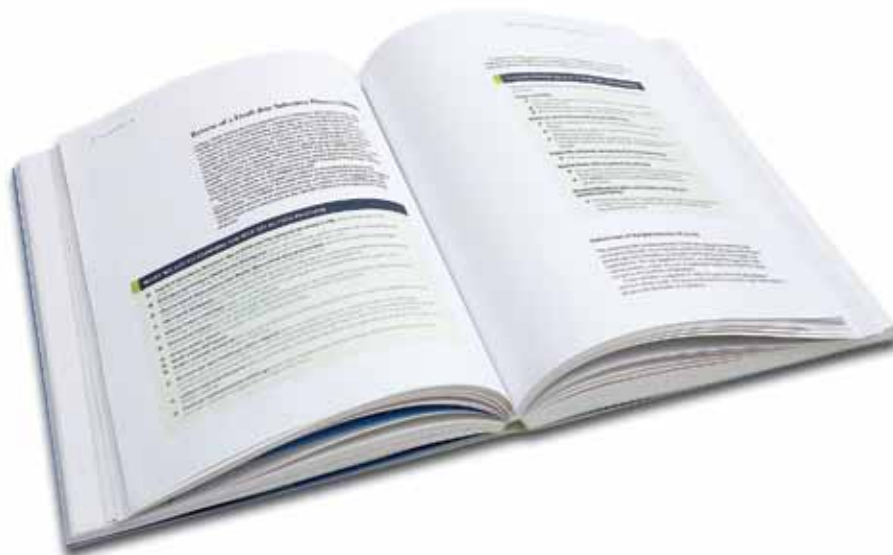
The *NFWA* sets out explicit reporting requirements of the NWMO, including required contents of annual reports, and the comprehensive requirements to be addressed in triennial reports. Both annual and triennial reports are to be submitted to the Minister of Natural Resources Canada and made public at the same time.

This report issued for the 2008–2010 reporting period is the NWMO's first Triennial Report.

Response to Statutory Reporting Requirements

As a guide for readers, a locational index is provided in the following table, which itemizes each section of the *NFWA* that invokes a requirement for the Triennial Report, and indicates where the requirement is addressed in the sections that follow.

In many instances, readers are referred to supplementary information made available in the appendices and/or in supplementary reports that are publicly available on the NWMO website at www.nwmo.ca.



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 <i>Nuclear Fuel Waste Act</i>	» Where these requirements are addressed in the NWMO Triennial Report 2008 to 2010
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;	» Activities for the reporting period are summarized in Chapter 6, <i>Our Work 2008 to 2010</i>. In that chapter, activities are reported against each of the seven strategic areas of focus for Adaptive Phased Management (APM). Activities relating to the “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” are addressed throughout Chapter 6, including activities to: • Build Long-Term Relationships to ensure potential social, economic and cultural effects are identified and are at the foundation of engagement and decision-making; • Collaboratively Design and Implement the Siting Process to ensure it includes appropriate areas and mechanisms for assessment of these effects; and • Review, Adjust and Adapt Plans to ensure evolving thinking on potential effects is monitored and plans adapted.
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);	» The strategic plan for the next five fiscal years to implement the APM approach is provided in Appendix 1, <i>APM Strategic Plan 2011 to 2015</i>. An overview of the strategic plan is provided in Chapter 7, <i>Moving Forward – The Next Five Years</i>.
c) its budget forecast for the next five fiscal years to implement the strategic plan;	» The budget forecast for 2011–2015 to implement the strategic plan for APM can be found in Chapter 8.
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	» Results of public consultations are reported in Chapter 9, <i>What We Heard on Implementing Adaptive Phased Management</i>. Supplemental information: A listing of engagement activities convened during the reporting period is provided in Appendix 3, <i>Listing of Engagement and Research Activities</i>.
e) the comments of the Advisory Council on the matters referred to in paragraphs a) to d).	» The comments of the Advisory Council are provided in an independent report in Chapter 14. These independent comments were prepared by the Advisory Council and submitted to the NWMO Board of Directors in February 2011 for inclusion in the Triennial 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:

Triennial Report Requirements of the Nuclear Fuel Waste Act

» Where these requirements are addressed in the NWMO Triennial Report 2008 to 2010

- | | |
|---|---|
| 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); | » Presented in Chapter 10, <i>Financial Reporting Requirements</i> . |
| b) the updated estimated total cost of the management of nuclear fuel waste; | » Presented in Chapter 10, <i>Financial Reporting Requirements</i> . |
| c) the budget forecast for the next fiscal year; | » Presented in Chapter 10, <i>Financial Reporting Requirements</i> , and also in Chapter 8, <i>Budget Forecast 2011 to 2015</i> . |
| 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 | » Presented in Chapter 10, <i>Financial Reporting Requirements</i> . |
| 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. | » Presented in Chapter 10, <i>Financial Reporting Requirements</i> . |

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.

- » Audited financial statements are provided in Chapter 13, *Auditor's Reports and Financial Statements*.

Additional Areas Addressed in This Report

Other Activities

The focus of this Triennial Report is on the NWMO's activities and strategic plans for the implementation of Adaptive Phased Management, Canada's used nuclear fuel program. The report also references the NWMO's work in support of other activities, in particular, its support services to Ontario Power Generation in respect of OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste.

A summary of these activities can be found in the section *Other Activities: OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste* of Chapter 6, and in Appendix 2, *Support to OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste 2011 to 2015*.

Elders Forum Report

An independent report of the Elders Forum and Niigani is presented in Chapter 15.

Established in 2005, the NWMO Elders Forum and its working group, Niigani, have been providing advice to the NWMO on a range of important topics. The Elders initiated development of a report to summarize their advice in past years. In this report, Elders review the advice provided to the NWMO by the Forum since its establishment in 2005 and describe their relationship with the NWMO.

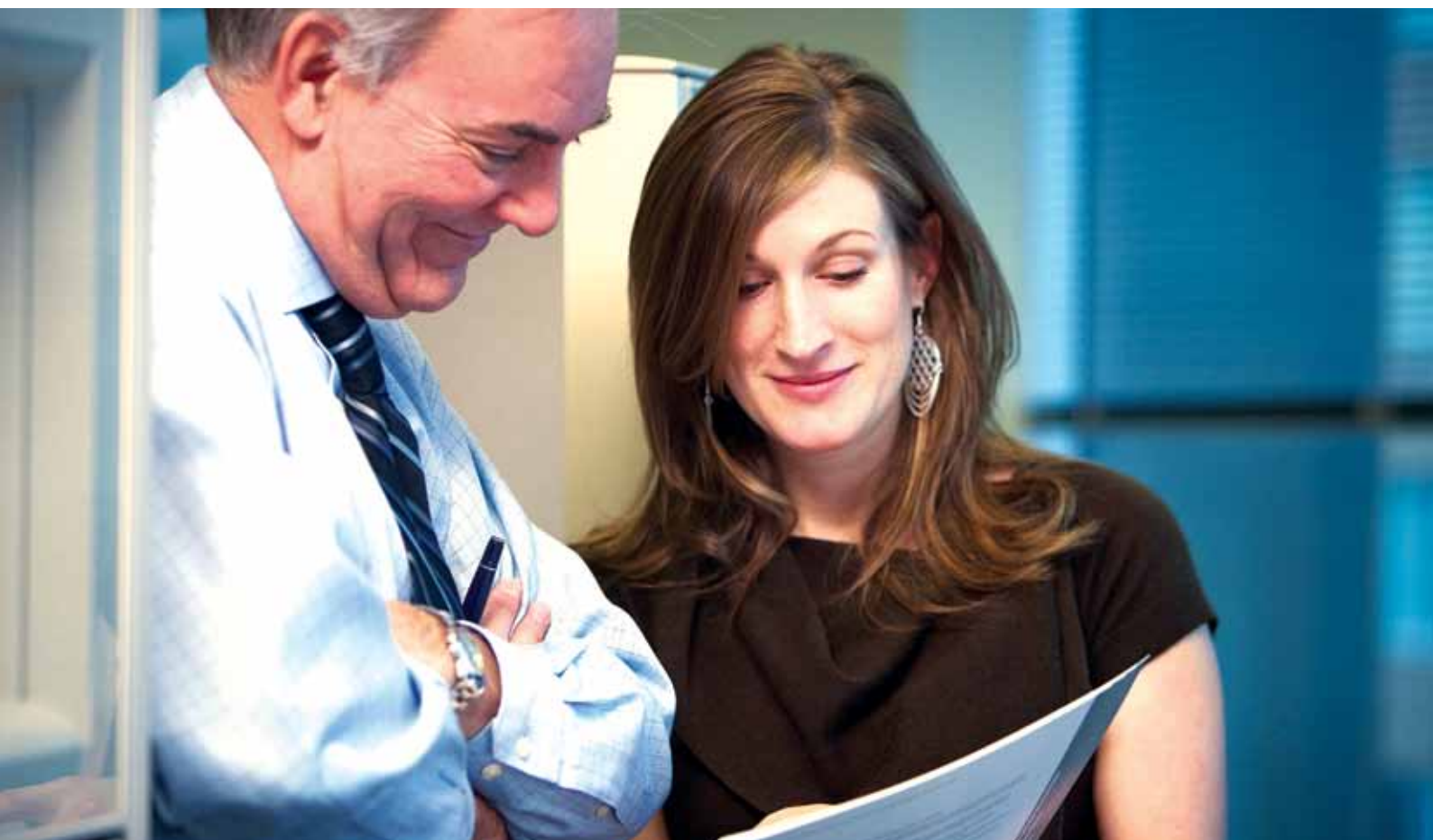
As noted in the report, "...Elders want to give the best advice they can to the NWMO so they requested a written report be completed to record the highlights of their advice...It is our view that a written text will document our legacy and will enhance and protect the credibility of the relationship between the Elders Forum and the NWMO."

The report was submitted by the Elders Forum to the NWMO Board of Directors.

The NWMO believes that these reflections of the Elders Forum are important and include them within this Triennial Report.

Talking Circle at Elders
Forum in Oromocto,
New Brunswick. »







4

Foundation for Canada's Plan

A Matter of Responsibility

For decades, Canadians have been using electricity generated by nuclear power reactors in Ontario, Quebec and New Brunswick, producing just over 2 million used fuel bundles. 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 now 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 NWMO has met with thousands of citizens from many parts of Canadian society to hear their advice and suggestions on how to proceed. We 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.

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.



You are building a social contract with generations in the future.

– Citizen Panel Dialogues and Public Discussion Group Sessions

How Did We Get Here?

The NWMO was created by Canada's nuclear energy generators (Ontario Power Generation, New Brunswick Power and Hydro-Québec) in 2002 as a requirement of the *Nuclear Fuel Waste Act (NFWA)*. The *Act* requires the NWMO to study possible approaches, recommend and then implement a plan for the long-term management of used nuclear fuel in Canada.

In 2002, the NWMO began its work to develop collaboratively with Canadians a management approach for the long-term care of Canada's used nuclear fuel. The NWMO conducted a three-year study involving thousands of citizens, specialists and Aboriginal peoples in every province and territory to develop a long-term management approach that is socially acceptable, technically sound, environmentally responsible and economically feasible.

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 waste management system, while simultaneously contributing positively to the local economy.

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 for the long term.

APM involves the containment and isolation of used nuclear fuel in a deep geological repository in a suitable rock formation. 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 the final closure, and the form and duration of postclosure monitoring.

On June 14, 2007, the Government of Canada – based on the NWMO's recommendations – selected APM 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.

What Options Were Considered?

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. Through the study, 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. 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.

Over the course of the dialogues, members of the public asked about the potential to recycle or reuse used nuclear fuel, which would involve reprocessing the material. Members of the public also asked about the

possibility of reducing the volume and toxicity of the waste to be managed, involving processes such as partitioning and transmutation. The NWMO keeps 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. As part of this watching brief, we note that there is some international interest in reprocessing and that France, the country leading related research in the world today, has also identified the need for the construction of a deep geological repository as part of its long-term management plan and is in the process of selecting a site for it.

The Emergence of Canada's Plan

APM was developed in dialogue with Canadians to reflect features considered important by citizens. It is consistent with the programs that have been developed in many other countries with nuclear power programs, such as Sweden, the United Kingdom, Finland and France. As a plan for the future, APM charts a course for the safe, secure long-term management of used nuclear fuel, in line with best international practice and the expectations of Canadians.

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. Deep geological repositories have been constructed and are operating around the world for various types of radioactive wastes. A deep repository for used nuclear fuel is under construction in Finland, and similar repositories are planned for used fuel and high-level waste management in Sweden, the United Kingdom and France.

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.

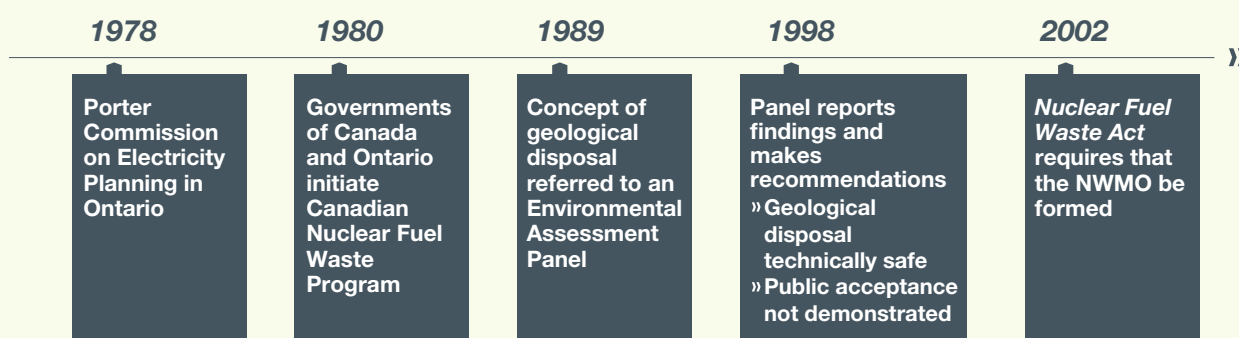
Choosing a Way Forward — The Future Management of Canada's Used Nuclear Fuel (Final Study)

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. Deep geological disposal has been the subject of intensive study in Canada for many decades, and is in an advanced state of scientific and technical understanding internationally.

In 1978, the governments of Canada and Ontario established the Canadian Nuclear Fuel Waste Management Program to study and advance the technology for storage, transportation and permanent disposal of Canada's nuclear fuel waste. Since that time, the research and development program has been primarily directed at developing the technology for deep geological disposal in the crystalline rock of the Canadian Shield. Although crystalline rock was the primary focus of the disposal research and development program in Canada, the 1977 study by Kenneth Hare recognized, based on studies and experience in other countries, that there are other potentially suitable rock types, including sedimentary rock and salt.

» History: Canada's Nuclear Fuel Waste Management Program



An intensive and lengthy period of deliberation was undertaken by the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel, chaired by Blair Seaborn, beginning in 1989. The Panel's specific mandate was to conduct an environmental assessment of an Atomic Energy of Canada Limited (AECL) proposal for deep geological disposal. In 1998, the Panel provided insight and direction on key issues that had 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, safety of the AECL concept has been on balance adequately demonstrated for a conceptual stage of development, but from a social perspective, it has not; and
- » As it stands, the AECL concept for deep geological disposal has not been demonstrated to have broad public support. The concept in its current form does not have the required level of acceptability to be adopted as Canada's

approach for managing nuclear fuel wastes. On the matter of criteria for safety and acceptability, they concluded that:

- » 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 brought into force the *NFWA* (an Act respecting the long-term management of nuclear fuel waste).

Since 1978, Canada has invested more than \$1 billion in used fuel technology development. OPG, on behalf of the nuclear fuel waste owners, has been ensuring that Canada has the capability to implement a deep geological repository program. OPG has been managing the technology development program since 1996, addressing the technical issues raised during the federal review of AECL's 1994 disposal concept. These issues were reported on by the Seaborn Panel in 1998 and were derived primarily from the findings of their Scientific Review Group (1995) and others during the federal review. Progress has been documented in a series of annual reports. Key technical and design changes to the Canadian concept include a more robust long-lived used fuel container capable of withstanding the effects of glaciation, and design improvements for monitoring and retrieval of used fuel in a deep geological repository.

Blair Seaborn chaired the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel review of the AECL's deep geological disposal concept.



ADVANCING OUR UNDERSTANDING OF DEEP GEOLOGICAL REPOSITORIES – RESEARCH AND DEVELOPMENT

Since 1978, Canada has invested more than \$1 billion in used fuel technology research and development. A number of technical issues were raised during the Seaborn Panel review process (1998). These have been the subject of a robust 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:

- » 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.

Formal agreements between the NWMO and radioactive waste management organizations in Sweden (SKB), Finland (Posiva) and Switzerland (Nagra) have made this research an area for international cooperation and information sharing.





5

Adaptive Phased Management

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 APM 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.

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
- » Optional temporary shallow storage at the central site, if needed
- » 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

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 on next page). This project requires a dedicated surface area of about 100 hectares (250 acres) for surface buildings and associated facilities. Underground, the repository requires a subsurface area in suitable host rock of about 2.5 kilometres by 1.5 kilometres (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 bentonite clay, a proven effective sealing material.

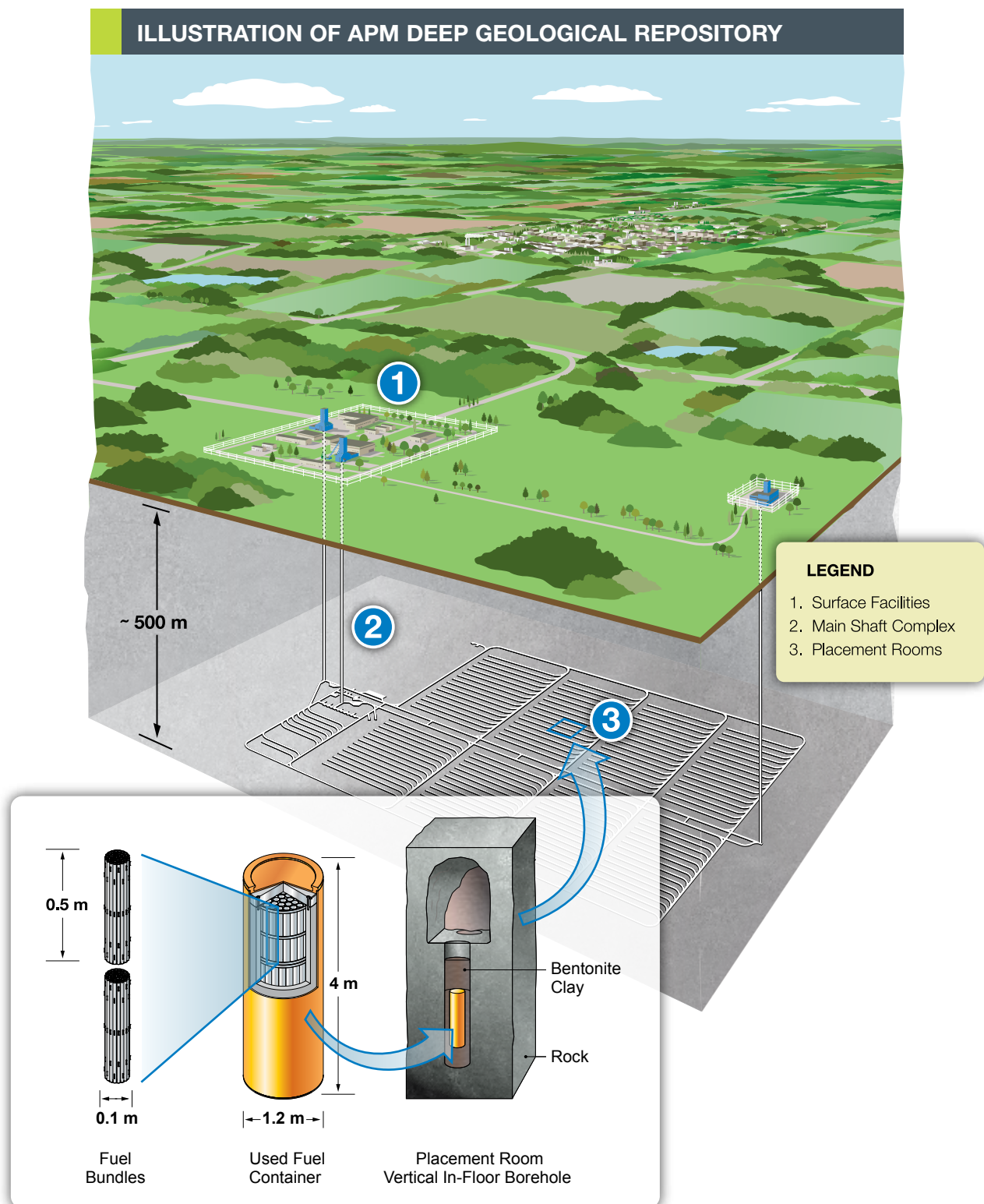
Monitoring and Retrievalability

The used fuel will be monitored and retrievable throughout all phases of implementation. Once the host community and the NWMO decide to close the site, the access tunnels will be backfilled and sealed and the NWMO 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 to the repository can begin. Transportation of the material will have to meet the stringent requirements of Transport Canada and the CNSC prior to an operating licence being issued and will be subject to ongoing compliance monitoring.



The deep geological repository is a multi-barrier system that will be constructed at a depth of approximately 500 metres. Used nuclear fuel bundles will be packaged in corrosion-resistant containers and placed in boreholes drilled into the rock where they will be sealed by a layer of bentonite clay.

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 and the surrounding region, with their preferences in mind. 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. As has been the case for deep geological repositories for nuclear waste constructed in other countries, 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 region 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 between the community and the NWMO to ensure that the project fosters well-being and sustainability of the community, consistent with its vision for the future. The pace and manner of project development will be determined in partnership with the community.

The planning, development and implementation of the 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* 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.

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 repository under Adaptive Phased Management (APM) 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) is Canada's regulatory authority, and regulates the use of nuclear energy and materials to protect the health and safety of people and the environment and to respect 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 APM repository will be subject to the CNSC's comprehensive licensing system, 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 an environmental assessment has been completed under the *Canadian Environmental Assessment Act*.

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

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 the provincial domain. Some aspects of siting or construction of the project 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.

Phased Implementation

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. 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. For example, the plan includes an optional step of shallow storage at the repository site as a contingency. This may be helpful should there be a need to move the used fuel from one or several of the current interim storage facilities before the deep repository is ready. The optional shallow facility, which would be located at the central site to minimize additional transportation of the used fuel, might then be used to safely and securely store this fuel in the interim period. The plan also 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 the final closure, and the form and duration of postclosure monitoring.

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.

PHASES OF IMPLEMENTATION

1

Site Evaluation (10 years or more)

- » 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.

2

Regulatory Approvals (5 years or more)

- » 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.

3

Construction (10 years or more)

- » 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.

4***Operation
(30 years or more)***

- » 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.

5***Monitoring
(extended
period of time)***

- » 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.

6***Decommissioning
and Postclosure
Monitoring***

- » The NWMO will work with the community, and potentially others, to decommission the facilities. Future society will determine the manner and timing of the final closure of the repository, and the form and duration of monitoring. 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 collaboratively with the community, regulators and other interested individuals.





6

Our Work 2008 to 2010

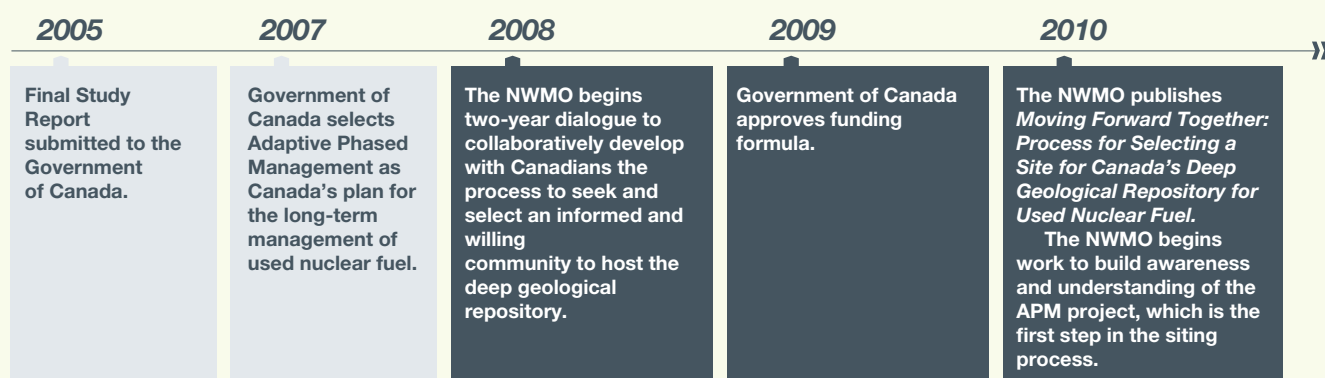
Implementing APM



The Strategic Focus for 2008–2010

In the three years since the Government of Canada's selection of Adaptive Phased Management (APM) as Canada's plan for the long-term management of its used nuclear fuel, the NWMO has focused on building the organization and planning the first steps in implementing APM.

» APM Milestones 2005 to 2010



Implementation of APM has been guided by seven strategic objectives. First developed in 2007, the seven Strategic Objectives were proposed to guide the first five years. The Objectives identify key program areas in the implementation of APM, specifically engagement, siting, technical research and development, social research, finance, governance and organizational issues. These Strategic Objectives flow from the NWMO's Vision, Mission and Values, and the principles and intentions that Canadians said were important for APM.

The Objectives were the subject of public review and discussion in 2007 and 2008. Subsequent evolution of the Strategic Objectives reflects advancement of APM implementation, as planning milestones have been met and major areas of focus for the used nuclear fuel program have evolved. The Strategic Objectives continue to provide the framework for the presentation of our annually updated five-year strategic plan and associated work programs, and annual reporting on our activities.

STRATEGIC OBJECTIVES 2010

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, 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.



Build Long-Term Relationships

NWMO 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.

Adaptive Phased Management (APM) will be designed and operated over many decades and will involve generations to come. In outlining the requirements for moving forward with this important national project, Canadians said that all stages of planning, construction and operation must proceed in a phased and iterative way with ongoing engagement.

The success of APM will require that the NWMO build and sustain relationships that will support and direct implementation well into the future. Relationships embarked upon today will set in motion a process of outreach, societal learning, capacity building and knowledge transfer designed to build and sustain the ongoing involvement of Canadians.

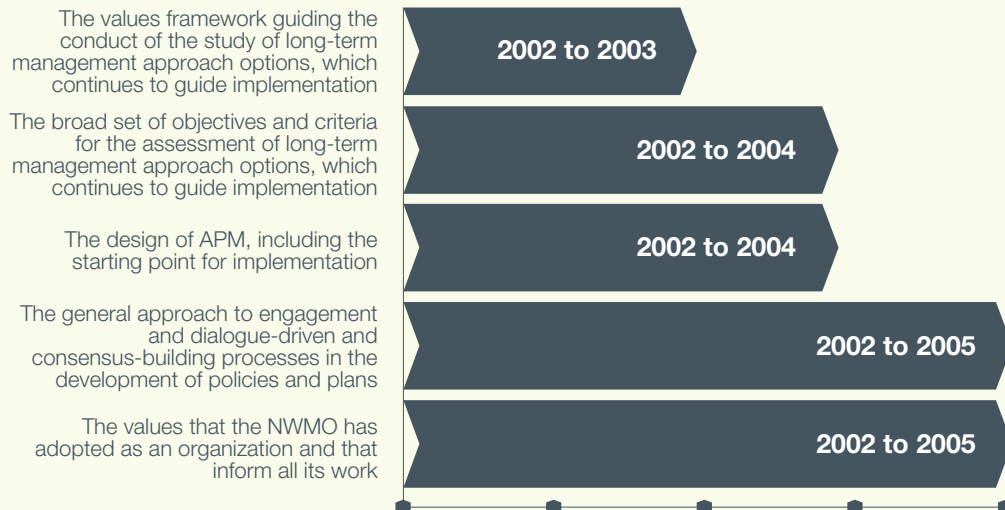
A Continuing Dialogue with Canadians

The NWMO understands that relationship building will require a sustained dialogue; values, principles, and safety, and the broad range of questions that will need to be addressed at each point in implementation must be a focus of this dialogue as identified by participants in the process.

During the study phase of work from 2002 to 2005, the NWMO engaged Canadians to invite their guidance on key decisions and activities of the NWMO, and to influence the substance, approach and operation of the NWMO's work going forward. Important objectives and principles emerged from engagement in the study period, since carried forward as the NWMO has taken early steps in implementing APM.

Engagement over the last three years has sought to continue this dialogue with Canadians and has proceeded in phases.

» Building the Foundation: Focus of Relationship Building and Collaborative Development – 2002 to 2005



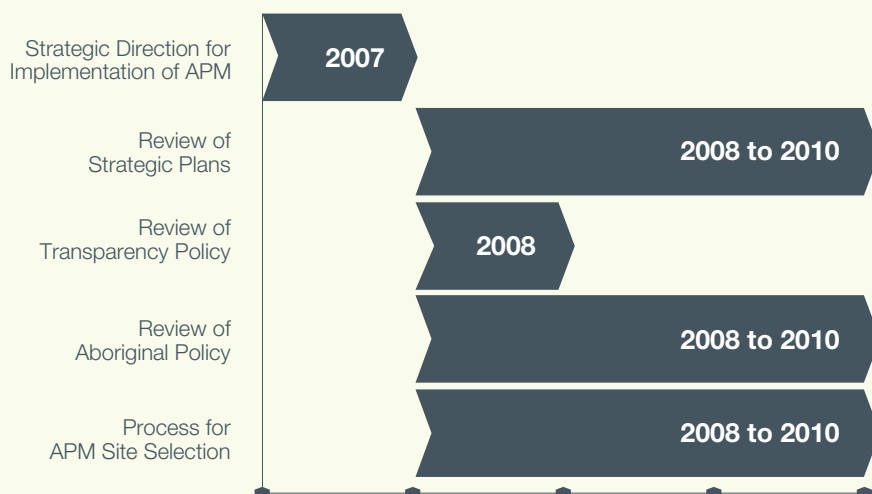
Following the Government's selection of APM in June 2007, the NWMO began to lay the groundwork for the collaborative development of plans. We met with many individuals and organizations, to describe APM and NWMO's mandate to implement Canada's plan, and to introduce our growing organization. We sought a diversity of views for advice and direction on the design of our processes and the issues to be explored in the early stages of implementation. We sought guidance on the identification of principles to guide siting, and then sought advice and input on the design of the site selection process.

Our progress through the early phases of engagement was continually reviewed and adjusted to align with the direction received through this engagement and dialogue. The phased approach allowed the NWMO to explore the priorities and concerns of Canadians, to develop processes and plans in response, and to test the appropriateness of these processes and plans and need for course correction before advancing to the next stage of work.

Each phase employed a number of engagement approaches, many of which were designed and conducted by third-party contractors. All phases were supported by discussion documents intended to draw out the key points for discussion and dialogue. The documents were also posted on the NWMO website and accompanied by an invitation to all interested Canadians to provide input and comment.

The NWMO has sought to engage people in an open, transparent and inclusive manner, taking the time that is necessary to confirm each step before proceeding.

» Focus of Relationship Building and Collaborative Development – 2007 to 2010



Understanding Diverse Perspectives

Canadians have been clear in saying that a strong process fosters learning and conversation among people with a diversity of perspectives, as part of a collaborative process. The perspectives that need to be included will evolve over time. All views are important to directing the implementation of APM in a way that continues to meet the needs and expectations of Canadians.

Over the course of these dialogues, we have sought to identify areas of agreement among Canadians – that common ground that might serve as the foundation upon which to develop policies and plans required for the implementation of Canada's plan. There are also questions still under debate among Canadians. These have been carried forward for future discussion and to help shape understanding of future work. This is discussed more fully in Chapter 9, *What We Heard on Implementing Adaptive Phased Management*. Differences of view arise and must be respected. We understand that conflict is an opportunity for further dialogue, new thinking and ideas, and its constructive use is a challenge that the NWMO must meet.

With the guidance and goodwill of the 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 for the long-term management of used nuclear fuel. Such a dialogue is the foundation for a resilient process, capable of addressing the challenges that will inevitably emerge over the course of implementation of APM.

Focusing Dialogue

The NWMO understands that relationships need to be built and sustained on a variety of levels.

During the study phase of work through to 2005, the NWMO engaged nationwide in order to help ensure that the assessment of possible approaches for the long-term management of used nuclear fuel reflected, as much as possible, the values, objectives, preferences and concerns of Canadians across the country. It is through this dialogue and study at the national level, that APM emerged as Canada's plan.

Among the important requirements of APM, emerging from the national study, is siting of the deep geological repository and associated facilities in an informed and willing community. In addition, Canadians involved in the national study felt fairness is best achieved by focusing the search for a site in provinces directly involved in the nuclear fuel cycle.

Based on this direction, the NWMO-led dialogues and engagement in recent years have paid special attention to provinces involved in the nuclear fuel cycle through nuclear power production, the mining of uranium or fabrication of nuclear fuel (Ontario, New Brunswick, Quebec, Saskatchewan). Increasingly, the organization's engagement has concentrated on the provinces that are likely to be directly affected by the implementation of APM through involvement in the site selection process, or by the transportation of used nuclear fuel as it is relocated from the interim storage facilities to the used fuel repository in the future.

With the recent launch of the site selection process, additional focus is drawn to the communities that choose to enter the site selection process to explore their interest in the project, and the surrounding communities, region and Aboriginal peoples that would be affected were the community selected to host the facility.

Throughout, the NWMO has maintained a certain level of general public outreach to make information readily accessible on this important national initiative. Through the NWMO website, web-based surveys and dialogues, public attitude research, earned media and regular mailings, the organization seeks to report regularly and invite all interested individuals and organizations to follow and contribute to the NWMO's plans.

Strategic Plans (2007 and Ongoing)

In its first phase of engagement following the Government's 2007 decision, the NWMO sought to reconnect with interested Canadians to explore their expectations of the NWMO, as it made the transition from a study organization to an implementing organization, and how they would like to be engaged in work going forward. Key activities included individual briefings, group presentations, meetings with a series of Citizen Panels, and outreach through the NWMO website. The NWMO invited individuals and organizations to meet informally to be updated on our work and near-term activities.

Beginning in 2007, we reconnected with many individuals and organizations that had expressed interest during the study phase of work. We also began the process of building relationships with those who may be interested and potentially affected by our work. The NWMO reached out to citizens, Aboriginal peoples, community and municipal organizations, non-governmental organizations, youth, provincial and national agencies and governments, in the nuclear

fuel cycle provinces and beyond.

In early discussions, the NWMO invited comment on a set of draft strategic objectives for implementing APM and on directions for our first five-year strategic plan. A short concept paper, *Preparing for Implementation*, and a new corporate brochure, *Moving Forward Together*, provided a starting point. The concept paper set out our strategic objectives with questions to start the dialogue. The brochure told the story of the NWMO, and how APM emerged from three years of study and public engagement. This material was posted on the NWMO website and sent to more than 1,000 individuals and organizations who subscribed through the website, phoned or wrote to express an interest in the long-term management of used nuclear fuel, with an invitation to review, comment and be involved.

The NWMO developed and published the first of its five-year strategic plans in 2008, using the input received. The document titled *Implementing Adaptive Phased Management 2008 to 2012* was first released in draft for further public comment about our objectives and plans. It was posted on the website, and 1,500 copies were mailed to NWMO mailing list subscribers, including private individuals, organizations and governments. After a period of public review that included Citizen Panels, e-dialogues, web-based review and surveys, meetings and briefing sessions, the Plan was revised based on comments received.

Over the period, the NWMO has continued to develop its five-year strategic plans with the guidance of interested Canadians and Aboriginal peoples. We have published four implementation plans covering the periods 2008 to 2012, 2009 to 2013, 2010 to 2014, and 2011 to 2015.

Siting Principles (2008)

In 2008, the NWMO initiated a dialogue with interested organizations and individuals on important principles and components for a process to identify an informed and willing community to host the facilities required for the implementation of APM. This represented the second phase of our engagement program following the Government's decision and the first step in the collaborative design of a process to select a site.

To facilitate conversations with Canadians on the design of a process for selecting a site, we published *Moving Forward Together: Designing the Process for Selecting a Site* (August 2008). This dialogue used a variety of engagement approaches to ensure that a broad diversity of perspectives was heard.

Citizen Panel discussions were convened in the nuclear fuel cycle provinces to gather input and explore the reaction to what an appropriate siting process might look like and how to communicate the project. The NWMO also contracted Royal Roads University to lead a series of online, real-time (synchronous) e-dialogues designed to increase Canadian literacy around this critical issue and to engage as many Canadians as possible. A nationwide telephone survey of 2,600 randomly selected Canadians was also conducted.

A broad cross-section of national and regional opinion leaders participated in multi-party dialogues, representing municipal and community associations, the nuclear industry, labour, academia, Aboriginal organizations and Elders, researchers, environmental and non-governmental organizations, public health workers, the faith community, and persons with practical experience in siting major projects. These full-day sessions were designed and facilitated by a third-party contractor and drew participants from the organizations and individuals with whom we had established relationships during 2007. In total, more

than 100 opinion leaders participated in sessions convened in nuclear fuel cycle provinces.

All materials were posted on the NWMO website with an invitation to contribute to the dialogue by making a submission or completing an online survey.

Collaboratively Designing a Site Selection Process (2009)

Engagement in 2009 continued to focus on the collaborative development of the APM site selection process. The NWMO published a draft site selection process in May 2009, a *Proposed Process for Selecting a Site*. The document outlined principles to help inform and guide the process for selecting a site. It also outlined a nine-step process for assessing the suitability of any site that is proposed and selecting an informed and willing host community. The document also briefly described what a host community should expect if it chooses to host the project. This proposal was developed using the direction received from the 2008 dialogue on guiding principles and key components that need to be included in order to ensure the site selection process is an appropriate one for Canada. Canadians were invited to consider the proposed process and share their thoughts on what changes, if any, needed to be made.

The proposed site selection process was widely distributed to over 3,000 people on the NWMO mailing list and formed the basis for our engagement throughout 2009. All interested Canadians were invited to learn more about the NWMO and the APM approach, and to help confirm the design of the site selection process, including framework and approach for assessing social, economical and cultural effects.

A series of advertised Public Information Sessions was held in 17 regional centres in the provinces involved in the nuclear fuel cycle. NWMO staff were present to answer questions, receive comments and discuss concerns with more than 700 visitors who attended the sessions. Participants represented many interests, including multiple levels of government, First Nations and Métis, environmental and conservation groups, educational organizations, business and industry, unions, social organizations, media and members of the public.

In addition to the discussion document, a broad range of information materials was prepared to support dialogue. These included a brochure on the proposed process, a video providing background and highlighting some key issues to be addressed, a travelling poster display, a workbook outlining key components of the proposed process and inviting comment, a series of backgrounders and fact sheets on commonly asked questions and topics, and a set of NWMO presentations designed to invite input to the process. The information video was produced in eight Aboriginal languages. All material was also posted on the NWMO website with an invitation to contribute to the dialogue by making a submission, completing an online workbook or survey, or participating in an online forum.

The NWMO hosted two day-long dialogues with members of its Citizen Panels, as well as five Public Discussion Groups of randomly recruited community-based citizen opinion leaders. The dialogues with members of its Citizen Panels were facilitated by a third-party contractor, as were the five Public Discussion Groups held in a variety of regional centres.

The NWMO invited Aboriginal organizations in the nuclear fuel cycle provinces to collaboratively design, develop and coordinate a series of regional information and dialogue sessions on the proposed site selection process. The

sessions, which brought together First Nations and Métis peoples in regional areas identified by Aboriginal organizations, reflected a broad range of perspectives, including leadership, Elders, women, youth and community members. The NWMO provided financial resources and communication materials about APM and the proposed siting process to support the dialogues. The Assembly of First Nations provided additional information materials developed with the interests of First Nations people in mind. The dialogue format varied in each province. At the invitation of these organizations, NWMO staff participated in the sessions along with one or more members of Niigani and the Elders Forum. In addition, a number of Aboriginal groups conducted meetings and information sessions directly with Aboriginal communities in order to provide a wide range of opportunities for participation and learning. In total, more than 800 people participated.

National and regional opinion leaders who had provided direction on siting principles in 2008, as well as others, were reconvened for day-and-a-half long discussion sessions on important principles and components to be included in the design of the site selection process. The meetings provided the opportunity to test whether the NWMO had listened well to their direction and incorporated it appropriately in the design of the process, and explore whether further refinements were needed.

Further supporting the design of the process to select a site were e-dialogues, a national telephone survey of 2,600 Canadians and an invitation for submissions to the NWMO website.

In total, over the two-year period, more than 7,000 people engaged in the design of the site selection process.

Building Capacity

Throughout its work, the NWMO has sought mechanisms to help ensure that 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. The challenge of how best to focus these efforts, prior to the identification of an informed and willing host community with a suitable site, has been addressed over the past three years with activities such as those profiled next.

The NWMO has developed a range of communication materials. »



Municipal Perspective

APM will be implemented in an informed and willing host community. Understanding local perspectives is critical as we design and refine plans and processes. Early activities in this area have focused on seeking advice through ongoing meetings with communities hosting nuclear waste facilities, as well as municipal associations in the nuclear fuel cycle provinces.

The Canadian Association of Nuclear Host Communities (CANHC) and Durham Nuclear Health Committee (DNHC) have provided the NWMO with important insight at each stage of the process, and we have applied their advice in working to broaden our municipal outreach in the nuclear provinces and nationally.

Over the past three years, the NWMO has engaged national and provincial municipal associations, including the Federation of Canadian Municipalities (FCM); the Saskatchewan Association of Rural Municipalities (SARM); the Saskatchewan Urban Municipalities Association (SUMA); the Association of Municipalities of Ontario (AMO) and its affiliates: the Federation of Northern Ontario Municipalities (FONOM), the Northwestern Ontario Municipal Association (NOMA), Ontario Small Urban Municipalities (OSUM) and Rural Ontario Municipal Association (ROMA); the Cities of New Brunswick Association (CNBA); and the Union of Municipalities of New Brunswick (UMNB).

We have participated in the annual conferences and trade shows of municipal associations in each of the four nuclear provinces. We accepted invitations from FONOM to participate in a Northern Leaders Summit held in Timmins, Ontario, and from many associations (AMO, SARM, FONOM, NOMA, UMNB, etc.) to attend their annual conferences and exhibitions. Hundreds of elected representatives and municipal officials at these events expressed interest in being kept apprised of NWMO activities. The interest expressed by these associations has encouraged the NWMO to continue expanding its outreach efforts to other similar organizations.

In addition to building relationships, we are learning about municipal structures and different and unique provincial processes for policy making, administration, planning, management of Crown land and political oversight. Our discussions with municipal associations have identified many areas of mutual research interests.

A meeting in late 2008 with the FCM and members of municipal associations from Saskatchewan, Ontario, Quebec and New Brunswick led to the formation of the NWMO's Municipal Forum. The 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. By the end of 2010, the Forum had met seven times. Members have helped the NWMO better understand municipal processes and the needs of municipalities with respect to information and communication material that may assist local governments considering locating a large, national infrastructure project in their communities.

As interested communities come forward to learn more about APM, the NWMO has begun to engage community leaders directly, including representatives of municipal councils, and members of local economic development offices, chambers of commerce, business leaders and other interested local citizens. In order to support the involvement of communities, the NWMO created a 'Learn More' program to begin to make available information and funding to assist communities, organizations and individuals to learn more

about Canada's plan, APM, and to begin to think through their interest in the project.

Ongoing Briefing of Federal and Provincial Governments

The NWMO keeps government officials and elected representatives fully aware of its work and plans through regular meetings. Over the period, many cabinet ministers and members of provincial legislatures in nuclear provinces have welcomed briefings. APM touches on the mandates of many government departments, and our practice has been to identify a lead ministry in each province as our primary point of contact. We have encouraged the coordination of engagement across relevant ministries and across various levels of management in the public service.

An important aspect of keeping government informed is meeting with departmental staff. The NWMO has scheduled information sessions attended by officials from a number of provincial and federal ministries and departments with an interest in long-term nuclear waste management. In Ontario, a forum has been established to facilitate the exchange of information across key ministries on an ongoing basis.

Natural Resources Canada has the lead oversight role of the NWMO. The department meets regularly with the NWMO for reports on progress and the NWMO's compliance with the *Nuclear Fuel Waste Act (NFWA)*. In 2009, Natural Resources Canada and the NWMO signed a memorandum of understanding clarifying respective roles and responsibilities of the Crown and the NWMO regarding Aboriginal peoples in the context of the *NFWA* and the APM plan.

APM will be subject to a thorough and comprehensive regulatory review

The Memorandum of Understanding is posted on the NWMO website.



DUTY TO CONSULT – MEMORANDUM OF UNDERSTANDING BETWEEN THE NWMO AND NATURAL RESOURCES CANADA

The roles of the federal Crown and the NWMO with respect to consultations with Aboriginal peoples were clarified in a Memorandum of Understanding signed in 2009. The Memorandum of Understanding is posted on the NWMO website.

Among other things, the agreement commits the NWMO to continue working with Aboriginal peoples and to keep the Crown informed of its engagement activities and plans. For its part, the Crown will monitor the NWMO's engagement activities in relation to Aboriginal peoples and assess the need for any additional consultations that may be necessary to meet the Crown's duty to consult. The Government has a legal duty to consult with Aboriginal peoples and accommodate, if required, when an Aboriginal treaty or right may be adversely affected by conduct contemplated by the Government. In the NWMO's case, the Crown's duty is triggered by the need for regulatory approvals for a deep geological repository at an identified site.

process covering the entire life cycle of the repository and associated facilities. The regulatory review process will be initiated once a comprehensive assessment of the suitability of the site has been completed and an agreement has been developed between a community and the NWMO to host a site. From the inception of the siting process, regulatory requirements for this project inform the site assessment activities and approach to engagement of citizens.

Over the eight-year period (or more) of site assessments, learning may increase, and expectations and best practices may evolve. For this reason, the NWMO will seek regulatory guidance throughout the siting process to ensure that its work remains consistent with regulatory expectations. With this in mind, over the past three years, the NWMO has met with staff from the Canadian Nuclear Safety Commission (CNSC) periodically to provide updates on the APM technical program. Topics include developments in used fuel repository designs, safety assessment methodology, and improving our understanding of geosphere stability. Other topics discussed include the scope and schedule of a CNSC pre-project review of APM conceptual designs and illustrative postclosure safety assessments for crystalline and sedimentary rock. This review is to be conducted by the CNSC in accordance with a special project arrangement, signed in March 2009, under which the CNSC will provide regulatory information and review during early implementation of APM, before a licence application is submitted by the NWMO.

The NWMO was pleased to have opportunities to report out on its progress to federal standing committees. In November 2009, NWMO President Ken Nash made a presentation on APM implementation before the House of Commons Standing Committee on Natural Resources. In 2010, he presented the NWMO's proposed project to the Standing Senate Committee on Energy, the Environment and Natural Resources.

Citizens

The NWMO encourages any community, interested individual or group to become involved in shaping the implementation of APM by learning more and sharing their thoughts. Over the past three years, we have sought to engage individuals and organizations using a number of approaches.

Those who have engaged with the NWMO have been clear that it is not enough simply to involve those already interested in the work of the NWMO; the NWMO has a responsibility to build awareness of its work and involve citizens more generally.

For instance, a variety of citizen organizations representing a cross-section of perspectives have participated in multi-party dialogues or workshops convened in 2008 and 2009. These dialogues were designed to provide the opportunity for in-depth discussion and collaborative development among representatives from organizations who closely follow the NWMO's work.

Advertised regional information sessions conducted in 2009 provided an opportunity for those interested to learn more about NWMO activities and to engage in one-on-one discussion with NWMO staff in attendance at the sessions. Open invitations were also extended to participate in deliberative e-dialogues conducted in

2008 and 2009 to assist in the development of the site selection process. Open invitations were also extended to shape the process through sending a letter, or making a submission or completing a survey on the NWMO website. These web-based approaches were designed to encourage the learning and involvement of interested individuals and organizations to help shape the NWMO's work, irrespective of where these individuals or organizations are geographically located.

Random sampling techniques have been used to involve a cross-section of citizens in helping to shape the NWMO's work going forward. These techniques included two nationwide telephone surveys of 2,600 Canadians each, the establishment of eight citizen panels that met over the course of more than a year, and a series of one-time discussion groups on a variety of topics. Random selection of participants in these activities helps ensure that we hear not only from individuals and organizations who follow the NWMO's work, but also from people who have yet to become involved. These approaches help ensure that a broad cross-section of perspectives shapes the NWMO's work.

Citizen panels were established as a means of eliciting the perspectives of a cross-section of citizens that may not be reflected by opinion leaders or others already involved in the NWMO's work. Eight panels were established in regional centres located in the nuclear fuel cycle provinces. These panels met over 18 months, which gave the panel members time to learn more about the issue and reflect upon it in the comments, advice and guidance they shared with the NWMO.

Participants were selected through random-digit dialing among a general population sample in the area where the session was held. All individuals called underwent a standard research screening survey in which they indicated whether they were interested and able to participate in a discussion about a general public policy issue with no advance notice of the specific topic. They were screened to include community-engaged opinion leaders in the following areas: community, environment, and public/social issues. The panels reviewed NWMO materials and provided advice on a variety of topics.

Reports of these sessions and other research reports are available on the NWMO website.



Youth

The NWMO seeks to include youth in its engagement activities. In 2008, the organization convened a Youth Roundtable. Sixteen people from the four nuclear provinces, ranging in age from 18 to 25 years, were identified and invited to participate by an independent firm contracted for this purpose. The roundtable included participants of varying demographic backgrounds and diverse educational and work experiences, young men and women from urban and rural communities, including four Aboriginal youth. Members were at different life stages, ranging from high school and university students to employed workers and people raising young families. They had an array of experiences from scientific and technical backgrounds to interests in ethics, public policy, social sciences and community involvement.

The NWMO sought recommendations from youth participants in three areas:

- » Raising awareness of the issue of used nuclear fuel and the mandate of the NWMO with youth audiences;
- » Building interest and understanding among youth about APM; and
- » Facilitating participation of youth in the dialogues and decision-making processes associated with the implementation of APM.

Youth Roundtable members met several times in 2009, both in person and online, to discuss these issues. Representatives presented their recommendations and comments to the NWMO and its Advisory Council in May 2009. Since then, the NWMO has implemented many of the recommendations in a phased manner, in alignment with organizational priorities and the site selection process.

In September 2010, the NWMO invited the Youth Roundtable members to a final two-day meeting to discuss specific actions the NWMO had taken in the intervening 15 months and seek their feedback regarding the NWMO's efforts.

In a parallel process, youth members of the Aboriginal Elders Forum have focused on developing opportunities for the increased involvement of Aboriginal young people in the NWMO's work.

Corporate Social Responsibility Program

In November 2008, the NWMO initiated a corporate social responsibility program for APM.

The program is focused on two areas:

- » contributing to national organizations that reflect the NWMO's interest in increasing youth pursuits in science and technology; and
- » funding requests for community-based projects that are focused on initiatives that help build capacity for more active, engaged and informed youth in our communities.

Between 2008 and 2010, the NWMO sponsored national organizations that support science and technology learning among young Canadians:

- » Funding for Youth Science Canada has enabled students with top science projects from Saskatchewan, Ontario, Quebec and New Brunswick to participate in an international science expo that brings together young



Team Canada – Best Delegation at MILSET (2009). »»

people from around the world to exchange ideas, compare projects and instill a culture of science by fostering networking and international collaboration. The NWMO's contribution has doubled the number of youth participants, and enabled New Brunswick and Saskatchewan participation for the first time. In 2009, Team Canada won Best Delegation Award for the first time at the international expo.

- » The NWMO provides bursaries to high-achieving science and technology students from Saskatchewan, Ontario, Quebec and New Brunswick to participate in Shad Valley's renowned summer educational program.
- » Contributions to Actua's National Aboriginal Outreach Program provided aboriginal youth in Saskatchewan, Ontario, Quebec and New Brunswick the opportunity to participate in science-focused workshops and summer camps that take place in Aboriginal communities. Where possible, the camps also showed how Traditional Knowledge can play a role in the study of science.

Since 2009, the NWMO has provided funds for 15 community-based projects, through the Community Foundations of Canada, aimed at fostering opportunities for young people to participate in civic life and support them in making a positive difference by becoming involved in activities or issues that make meaningful contributions to their communities. Grants are focused on:

- » Youth and Education: Programs that encourage learning and achievement, and help develop future generations.
- » Youth and the Environment: Programs that support local initiatives to promote understanding of, and/or address, our environmental impacts.
- » Youth and Science & Technology: Programs that promote an understanding of, and appreciation for, science and technology.

General Outreach

Over the past three years, the NWMO has participated in a variety of conferences, networks and roundtables sponsored by others, many at which the NWMO hosted an information booth. Activities ranged from participating in the Fundy Bay Fishermen's Day event in Dipper Harbour, New Brunswick, to the Globe environment conference in Vancouver, British Columbia.

We have briefed a number of academics and convened several small group conversations with practitioners on topics related to siting process design. There is significant international and academic interest in NWMO processes and achievements. Each year, we respond to invitations and requests from groups and organizations to provide information on past work and updates on current activities. We accepted invitations to present at several institutions, including the University of Calgary, the University of Western Ontario, Queen's University, Carleton University, Lakehead University and the University of Ontario Institute of Technology. Almost 200 students attended these sessions. The NWMO also presented its approach to long-term radioactive waste management at the Canmore Museum and Geoscience Centre in Alberta.

Over the period, the NWMO has hosted and exchanged information with delegations from many countries. Among those who visited were representatives of the Australian Nuclear Science and Technology Organisation, the China-Canada Legislative Cooperation Project, the Swedish Young Generation Group and a Lithuanian Political Delegation.

The news media provides another way of increasing awareness of the NWMO's activities and generating interest in them. In addition to responding to reporters' inquiries, the NWMO sought to build media awareness following the Government's 2007 decision to select APM. We provided a technical briefing on APM for the Parliamentary Press Gallery. With the release of the siting process and the hosting of public information sessions, media interest has increased. We regularly meet with editorial boards, columnists and reporters representing community and regional media in the nuclear fuel cycle provinces. We also submit Op-Eds to specialty publications, which reach those who might have an interest in our work. Our efforts in this area continue.

The NWMO website has developed to be a repository of information and communication materials. It is an important resource for communication with the public about the long-term management of used nuclear fuel. Over the three years, the website has evolved, and the library of materials continues to grow. The website publishes our plans and makes available all our documentation, including technical research and engagement reports, newsletters and news releases, and minutes of our Board and Advisory Council meetings. The NWMO's evolving five-year strategic plans and the discussion documents to support dialogue on the design of a siting process were published on the website. Public submissions on the plans were invited through the site and are published there. We received and responded to many requests for copies of NWMO documents and our DVDs, and continue to receive submissions from people with questions or comments about our work.

Communication

The NWMO understands that in order to effectively participate in implementation, people need to understand the issues, and what the NWMO is doing and why. Over the period, we have expanded our capacity to produce and deliver more effective and accessible information.

Several DVDs have been produced. A DVD called *Moving Forward Together* introduces the NWMO and explains APM and its implementation, and the collaboratively designed process to identify an informed and willing community to host a deep geological repository. Other DVDs address the transportation of used nuclear fuel and the nuclear fuel cycle.

To further promote general knowledge of the technical, social and economic issues of used nuclear fuel management, we published backgrounders and information sheets on a range of topics, including the project to construct and operate a deep repository, climate change, transportation of used nuclear fuel and regulatory oversight. These materials were distributed to interested subscribers and at conference trade shows, and are available on the NWMO website. They are also provided on request and at information kiosks and literature stands set up in communities participating in the Learn More Program.

We have also developed an interactive exhibit that is designed to engage visitors and provide learning experiences that make the concepts about the long-term management of used nuclear fuel tangible. Because the public has a widely varying understanding of the issue, the exhibit provides different starting points in order to make sense of this complex subject.

Focus groups, Citizen Panels, the Municipal Forum, the Youth Roundtable and Elders Forum provided feedback on many of our communications materials. The NWMO continues its efforts to identify and respond to opportunities to build awareness about our activities, and to develop communications materials to promote the understanding of APM through all its stages of implementation.

Videos help explain what the NWMO is doing and why.



Relationship Building with Aboriginal Peoples

The NWMO recognizes that there are Aboriginal peoples in all areas of Canada in which the NWMO's work will take place. Under the NFWA, the NWMO has an ongoing statutory obligation to engage Aboriginal peoples as it implements APM.

The NWMO wishes to build long-term relationships with Aboriginal peoples that may be affected by the implementation of APM. From its inception, the NWMO has sought to develop its processes and plans with the involvement of Aboriginal peoples to ensure that these processes and plans welcome the full involvement of Aboriginal peoples in a way that is respectful of traditional practices and approaches to decision-making as shared with the NWMO by Aboriginal peoples. This work has been greatly aided by the Elders Forum and Niigani and by direction and advice received through ongoing engagement with national and regional Aboriginal organizations. Over the course of the three-year period, the NWMO has engaged national and provincial organizations in the nuclear fuel cycle provinces. The timing and nature of engagement of individual groups reflects the priorities and concerns of these groups.

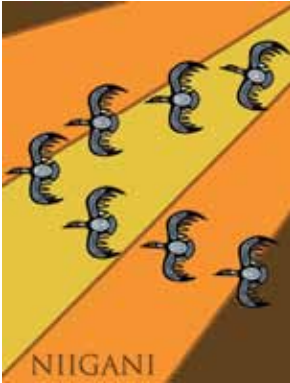
The NWMO acknowledges and respects the unique status and rights of Aboriginal peoples – Indian, Inuit and Métis peoples of Canada – as recognized and affirmed in s.35 of the *Constitution Act* (1982), and is committed to respecting the Aboriginal rights and treaties of Aboriginal communities potentially affected by our work. The NWMO also recognizes that there may be unresolved claims between Aboriginal communities and the Crown to be taken into account in relation to a proposed site.

BUILDING THE FOUNDATION: APPROACH TO EARLY ENGAGEMENT

The NWMO began its dialogue with Aboriginal peoples in 2003, during the study phase. Agreements with 15 national, regional and local Aboriginal organizations guided the engagement of several thousand Aboriginal peoples across Canada on the long-term management of used nuclear fuel. Aboriginal organizations designed, conducted and reported on dialogues that they conducted with their members. Each dialogue initiative was unique, reflecting the needs, concerns, value systems and/or decision-making process of the organization and people represented. Aboriginal peoples were also involved in multi-party dialogues and other activities, as possible, to ensure their unique perspective influenced all discussions.

Over the course of the study, direction from Aboriginal peoples was instrumental in shaping the design of APM on a number of levels. For instance, the values framework guiding the conduct of the study was designed to reflect the values shared by Aboriginal Traditional Knowledge holders in an early workshop. The NWMO's general approach to engagement – one focused on dialogue and consensus building – was shaped by the learnings about processes that were first shared with the NWMO in the early workshop. The objectives and criteria against which management approaches were assessed were developed to reflect the holistic approach that Aboriginal peoples said needs to be taken. The NWMO's approach to thinking about long planning horizons and intergenerational responsibility has been shaped by learning shared with the NWMO about seven generations' teachings.

Elders Forum Mission Statement



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.

Elders Forum and Niigani

The Elders Forum and its working group, Niigani, have provided the NWMO with advice on many issues and worked to develop a process for creation of a partnership between Aboriginal communities and the NWMO for the long-term management of used nuclear fuel. The Elders Forum and Niigani have provided the NWMO with advice on how to address questions and issues, and how to build relationships with national, provincial and regional Aboriginal organizations. Elders have helped arrange briefings with a number of Aboriginal leaders. Work continues to help the NWMO expand relationships and explore how best to engage Aboriginal communities. Niigani is involved in developing the Elders Forum agendas and participating and assisting in dialogues with Aboriginal peoples. Members of Niigani also participated in the multi-party dialogues. Niigani initiated the publication of a newsletter for communicating with members of the Elders Forum and for distribution among Aboriginal peoples. These newsletters are available on the NWMO website. Reports of the Elders Forum are listed in Appendix 3, *Listing of Engagement and Research Activities*. The Elders Forum has also prepared a report for inclusion in this Triennial Report in Chapter 15, *Report of the Elders Forum and Niigani*, that identifies the advice provided by the Elders since the Forum came into existence in 2005, and describes the relationship between the Elders Forum and the NWMO.

The Elders Forum and Niigani were instrumental in establishing two NWMO summer work programs with Aboriginal youth. In 2007, two Aboriginal students spent six weeks travelling to Aboriginal communities – Elsipoqtoq (Big Cove), New Brunswick; Constance Lake, Ontario; and Ile-a-la-Crosse, Saskatchewan – and a Youth Outdoor Wellness Conference in Northern Saskatchewan. The students met with Elders, youth and community members to learn about processes, tools and potential methods for communicating with Aboriginal peoples, particularly youth, about the long-term management of used nuclear fuel.

ESTABLISHMENT OF ELDERS FORUM AND NIIGANI

Upon the advice of Aboriginal peoples who engaged in early dialogue, the NWMO established an Elders Forum to assist in bringing Aboriginal Elders and their knowledge into deliberations and to continue work towards interweaving Aboriginal Traditional Knowledge and APM. Local, regional and national Aboriginal organizations that had worked with the NWMO during the study phase were asked to identify Traditional Knowledge holders to join the Forum. First convened in Ottawa in August 2005, the Elders Forum has met since at least once each year. The forum brings together Aboriginal Elders and youth.

On the advice of the Elders Forum in 2006, a working group was established to support the work of the Elders Forum. Elders were selected from among the participants of the Elders Forum for members of this group that has been meeting several times each year. Niigani, as the group is now known, is tasked with ensuring that the unique responsibility Aboriginal peoples have for the land and protection of Mother Earth is recognized and reflected throughout implementation of APM. This responsibility lies at the heart of the Elders Forum's Mission Statement. "Niigani" means "leading the way" and represents all people working together.

Chair in Indigenous
Governance
Ryerson University,
Ontario



RYERSON
UNIVERSITY

In 2009, the NWMO announced a contribution of \$105,000 over three years in support of the Chair in Indigenous Governance at Ryerson University. This initiative will considerably impact capacity building and help strengthen governance in Aboriginal communities across Canada. Dr. Pam Palmater has been appointed as the Chair of Indigenous Governance at Ryerson University.

In 2008, two Aboriginal students interviewed Elders in the nuclear fuel cycle provinces about their experiences in communities undergoing change from large development projects, and about how to interweave Traditional Knowledge and Western science. The students also made presentations to young people about the NWMO and its work. Youth members of the Forum have continued with projects to gain a deeper understanding of the long-term management of used nuclear fuel.

The NWMO's work with Aboriginal youth has included sponsorship of the Youth Outdoor Wellness Conference held annually for First Nations and Métis youth in northern Saskatchewan and planned through the Ile-a-la-Crosse Friendship Centre. In addition, the NWMO has provided sponsorship to Actua, a program that provides hands-on, dynamic and interactive education enrichment experiences in science, engineering and technology to Canadian youth aged 6–16 years. NWMO funds will encourage Aboriginal youth participation in science-focused workshops and summer camps that take place in Aboriginal communities and that show how Traditional Knowledge can play a significant role in the study of science.

Building Understanding

Using the insight learned from our relationships with Aboriginal organizations, communities and the Elders Forum, the NWMO initiated work to develop culturally appropriate communication materials. A Niigani member joined Aboriginal communication specialists from the fields of television, print and community engagement to develop a brochure and adapt an NWMO DVD for Aboriginal peoples. The DVD was translated and produced in Mi'kmaq, Maliseet, Innu, Swampy Cree, Ojibway, Oji-Cree, Woodland Cree and Dene. All translated DVDs were posted on the NWMO website and distributed at dialogues in the four nuclear provinces. This DVD was updated in 2010, including the addition of translation to the Michif language.

In order to further assist early involvement, agreements were developed with the Assembly of First Nations (AFN), Native Women's Association of Canada (NWAC), and the Federation of Saskatchewan Indian Nations (FSIN). Meetings to provide information and explore the NWMO's work were also held with: the Congress of Aboriginal Peoples; Métis Nation Saskatchewan; Atlantic Policy Congress of First Nations Chiefs – senior staff; and the Grand Chief of the Association of Iroquois and Allied Indians. Presentations on the NWMO and APM were provided on request at the Northern Saskatchewan Trappers Convention and to the Treaty 4 Elders Gathering in Saskatchewan.

A two-year project was begun with the AFN that provided resources to hire a project coordinator to provide support to First Nations and assist in communication between the NWMO and First Nation communities. The NWMO and AFN worked jointly to develop communication materials to support any First Nation seeking information and advice on nuclear waste management. The AFN also assists First Nations as they begin building their relationships with the NWMO by providing information and support. The AFN supported the development and delivery of the regional dialogues on the proposed site selection process, and conducted a "Seven Generations" Workshop with their Elders advisory committee in Tofino, British Columbia, and a workshop on traditional decision-making processes at Nakoda Lodge, Morley, Alberta.

The NWMO assisted the NWAC's work to involve Aboriginal women in their role as stewards of the environment through the development of an Environmental Toolkit. The toolkit provides practical advice and tips on

facilitating dialogue about environmental issues, including the implementation of APM. This project began with a roundtable held with the NWAC Environmental Network to explore issues, processes and protocols to enhance the effective engagement of Aboriginal women in national and regional issues. The toolkit was developed for the NWAC through a graduate program in environmental studies at Dalhousie University and with support from the NWMO. It is available on the NWMO and the NWAC websites.

An agreement was reached in 2008 with the FSIN to explore the development of a Protocol Framework between the NWMO and the FSIN. Led by the FSIN Lands and Resources Commission, a workshop in September 2008 with Saskatchewan First Nations chiefs provided information about the NWMO and received their ideas about such a Protocol Framework for consideration by the FSIN. Plenary and breakout discussions explored risks and opportunities related to Saskatchewan's nuclear industry, particularly the potential for a deep geological repository.

The NWMO has worked with provincial and national Aboriginal organizations to establish liaison relationship agreements to ensure a regular means of liaison and to maintain the internal capacity to support their members seeking information or involved in the site selection process. Liaison Relationship agreements are designed to build on the ongoing relationships the NWMO established with organizations at the outset of its study in 2003. Each agreement reflects the unique needs, priorities, and cultural and political protocols of the individual Aboriginal organization and includes the establishment of a liaison coordinator position: to build internal capacity and understanding about the NWMO, the site selection process and the development of the deep geological repository; to provide information updates, as needed, with their members; to support members on an ongoing basis as the siting process evolves and keep members apprised of the NWMO's work; to provide assistance to the NWMO in working with Aboriginal communities in areas of potential host communities to identify communities, understand issues facing Aboriginal communities in these areas, assist in making contact and provide liaison according to community wishes; and to attend liaison training provided by the NWMO.

Agreements were completed in 2010 with the AFN, the Union of New Brunswick Indians, the Mawiw Council of First Nations, the FSIN and the Chiefs of Ontario. In addition, an agreement was made with the Métis Nation Ontario to provide an update to members during its Annual Assembly in Thunder Bay in August. Discussion continues with Aboriginal organizations in order to keep their members informed as communities begin to express interest in the Learn More Program.

The agreement with the AFN provides the opportunity for the organization to conduct independent research, provide advice to First Nations and serve as a vehicle to provide communication material on used nuclear fuel storage to First Nation communities. The AFN will liaise with First Nation communities at their request and will develop and provide culturally appropriate information and public education documents to First Nations. The AFN continues to assist the NWMO in facilitating any dialogues or consultations in a manner that is respectful of the culture and interests of the First Nations concerned, and to help First Nations prepare for dialogues by providing advice and information on conceptual and technical aspects of APM.

Development of Site Selection Process

In 2009, the NWMO invited Aboriginal organizations in Saskatchewan, Ontario, Quebec and New Brunswick to collaboratively design, develop and coordinate a series of regional information and dialogue sessions on the Proposed Process for Selecting a Site. The sessions brought together First Nations and Métis peoples in regional areas identified by Aboriginal organizations to reflect a broad range of perspectives, including community and regional leadership, Elders, women, youth and community members.

The NWMO provided financial resources to each participating organization and communication materials about APM and the proposed siting process to support the dialogues. In addition, with NWMO project funding, the AFN provided additional information materials developed for First Nations people and supported First Nations in their involvement. In undertaking these dialogues, the NWMO sought to ensure that appropriate regional structures and protocols were followed and that local perspectives within each identified region were heard.

Reports on the dialogues in each region, including summaries of the input received, are available on the NWMO website. Details about locations and dates of the dialogues are included in Appendix 3, *Listing of Engagement and Research Activities*.

Understanding Aboriginal Traditional Knowledge

The interweaving of Aboriginal Traditional Knowledge in the implementation of APM helps to build relationships with Aboriginal peoples and benefits the long-term management of used nuclear fuel. Early efforts to learn and integrate the insight from Aboriginal Traditional Knowledge focused on five activity areas: the Elders Forum, enhancing communication and understanding, cross-cultural training of NWMO staff, development of policies that encourage continued effort, and dialogues designed and conducted by Aboriginal organizations.

In 2008, with the guidance of the Elders Forum and Niigani, a three-part project was initiated to further explore the interweaving of Aboriginal Traditional Knowledge and Western science. In the first phase, participants visited the site proposed for Ontario Power Generation's Deep Geologic Repository Project for Low and Intermediate Level Waste in Kincardine, Ontario. Participants viewed the geological investigations underway in the development of a deep repository. In the second phase, NWMO staff and members of Niigani participated in a fish camp with a traditional Aboriginal family near Fort Good Hope in the Northwest Territories. The experience afforded a natural environment for sharing Traditional Knowledge and an opportunity for NWMO personnel to develop their skills in communicating scientific concepts to Aboriginal Elders and youth.

The project concluded with a workshop that brought together holders of Aboriginal Traditional Knowledge, resource people with experience in industrial projects interweaving Traditional Knowledge and Western science, and NWMO technical and engagement team members. Participants discussed the strengths, similarities, opportunities and limitations of each system.

In December 2009, the NWMO held a Traditional Knowledge Workshop to which we invited individuals with practical project experience in interweaving Traditional Knowledge and Western science to meet with NWMO staff. Over the course of a day-long discussion, these individuals shared their experience in siting and implementing large development projects and their insights on best practices. The report of this workshop is posted on the NWMO website.

In 2010, the NWMO sought to learn directly from Aboriginal peoples how Aboriginal Traditional Knowledge is being applied in the economic development of an Aboriginal community. The NWMO was invited to visit with Dr. Dean Jacobs and tour Walpole Island First Nation, where community members provided an overview of programs developed to protect and maintain Aboriginal Traditional Knowledge in the economic development of this First Nation.

In all meetings with Aboriginal organizations, correct cultural protocols are followed and local Aboriginal Elders are involved in planning ceremonies, as appropriate. In order to better prepare for relationship building with Aboriginal peoples, training for NWMO staff has been conducted by Niigani Elders about cultural protocols, treaties, governance and consultation with Aboriginal peoples.

NWMO staff and Niigani members participated in a fish camp with an Aboriginal family. »



Policy Development

NWMO Aboriginal Policy

The NWMO is committed to the active and meaningful participation of Aboriginal peoples in its work. In 2009, with the assistance of the Elders Forum and Niigani and ongoing advice from national, provincial and regional Aboriginal organizations, the NWMO developed a draft Aboriginal Policy to guide its work. The proposed Policy was posted on the NWMO website in 2009 for public review and input, and the Elders Forum and Niigani contributed to the development of the policy through multiple meetings. In 2010, the Policy was finalized and adopted.

NWMO Transparency Policy

The NWMO is committed to openness and transparency in our processes, communications and decision-making, so that our approach is clear to all Canadians.

The NWMO released a discussion document in April 2008 to seek comment and advice on the development of a Transparency Policy. It was published in tandem with our draft Implementation Plan for review. Engagement activities included:

- » Review during Citizen Panels in four provinces
- » Posting of a discussion document with questions on the NWMO website
- » Mailing of the discussion document with questions to interested individuals and organizations and those on the NWMO subscriber list

A number of submissions were received from individuals and various organizations and government agencies. Comments were generally supportive, and based on the feedback received, changes were made to the Policy, primarily for clarification. The Transparency Policy that emerged from these discussions can be viewed at www.nwmo.ca.

The NWMO continues to learn from those it engages about how relationships might best be built and sustained.

The NWMO understands that relationship building will require a strong and sustained effort to ensure that APM is implemented in a safe, fair and adaptive manner. We look forward to the guidance and goodwill of those we engage so that together we can move forward with Canada's plan for the long-term management of used nuclear fuel in a manner that continues to meet the expectations and needs of Canadians.



Collaboratively Design and Implement the Siting Process

NWMO 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.

Adaptive Phased Management (APM) involves the centralization of Canada's used nuclear fuel at a single site.

One of the first processes developed in implementing APM was a process to be used to seek and select an informed and willing community to host the central facility. Between 2008 and 2010, the NWMO initiated dialogue to collaboratively design the process to guide selection of a site for a used fuel repository. Over two years of dialogue with Aboriginal peoples, the public and specialists, the NWMO received direction on what an appropriate process for Canada would look like.

The process that emerged from the dialogue was initiated in May 2010. It is designed to be triggered by interested communities.

Initial implementation activities have focused on working with interested communities to build their understanding of both the project and the site selection process, and their capacity to understand and act in their own interests. In doing so, an initial program was developed to support learning and capacity building. This program is expected to evolve as the needs of interested communities, and surrounding communities and Aboriginal peoples, are identified through the process.

The two-year collaborative development of the process to select a site is briefly outlined in the table that follows.

TWO-YEAR COLLABORATIVE DEVELOPMENT OF A PROCESS TO SELECT A SITE 2008 TO 2010

2008 »

Identifying what is important in a site selection process



Discussion document launched dialogue (conducted from August to December 2008) on what an appropriate siting process would look like. Key discussion questions included:

1. Does the framework of objectives, ethical principles and requirements provide a sound foundation for designing the process for selecting a site?
2. How can we ensure that the process for selecting a site is fair?
3. From what models and experience should we draw in designing the process?
4. Who should be involved in the process for selecting a site, and what should be their role?
5. What information and tools do you think would facilitate your participation?

2009 »

Reviewing proposed site selection process



Based on input received in 2008, the NWMO published in May 2009 a draft site selection process for review, discussion and refinement through dialogue activities (conducted from June to December 2009). Key discussion questions included:

1. Are the proposed siting principles fair and appropriate?
2. Are the proposed decision-making steps consistent with selecting a safe site and making a fair decision?
3. Does the proposed process provide for the kinds of information and tools that are needed to support the participation of communities that may be interested?
4. What else needs to be considered?

2010 »

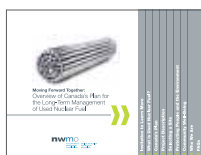
Finalizing the site selection process



Based on input received in 2009, the NWMO published in May 2010 a refined site selection process. This 'living' document will be refined as needed using a collaborative process throughout its implementation.

2010 »

Initiating the site selection process



Publication of the refined site selection process marked initiation of the site selection process. A brochure and supporting materials were produced and distributed through a variety of engagement activities.



Visit to research facility by
NWMO staff and members
of the Elders Forum.



What Is Important in a Site Selection Process? (2008)

In considering the design of a site selection process, many questions need to be considered. Who needs to be included? How do Canadians want to be involved? What information needs to be considered in deciding on a site? What specialists should have a role? What criteria should guide the decision? What concerns must be addressed, and what principles ought to be protected? What safeguards must be in place for Canadians today and for future generations?

To begin the dialogue about the site selection process, the NWMO captured the questions, concerns and expectations for a site selection process raised by Canadians during the Study (2002–2005) in a discussion document. The document, titled *Moving Forward Together: Designing the Process for Selecting a Site*, was published in August 2008. Its purpose was to seek the involvement of a broad cross-section of Canadians in the design of the process for selecting a site. The document drew from the experience of previous siting processes in Canada and internationally and encouraged readers to think through the challenges and opportunities to be addressed.

The release of the document launched the two-year collaborative process to design the siting process. The engagement activities and dialogue about the siting process are described in the table that follows. Detailed description of activities and reports summarizing input received are available on the NWMO website.

WHAT WE DID TO IDENTIFY EXPECTATIONS FOR THE SITE SELECTION PROCESS

- » **Carry forward direction received during the NWMO Study 2002–2003.** Many people had shared their views about an appropriate siting process, including that it be transparent, open and inclusive.
- » **Discussion document** developed using the direction received during the NWMO Study and review of international best practices; the purpose of the document was to begin dialogue about the principles and characteristics of an appropriate site selection process.
- » **Backgrounders to address frequently asked questions** were developed to inform discussion about the management of used nuclear fuel.
- » **Dialogue workshops (multi-party dialogues)** were convened with a cross-section of opinion leaders who had previously contributed to our study.
- » **Citizen panel discussions.** Eight groups of randomly selected citizens active in their community were engaged in a series of discussions about the long-term management of used nuclear fuel and siting principles and process.
- » **Aboriginal briefings** to seek the advice of Aboriginal peoples at the national, provincial and regional levels.
- » **Elders Forum** brought together 22 Aboriginal Elders and 16 youth, and the Aboriginal working group Niigani, to discuss siting issues.
- » **Municipal forums** such as the NWMO Municipal Forum and the Canadian Association of Nuclear Host Communities (CANHC) brought together representatives of municipal associations to consider the siting principles and process.
- » **Youth Roundtable** brought together 16 youth with a diverse background, education and experience.
- » **Online public forum** convened by Royal Roads University.
- » **Public attitude research** conducted by Pollara with a representative cross-section of 2,600 Canadians.
- » **Meetings upon request** were held with many interested individuals and groups to answer questions about the dialogue process and receive comments.
- » **Workshops** with experts were organized to advance understanding of siting issues such as approaches to community well-being, community processes for decision-making for major projects, and integration of Aboriginal Traditional Knowledge with Western science.
- » **Letters and submissions** from interested Canadians received in response to the mailing of the discussion document and web postings were carefully considered.
- » **Political representative briefings** at all levels of government and international agencies involved in this issue provided advice and comment about the plans for the site selection process.
- » **Development of draft Site Selection Process for discussion.** This phase culminated with delivery of a draft site selection process that attempted to incorporate direction received and was the subject for the next phase of dialogue.

We also engaged experts to help understand the possibilities to respond to requirements that citizens identified. Building on the technical research program, described in the next chapter, papers were commissioned in a number of areas to supplement the growing body of knowledge in reports published on the NWMO website since 2002.

WHAT WE DID TO CREATE THE INFORMATION FOUNDATION FOR THE DESIGN OF THE SITE SELECTION PROCESS

During the study phase, the NWMO commissioned over 70 papers to aid understanding of many aspects of the long-term management of used nuclear fuel, including social and ethical dimensions, health and safety, science and environment, economic factors, technical methods, conceptual engineering designs, alternative management approaches, institutions and governance. To continue learning and support development of the siting process, additional research and papers were commissioned from specialists in a number of areas including the following:

Social and Ethical Dimensions

- » Siting processes and experience in Canada and internationally
- » Approaches to defining the concept of “community”
- » Approaches to understanding and assessing community well-being
- » Estimation of economic benefits to a generic host community and region

Technical Considerations

- » Feasibility of using geoscientific criteria for early screening of large geographic areas that would be unsuitable for safely hosting a deep geological repository
- » Tracking of seismic activity in Canada
- » Canadian and international experience in the transportation of used nuclear fuel
- » Used nuclear fuel inventory, projections and transportation estimates
- » Summary of the safety aspects of the deep geological repository in preparation for development of the safety case

Review of a Draft Site Selection Process (2009)

In May 2009, taking direction received from dialogues and submissions, the NWMO published a proposal for a siting process. Titled *Invitation to Review a Proposed Process for Selecting a Site*, this discussion document was the basis for our engagement throughout 2009. Canadians were invited to consider the proposed process and to share their thoughts. We asked them whether we had heard them well, whether we had incorporated their direction appropriately in the design of the process and what further refinements to the process were needed. Information materials prepared to support the dialogue included a corporate video about APM and the NWMO, poster boards, a workbook

outlining key components of the proposed process, and backgrounders and fact sheets on commonly asked questions and topics. The corporate video was also produced in eight Aboriginal languages. All this material was available on the NWMO website.

The many activities to engage Canadians in reviewing the proposed process are summarized in the table below and described in detail in the section *Build Long-Term Relationships* of Chapter 6. The NWMO received many comments and suggestions. The independent reports and submissions are available on the NWMO website. All this input was considered as the NWMO refined and finalized the siting process.

WHAT WE DID TO CONFIRM THE SITE SELECTION PROCESS

- » **Public information sessions about APM and the process to select a site** were convened in 17 regional centres in the provinces involved in the nuclear fuel cycle.
- » **Dialogue workshops (multi-party dialogues)** were convened with opinion leaders who had previously contributed to our study in each of the provinces involved in the nuclear fuel cycle.
- » **Citizen panel discussions and public discussion group sessions** were convened which brought together groups of randomly selected citizens active in their community.
- » **Aboriginal dialogues** to seek the advice and guidance of Aboriginal peoples at the national, regional and local levels were designed, implemented and reported on by Aboriginal organizations.
- » **Elders Forum meetings** were convened which brought together Aboriginal Elders and youth, and meetings of the Aboriginal working group Niigani.
- » **Municipal forums** such as the NWMO Municipal Forum and the Canadian Association of Nuclear Host Communities (CANHC) brought together representatives of municipal associations.
- » **Online public forum** convened by Royal Roads University.
- » **Public attitude research** through focus groups of randomly selected citizens sought suggestions on how to improve our communication materials.
- » **Workshops and meetings upon request** were convened to answer questions about the dialogue process and receive comments from various interested individuals and groups. This included a workshop of practitioners who have worked with communities to think through their involvement in major projects.
- » **Letters and submissions** were received from interested Canadians through regular mail and through the NWMO website.
- » **Political representative briefings** were held regularly with elected officials at all levels of government and with international agencies involved in this issue.

In response to the questions, comments and suggestions received on the draft process, the NWMO made refinements in a number of key areas. The site selection process is designed as a road map built on principles and steps.

Refinement of the Site Selection Process

The proposed site selection process (2009) was revised to respond to the comments received. As a 'living' document, the NWMO will review the process periodically with Canadians to ensure it continues to meet their needs and expectations. The site selection process, as developed through the collaborative process, is built on a set of guiding principles that reflect the values, concerns and priorities of Canadians.

GUIDING PRINCIPLES FOR THE SITE SELECTION PROCESS

The site selection process is designed as a road map built on principles and steps.

Focus on safety

- » Safety, security and protection of people and the environment are first and foremost.
- » All regulatory requirements will be met, and if possible, exceeded.
- » The best available knowledge will inform the process.

Select an informed and willing host community

- » The host community must be informed and willing to accept the project.
- » Communities will be considered for this project only if they willingly enter the process.
- » Communities that decide to participate have the right to end their involvement at any point up to and until a final agreement is signed.

Foster the long-term well-being of the host community

- » The host community has a right to benefit from the project.

Involve those who are potentially affected

- » The questions and concerns of surrounding communities and those on the transportation route must be addressed.
- » The NWMO will involve all potentially affected provincial governments.

Respect Aboriginal rights and treaties, and take into account land claims

- » The siting process will respect Aboriginal rights and treaties and will take into account unresolved claims between Aboriginal peoples and the Crown.

It also identifies a sequence of steps through which the site selection decision will be made. The pace and manner of moving through these steps is designed to be flexible and adaptive.

Over the course of implementing the site selection process, there will be opportunities to learn along the way and incorporate this learning in subsequent steps of the process. Adaptability will also help ensure that individual needs of communities are addressed through the process.

Steps in the Process – At a Glance

Getting Ready	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. The NWMO will continue briefings throughout the siting process to ensure new information is made available and requirements that might emerge are addressed.
Step 1	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. Awareness-building activities will continue throughout the full duration of the siting process.
Step 2	Communities identify their interest in learning more, and the NWMO provides detailed briefing. An initial screening is conducted. 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	For interested communities, a preliminary assessment of potential suitability is conducted. 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. Interested communities will be encouraged to inform surrounding communities, including potentially affected Aboriginal communities and governments, as early as possible to facilitate their involvement.
Step 4	For interested communities, potentially affected surrounding communities are engaged if they have not been already, and detailed site evaluations are completed. 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.
Step 5	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.
Step 6	The NWMO and the community with the preferred site enter into a formal agreement to host the project. The NWMO selects the preferred site, and the NWMO and community ratify a formal agreement.
Step 7	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. 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 steps in the siting process. The documentation produced through previous steps, as well as other documentation that will be required, will be formally reviewed by regulatory authorities at this step through an Environmental Assessment and then licensing hearings related to site preparation and 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	Construction and operation of an underground demonstration facility proceeds. 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	Construction and operation of the facility. 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.

Finally, it contains a framework for assessing the safety and opportunities of any potential site. Six key safety-related questions will be asked of any site, as outlined in the table below.

ENSURING THE SAFETY OF A SITE

1. Are the characteristics of the rock at the site appropriate to ensuring the long-term containment and isolation of used nuclear fuel from humans, the environment and surface disturbances caused by human activities and natural events?
2. Is the rock formation at the site 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?
3. Are conditions at the site suitable for the safe construction, operation and closure of the repository?
4. Is human intrusion at the site unlikely; for instance, through future exploration or mining?
5. Can the geologic conditions at the site be practically studied and described on dimensions that are important for demonstrating long-term safety?
6. Can a transportation route be identified or developed by which used nuclear fuel can safely and securely be transported to the site from the locations at which it is stored?



Beyond ensuring safety, the NWMO's commitment to any host community and region is that its long-term well-being or quality of life will be fostered through its participation in this project. The NWMO will work with the community to consider the effects of the project on a variety of factors.

FOSTERING COMMUNITY WELL-BEING

- » Health and safety of residents and the community
- » Sustainable built and natural environments
- » Local and regional economy and employment
- » Community administration and decision-making processes
- » Balanced growth and healthy, livable community
- » Ability to avoid ecologically sensitive areas and locally significant features
- » Availability of physical infrastructure required to implement the project
- » Ability of the community, and the social infrastructure it has in place, to adapt to changes resulting from the project
- » Availability of routes (road, rail, water) and associated infrastructure to transport used fuel from existing storage facilities to the repository site, or potential to put these in place
- » NWMO resources required to put in place physical and social infrastructure needed to support the project

Transportation is an important consideration in assessing the safety of any site. In order for a site to be considered technically safe, a transportation route must be identified, or be capable of development, by which used nuclear fuel can be safely and securely transported to the site from locations at which it is currently stored. Beyond safety, transportation is also an important consideration in identifying and assessing effects on community well-being.

Engaging Aboriginal Peoples

In addition to their involvement in many of the engagement activities described earlier in this chapter, the NWMO invited Aboriginal organizations in Saskatchewan, Ontario, Quebec and New Brunswick to design and implement a series of information and dialogue sessions

about the proposed site selection process. The table below lists Aboriginal organizations that participated in this phase of work. Additional information about the meetings held in 2009 and 2010 is available in Appendix 3, *Listing of Engagement and Research Activities*.

NATIONAL AND REGIONAL ABORIGINAL ORGANIZATIONS THAT PARTICIPATED IN THE DEVELOPMENT OF THE SITE SELECTION PROCESS

- » **Native Women's Association of Canada:** Conducted workshops in New Brunswick, Saskatchewan and Ontario
- » **Métis Nation Saskatchewan:** Conducted regional workshops in Regina, Prince Albert, North Battleford, Ile-a-la-Crosse and Saskatoon
- » **Chiefs of Ontario:** Conducted regional workshops in Nigigoonsiminikaaning First Nation, Whitefish River First Nation, Six Nations of the Grand River, Moose Cree First Nation, Batchewana First Nation and Obashkaandaguang First Nation
- » **Métis Nation of Ontario (MNO):** Conducted workshops at MNO Annual General Assembly, Sudbury, and in Toronto
- » **Assembly of First Nations – Quebec and Labrador:** Conducted workshop in Wendake, QC
- » **MAWIW Council of First Nations:** Conducted workshops in Fredericton, Tobique First Nation, Elsipoqtoq First Nation and Burnt Church First Nation
- » **Union of New Brunswick Indians:** Conducted workshops in Fredericton, Eel River Bar First Nation, Metepenagiag First Nation (Red Bank), Oromocto, Fort Folly First Nation, Buctouche First Nation, Madawaska Maliseet First Nation and Red Bank First Nation

Initiating the Site Selection Process (2010)

The site selection process was initiated in May 2010, accompanied by an invitation to communities to begin to learn about the APM project, without any obligation to continuing in the site selection process.

A Learn More Program was introduced, offering resources to interested individuals, organizations and communities to support them in their early consideration of the APM project. Two formal initiatives were launched to support the site selection process.

The *Learn More Program – Focus on Early Steps* includes five areas of activities to introduce a community to the project and issues. As part of this initiative, a Community Sustainability Visioning handbook was prepared and resources made available, to provide a possible starting point for conversations in communities wishing to assess whether hosting the APM project could be consistent with their long-term visions and aspirations. The *Research Support Program – Studies in the Humanities and Social Sciences* supports continuous learning through funding for research that contributes to building understanding of important issues related to the site selection process. These programs were designed to begin to address the early needs of communities to build capacity to think through their own interest and act upon it, and to continue to build awareness and foster ongoing public conversation. Additional programs will be developed as communities begin to proceed through the site selection process. These programs will be developed collaboratively with the communities involved to meet their needs as these evolve over time.

The initiation of the site selection process in May 2010 was supported by a program of activities to raise awareness of the APM project. The organization actively participated in a range of municipal and Aboriginal meetings and conferences. A mobile exhibit was developed to explain the components of the APM project and the multiple-barrier concept underlying deep geological repositories to provide safety to people and the environment. This exhibit provided a meeting place at conferences and trade shows for informal early conversations about the site selection process. A suite of communication materials was issued in 2010, including backgrounders and DVDs, to support early community information sharing and dialogue. A dedicated APM siting website was launched with updated information on the APM site selection process.

The site selection process was initiated in May 2010.



Supporting Communities in Learning about APM

By year-end 2010, five communities had expressed interest in learning more about APM and the process to select an informed and willing host for the project: Ignace, Ear Falls and Schreiber, all in Ontario, as well as Pinehouse and English River First Nation in Saskatchewan.

In those early months of engaging with the NWMO on the site selection process, communities began to further shape the site selection process by articulating their specific information needs and the manner in which they would like to receive this information. Communities engaged with the NWMO on the nature of the support they require to consider their interest in the project and strengthen their capacity to participate in the site selection process. The NWMO continues to learn from communities on these important points. In response to these early conversations with communities, a number of initiatives and activities have been launched.

The NWMO has begun the process of early involvement of Aboriginal communities near communities that have expressed interest in learning more about APM. Letters were written to Aboriginal communities neighbouring these potentially interested communities, providing an overview of the NWMO's work, the site selection process and commitments to Aboriginal peoples as outlined in the site selection process. The NWMO has also begun meeting with Aboriginal community leaders to provide information on the site selection process and the NWMO's work and to seek their comments and concerns on how best to involve them in the process. Members of Niigani, the NWMO Aboriginal working group, have participated in many of these meetings. To assist in building understanding, the NWMO corporate DVD and overview of the site selection process were translated into nine Aboriginal languages: Woodland Cree, Michif, Dene, Oji-Cree, Ojibway, Maliseet, Mi'kmaq, Swampy Cree and Innu.

The NWMO has learned a great deal from its early interactions with communities about how to effectively support communities interested in the project, how to begin a conversation with the community and involve others that may be affected, and how to ensure that participation in the site selection process benefits the community – even if it is not ultimately selected to host the deep geological repository and associated facilities. Programs being designed in partnership with communities are in initial stages and will take on greater shape and prominence as communities and the NWMO proceed through the site selection process.

The NWMO's Learn More Program provides resources in the form of information and funding to support participation in the early steps of the siting process, as described in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* (May 2010).

The five program components outlined on the right are offered to interested individuals, organizations and communities to support early consideration of APM.

LEARN MORE PROGRAM – FOCUS ON EARLY STEPS

» Learn More About Adaptive Phased Management

The NWMO will meet with any group to provide information about APM and the nature of the used nuclear fuel repository project. The NWMO will provide funding to assist a community to build its understanding of the technical safety dimensions of the project and to engage a third-party expert to review NWMO material published to date.

» Learn More About the Potential Suitability of the Community to Host the Project

The NWMO will provide funding to geographically defined communities to hire a third-party expert to review the NWMO's initial screening of the suitability of the community.

» Support for Visit to Interim Storage Facility Site

The NWMO will cover travel expenses for a small representative delegation from a community to visit an interim radioactive waste storage facility in Ontario or another nearby facility.

» Support for Development or Refinement of a Long-Term Vision for Sustainability

Should an initial screening suggest a community has potential to be suitable for the project, the NWMO will provide a community with resources to develop or augment a long-term vision for community sustainability.

» Support Activities to Build Awareness and Understanding of the Project Within the Community

Should an initial screening suggest a community has potential to be suitable for the project, the NWMO will provide resources for accountable authorities in the community to begin engaging citizens in the community about the project.



Refine and Further Develop Generic Designs and Safety Cases for a Deep Geological Repository

NWMO 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.

Each phase of implementing Adaptive Phased Management (APM) will require decisions that Canadians expect will be informed by the latest understanding of science, engineering and social sciences. The best available knowledge must guide decisions on the technology for used fuel management, on the detailed site investigations for a deep geological repository, and in incorporating developments in other non-technical areas that may have relevance in confirming or adjusting the path forward. The monitoring, consideration and incorporation of emerging knowledge into implementing APM is essential to building confidence in the safety case for the project.

The NWMO technical research program follows the stepwise implementation of APM with activities designed to support decision-making.

In 2007, the NWMO assumed responsibility for directing and managing all aspects of the established technical research program on long-term used nuclear fuel management in Canada. The program supports implementation of APM, including work completed during the reporting period in support of collaboratively designing the site selection process, and work currently underway as the process is being implemented. The results of this work are published and are available on the NWMO website at www.nwmo.ca/technicalresearch.

The NWMO technical research program is reviewed annually by the Independent Technical Review Group (ITRG) that provides external expertise and counsel to the NWMO Board of Directors to ensure that the NWMO adopts the best technical practices available in Canada and internationally. The ITRG is further described in the section *Ensure Accountability* of Chapter 6.

It is expected to take about 25 years to identify a preferred site to implement the APM plan, to complete the environmental assessment and licence approval process, to prepare and construct a deep geological repository and associated facilities, and to obtain an operating licence. The technical research program is organized into two principal areas of focus:

- » updating reference designs and safety cases for a used fuel deep geological repository and transportation system; and

ADAPTIVE PHASED MANAGEMENT TECHNICAL RESEARCH PROGRAM PRINCIPAL OBJECTIVES:

1. Prepare updated generic reference designs, cost estimates and safety cases for a deep geological repository in crystalline rock and in sedimentary rock.
2. Further improve the reference designs for a deep geological repository in crystalline rock and in sedimentary rock.
3. Further increase confidence in the deep geological repository safety case.
4. Obtain Canadian Nuclear Safety Commission pre-project review of reference designs and safety cases for a deep geological repository in crystalline rock and in sedimentary rock by 2013.
5. Enhance scientific understanding of processes that may influence repository safety.
6. Evaluate the adequacy of potential candidate sites for a deep geological repository by conducting site characterizations and safety evaluations.
7. Maintain awareness of advances in technology development and alternative methods for long-term management of used nuclear fuel.

» increasing confidence further in the deep geological repository safety case and enhancing our scientific understanding of processes that may influence repository safety in the near and long term.

Work in geosciences, repository engineering and safety assessment is underway both in-house and in collaboration with specialists and universities in Canada and internationally to address these two principal areas of focus.

The following sections offer highlights of the activities and findings over the past three years. For additional information about the APM technical research program, please see *Technical Program for Long-Term Management of Canada's Used Nuclear Fuel – Annual Report*, available on the NWMO website.

Geosciences

The NWMO geoscience program is developing plans and methods to assess the suitability of potential candidate sites in willing host communities, and refining the NWMO's understanding of the long-term stability of the geosphere.

Over the past three years, the program has developed geoscientific criteria for evaluating host rock formations at potential candidate sites in both crystalline and sedimentary rock. The criteria we developed were derived to meet or exceed the regulatory expectations of the Canadian Nuclear Safety Commission (CNSC), guidance from the International Atomic Energy Agency (IAEA) and siting experience gained through cooperation with nuclear waste management programs in other countries.

Over the period, we also advanced understanding of geosphere stability and its resilience to long-term geological and climate change processes such as earthquakes and glaciations. Projects in each of these areas apply specialized knowledge and expertise, including geology, seismology, climate change and glaciation, hydrogeology, geochemistry and paleohydrogeology. The work is advanced through a multidisciplinary approach involving the coordinated effort of research groups drawn from Canadian universities, consultants, federal organizations and international research institutions. In particular, the geosciences program is a partner and participant in the Äspö Hard Rock Laboratory in Sweden, the Mont Terri Underground Rock Laboratory Project in Switzerland and the Greenland Analogue Project in collaboration with the Swedish and Finnish national radioactive waste management organizations.

Over the period, the NWMO has developed thorough processes and geoscientific criteria to evaluate the suitability of potential candidate sites in willing host communities in both crystalline and sedimentary rock. As described in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* (May 2010), the criteria were developed with Canadians through a collaborative process that spanned over a period of two years. We are now preparing to apply these criteria to the early stages of the site selection program as potential host communities express interest in learning more.

A framework for applying the criteria during initial stages of the site evaluation process has also been developed and used as a basis for selecting external contractors that would assist the NWMO in undertaking initial screenings and feasibility studies to assess potential suitability of candidate sites.

In addition to developing readiness for implementing initial site evaluation steps, a number of work programs have been initiated over the period to refine tools and methods for conducting more detailed field and laboratory

investigations. These programs consider both crystalline and sedimentary rock and address a wide range of geoscientific topics, such as: collection of available background geoscientific information on the nuclear fuel cycle provinces; seismic hazard assessment; radionuclide transport properties of rocks such as diffusion and sorption; groundwater chemistry and rock porewater geochemical composition; thermal properties of rocks; microbial properties of rocks; geophysical investigation methods; and other relevant topics.

A great deal of practical knowledge and experience in sedimentary rock environments has also been acquired through the NWMO's involvement in Ontario Power Generation's (OPG) site characterization program for its proposed Deep Geologic Repository (DGR) Project for Low and Intermediate Level Waste. Our work on this program has included field operations, borehole drilling, groundwater sampling, rock core mineralogy, geophysical logging, deep hydraulic well testing, geomechanical testing, borehole instrumentation, site characterization, quality assurance procedures and multidimensional scientific visualization. The NWMO's involvement in OPG's DGR Project has provided the APM program with valuable information regarding the mechanical characteristics of sedimentary rock formations at repository depth and provided confirmation on the homogeneity of these formations through the site characterization program.

In 2008, the NWMO completed a review of the geology of the four nuclear fuel cycle provinces in terms of the geoscientific factors for siting a deep geological repository and assessed the feasibility of early exclusion of unsuitable geographic areas. The study concluded that it is not practical to exclude large areas of land in the four provinces early in the siting process. Some geoscientific factors may, however, be used as exclusion factors at later stages, as more local-scale and site-specific information becomes available. The study highlighted two main challenges in attempting to screen out large areas. First, most geoscientific site evaluation factors require site-specific information at repository depth, and this is typically lacking at early stages in the siting process. The second challenge is analyzing the large geographic extent of the four provinces (3,300,000 km²) at the typical repository scale for which site-specific geoscientific information is needed (~6 km²).

In the area of earthquakes, the NWMO focused its activities on developing Seismic Hazard Assessment Methods that would be used to predict the intensity and characteristics of future earthquakes in low seismicity areas that are typical of many regions in Canada. The NWMO completed a state-of-the-science review of existing seismic hazard assessment approaches for low seismicity regions and continues to support seismic monitoring activities of the Canadian Hazards Information Service of the Geological Survey of Canada. A review of paleoseismology techniques that could be used to enhance earthquake predictions in low seismicity areas has also been completed. A multi-year seismic monitoring study was completed at the Sudbury Neutrino Observatory to quantify the level of attenuation of seismic ground motion with depth. The results confirmed that ground motion at depth caused by earthquakes is less severe than that observed at the surface.

In order to further increase confidence in the ability to safely contain and isolate used nuclear fuel, the NWMO continues to collect multiple lines of evidence to demonstrate the robustness of the geosphere and its resilience to future perturbations. This is achieved through multidisciplinary numerical and field studies aimed at further understanding the impact of glaciations, as this is the most intense perturbation that a repository will experience in the future in both crystalline and sedimentary formations.

Topics being studied include:

- » rate of advance and retreat of future glaciers, extent and thickness of future ice sheets, ground surface temperature and permafrost occurrence;
- » impacts of glaciations on redox stability;
- » evolution of deep groundwater flow systems;
- » seismicity and faulting induced by glacial rebound; and
- » influence of ice-sheet characteristics and permafrost on groundwater flow system.

Case studies of the potential impact of glaciation on a deep geological repository are based on the University of Toronto's Glacial Systems Model. This state-of-the-art model of continental scale ice-sheet evolution allows reconciliation of a large body of observational constraints concerning ice-age advances and retreats of ice cover over the North American

continent during the late Quaternary period of Earth history. A review of glaciations impacts on sedimentary rock formations to assess the resilience of deep groundwater flow systems to physical and chemical perturbations at depths and over time frames of relevance to a repository was conducted in collaboration with the New Mexico Institute of Mining and Technology.

Glacial loading and unloading is an important consideration in the assessment of seismic risk. Loading and unloading of the crust by continental ice sheets during glacial cycles alters the crustal stress regime and creates compressive stresses normal to the ice margin. The NWMO completed a review of the influence of glacial cycles on the evolution of fault reactivation, specifically the spatiotemporal variation of stress and fault stability induced by the stresses from glacial loading, bending of the lithosphere and relaxation of the mantle. Our studies on geosphere

stability and glaciation have provided strong evidence that a deep geological repository in a suitable host rock formation will not be affected by severe climate change over hundreds of thousands of years.

The NWMO is actively collaborating with researchers at the University of Waterloo and McGill University to investigate the evolution of groundwater flow systems and their impact on the long-term performance of a deep geological repository. The focus is on testing and refining numerical tools and modelling approaches to assess the influence of site characterization uncertainties on groundwater flow and transport predictions in crystalline rock settings. Groundwater flow studies based on hypothetical sites in crystalline rock are providing insight into the influence of a number of geosphere properties and coupled thermal-hydraulic-mechanical processes on deep groundwater flow dynamics and evolution over geological time frames.

GREENLAND ANALOGUE PROJECT

The NWMO participates in the Greenland Analogue Project (GAP) in collaboration with SKB and Posiva – the Swedish and Finnish radioactive waste management organizations. This four-year project (2009–2012) strives to advance understanding of processes associated with glaciation and their impact on the long-term performance of a deep geological repository.

Following permafrost studies in the Canadian Arctic and an introductory field campaign in 2008 near Kangerlussuaq, Greenland, the

GAP field program began in 2009 and included the successful initiation of ice sheet and geosphere/geochemistry studies. Through an extensive field and modelling program, the GAP will evaluate glacial hydrology, groundwater flow and groundwater composition (particularly redox conditions) at the base of a continental-scale ice sheet. In 2009, research conducted on the surface of the ice sheet included the installation of GPS stations, ground-based radar work, remote sensing of the study area and

tracer tests near the ice margin to look at water flow from the surface to the base of the ice sheet. Three boreholes were drilled in front of the ice sheet to investigate the depth of the permafrost in the area and to confirm the presence of a talik beneath a water body. Geochemical sampling of surface water bodies was also conducted. Preparations were made in 2010 for drilling through the ice sheet to the base to study temperature and pressure conditions.

In 2009, the NWMO and the National Sciences and Engineering Research Council of Canada jointly awarded Industrial Postgraduate Scholarships to University of Waterloo Ph.D. candidates who are participating in field, laboratory and modelling studies as part of the GAP project.



Repository Engineering

The repository engineering program is developing and evaluating the conceptual designs for a deep geological repository and associated systems; and providing input to assess the safety of the repository concept. The program supports site characterization and investigation activities, and the development of cost estimates for the long-term management of Canada's used nuclear fuel. Work underway includes study of used fuel integrity, container design, repository design, placement methods, corrosion, sealing materials, transportation, used fuel monitoring and used fuel retrievability.

Assurance about the structural integrity of the CANDU fuel bundle is important to its post-reactor site storage phase, specifically, the safe and efficient handling and transportation of the used fuel. Over the past several years, this work has included modelling fuel bundle stress factors, assessing the corrosion processes of fuel bundles and studying the heat of decay of stored fuel bundles.

Work is also underway to investigate and model corrosion of used nuclear fuel container materials, such as copper and carbon steel, in crystalline rock and in sedimentary rock under anticipated conditions in a deep geological repository including the potential for high salinity. Over the period, studies have been undertaken to support modelling work to predict container lifetimes in a repository, including studies to address the potential for stress corrosion cracking of copper in ammonia and ammonia/chloride environments. The results of the stress corrosion cracking studies suggest minimal risk affecting container lifetime under repository conditions. As well, preliminary results from a study of carbon steel corrosion under anaerobic, unsaturated conditions in a repository in sedimentary rock suggest very low corrosion rates for steel containers, perhaps less than 1 nm/year.

The used nuclear fuel bundles are planned to be transported from the interim storage facilities at the reactor sites to the repackaging facility where the used fuel will be transferred into long-lived containers. The packaging plant is being designed to receive and repackage an estimated 120,000 CANDU fuel bundles per year.

Once used nuclear fuel bundles have been placed in the repository, the placement rooms and tunnels will be sealed. A large amount of work has been invested in Canada and internationally on developing an understanding of the properties of sealing materials used in engineered barrier systems in a deep geological repository. Knowledge of the properties and behaviour of these materials, such as clay-based sealing materials and concrete, is required to evaluate and model the performance of the overall repository sealing system. Clay and concrete seals are affected by salinity and degree of saturation, and they will evolve over time. Studies have characterized properties such as strength, swelling pressure and permeability. The NWMO has contributed to the Backfill and Closure Project, conducted as part of an international (SKB – Sweden, Posiva – Finland, NWMO – Canada) study on piping, erosion and backfill stability done in several laboratories and at the Äspö Hard Rock Laboratory in Sweden.

A key requirement of the repository sealing system is to suppress microbial activity at or near the used fuel container surface in a repository. Microbial activity may lead to corrosion, which may affect the service life of used fuel containers. The NWMO team has made important contributions to the study of the ability of highly compacted bentonite to reduce significant microbial activity near the used fuel containers, especially for repository environments with low salinity anticipated in crystalline rock. The NWMO has investigated the

TYPICAL PHYSICAL ATTRIBUTES RELEVANT TO LONG-TERM SAFETY

- » Repository depth provides isolation from human activities
- » Durable waste form
- » Robust container
- » Clay seals
- » Low-permeability host rock
- » Spatial extent and durability of host rock formation
- » Stable chemical and hydrological environment
- » Site low in natural resources

culturability of microorganisms in buffer and sealing materials and found that heterotrophic aerobes, anaerobes and sulphate-reducing bacteria were present in the studied materials. The research has identified a number of factors and conditions, such as bentonite dry density and porewater salinity, to suppress the viability of microbes and reduce the risk of container corrosion.

The technical program is developing generic conceptual designs and safety cases for both a used fuel deep geological repository in crystalline rock and in sedimentary rock to support a licence application following selection of a preferred site. Based on the experience in other countries, there are a number of possible design options and choices for used fuel containers, placement methods, sealing materials and underground repository layouts being studied and optimized in parallel with developments in the APM siting program.

Several methods such as the in-floor borehole method and the horizontal tunnel placement method have been studied to develop options for repository design layout, used fuel container spacing, placement room spacing and the shape of placement rooms (circular and elliptical). Excavation-induced mechanical stresses in the rock around the placement room and the placement borehole were studied for circular and elliptical-shaped placement rooms. Results to date suggest that drilling has the potential to induce some localized disturbance at the roof of the placement room, around the boreholes and in the rock web between two adjacent boreholes in the floor for vertical placement of used fuel containers. However, these localized disturbances in the rock can be keyed off to reduce the permeability of these features and limit the flow and transport of groundwater or radionuclides in the repository. The development of numerical models and computer codes to assess and predict excavation stability of a horizontal tunnel in a repository in potential host rock formations began in 2009 and continued in 2010.

A future society will decide when decommissioning of the deep geological repository would begin and all underground access tunnels and shafts would be backfilled and sealed. The design of the repository must consider the longevity of the sealing system along with the selection of the used fuel container and the characteristics of the surrounding rock.

An international project to demonstrate components of full-scale shaft sealing and monitoring is being conducted at Atomic Energy of Canada Limited's (AECL) Underground Research Laboratory (URL) under a cooperation agreement between AECL, NWMO, ANDRA (France), Posiva (Finland) and SKB (Sweden). Two composite concrete/bentonite seals were installed in the main access shaft and in the ventilation shaft of the URL to assess their effectiveness in limiting water mixing along the shafts. The seals consist of a bentonite clay-sand component sandwiched between concrete components. The project has demonstrated that a full-scale shaft seal can be constructed and instrumented to evaluate the performance of clay and concrete seals associated with a deep geological repository. Initial measurements have confirmed that the groundwater uptake of the clay component of the seal is proceeding as anticipated. Further monitoring of the seal will provide additional data on full-scale shaft seal performance over time.

The NWMO's experts have also provided technical support and modelling expertise to repository sealing system compliance tests run by the Äspö Engineered Barrier System Task Force in Sweden. Over the course of 27 months, the performance of buffer and backfill materials has been studied for various repository designs. Over the reporting period, the properties and the behaviour of sealing materials have been documented, and areas of further study and analyses identified to confirm and validate the use of these materials for various repository designs.



GLACIATION SCENARIO

The NWMO reference time frame for the safety assessment of deep repositories is one million years, roughly equivalent to the time scale for the radioactivity in used fuel to decrease to that due to its natural uranium content. Over the past one million years, the most significant natural event across Canada has been repeated glaciation cycles, which have occurred approximately every 100,000 years. It is possible that current greenhouse gas levels would delay the onset of the next glaciation, but in the long run, it is prudent to assume glacial cycles resume because they are driven by long-term variation in solar insolation due to earth's orbital variations.

During past glacial cycles, much of Canada has been covered by kilometre-thick ice sheets. These glacial cycles are a large potential perturbation to a site, and the Canadian used fuel program has been examining the implications of glaciation for many years. The general conclu-

sion is that an appropriately sited and sufficiently deep repository can provide containment and isolation of the used fuel during glaciation.

In previous Canadian case studies, the effects of glaciation have been considered in geoscience studies and in engineering the design of the repository. The potential impacts of glaciation on safety and performance have also been evaluated qualitatively, but not quantitatively. Therefore, the effects of an evolving climate with multiple glaciations have been quantitatively evaluated from a safety assessment perspective, within the context of the hypothetical Third Case Study site on the Canadian Shield. The purpose of this Glaciation Scenario case study is to quantitatively assess the long-term dose implications of glacial cycles for a deep repository and to understand the key factors involved.

The detailed modelling results confirmed the expected impact of glaciation on the velocity and direction of the groundwater flow system. The

modelled effects were greatest near the surface, but extended to the repository level. The open taliks during permafrost conditions, in particular, are a dominant factor, focusing system impacts at a discrete location (a talik is a layer of year-round unfrozen ground that lies in permafrost, generally below a large lake). In addition, the transport calculations indicated that radionuclide mass flows to the surface biosphere are quite different in detail for the transient glaciation model compared to the equivalent constant climate case. However, the overall trends in the radionuclide mass flows are similar in the two cases, as are the cumulative mass flows to the biosphere. Since calculated dose rates to human receptors are generally proportional to the radionuclide mass flows to the biosphere, calculated peak dose rates are found to be similar for the two cases. This indicates that results generated with a constant climate model are adequate for initial site safety assessments.

Over the reporting period, a number of transportation studies were initiated, summarizing the Canadian and international experience in the transport of used nuclear fuel. The review examined waste volumes transported annually, the types of packages used to transport used nuclear fuel and the regulatory tests that transportation packages must meet.

A draft work program plan on repository monitoring is under

development and will be the subject of consultation with the public and other interested stakeholders.

Work is underway to update the generic conceptual designs, implementation schedules and cost estimates for a generic deep geological repository in crystalline and in sedimentary rock, as well as the used fuel transportation system to support design refinements, financial planning and the siting process. The conceptual design and cost update include

associated facilities at the repository site and the systems for transporting used fuel from current storage locations to the repository site. The base case assumes an inventory of 3,600,000 used CANDU fuel bundles, and the alternative case assumes an inventory of 7,200,000 used CANDU fuel bundles. The preliminary requirement is that the used fuel packaging and placement rate will be about 120,000 used fuel bundles per year.

Safety Assessment

Safety assessment evaluates the operational and long-term safety of a candidate deep geological repository and associated facilities such as packaging plants and transportation. These assessments support optimization of the safety of any facility, as well as the licensing decision.

Also, in the near term, before any candidate site has been proposed, case studies for hypothetical sites are evaluated in order to improve our understanding of important features and processes relevant to safety.

In the NWMO technical research program that supports the APM siting program, topics examined include used fuel dissolution, radionuclide release and transport processes like solubility and diffusion, seals behaviour, and biosphere data.

For example, the first barrier to the release of radionuclides is the used fuel itself, where the radionuclides are produced. The CANDU uranium dioxide (UO_2) fuel is a durable ceramic material that traps and holds most radionuclides within the UO_2 “grains.” These radionuclides can only be released if the container fails and the ceramic used fuel dissolves in groundwater. Therefore, the rate of fuel dissolution is an important parameter for long-term safety.

A review of used fuel and UO_2 studies in Canada and internationally concluded that the dissolution rate of used fuel in a Canadian repository will be very slow. UO_2 dissolves extremely slowly under the chemically reducing conditions expected in a deep geological location. Used fuel dissolution may, however, be driven by oxidants, particularly hydrogen peroxide, generated by radiolysis of water as in a failed container that has filled with groundwater. The mechanistic understanding of the radiolytic corrosion of UO_2 is therefore important for long-term predictions of used fuel stability. The NWMO, in collaboration with the University of Western Ontario, has studied UO_2 dissolution and investigated the influence of factors such as the presence of hydrogen also produced by radiolysis. These results continue to confirm that the rate of dissolution of used fuel in contact with typical groundwaters will be very slow and would likely take more than one million years.

The repository includes the waste, the container, the surrounding seals and engineered barriers, and the adjacent host rock. Almost all the radioactivity is expected to be contained and isolated within this region. Repository safety work being done in this near-field region is aimed at improving our understanding of the radionuclide transport-limiting processes around a failed container. This involves models and data to represent the likely container failure mode, release of radionuclides from used fuel, and transport of radionuclides through the container/buffer and buffer/host rock boundary. This work involves studying transient thermal-hydraulic-mechanical behaviour over long times. Current modelling work includes use of state-of-the-science computer codes to better represent the physical geometry.

The maximum concentration of radionuclides may be limited by their solubility in water. Many potentially important radionuclides, such as plutonium, have very low solubilities in water under the conditions expected around a deep repository and will therefore never mobilize in large amounts. The NWMO is participating in ongoing international work to improve solubility data and modelling. As part of this work, the NWMO has recently defined reference groundwaters for general research purposes, representative of both crystalline and sedimentary rock sites. The NWMO has also been evaluating the ability of various thermodynamic databases to support calculations of solubility and geochemistry, especially under saline conditions.

Corrosion of the steel component of used fuel containers will result in the

slow generation of hydrogen gas in a repository. The low-permeability clay seals and host rock around the container will initially hold in these gases. To explore this area, a full-scale in situ test called “LASGIT” was initiated several years ago in the SKB Äspö Hard Rock Laboratory in Sweden. The NWMO is contributing to the gas transport modelling component of LASGIT.

Iodine-129 is an important radionuclide in used fuel with respect to a potential long-term public dose impact because it has a relatively high production rate (relative to other radionuclides), is long-lived and is relatively mobile in groundwaters. In order to improve our understanding of the behaviour in the biosphere, a new method was developed for measuring natural iodine in the environment. Using this method, a considerable amount of new data has been collected on the behaviour of iodine (and many other elements) for aquatic and terrestrial ecosystems and domestic farm environments (e.g., cows, chickens, fish, deer, berries). The results are generally consistent with expectations and provide a much more comprehensive dataset to support biosphere modelling.

Radioactivity occurs naturally and is a component of the natural environment. Knowledge of the natural background radioactivity is a useful reference point for evaluation of potential long-term impacts from a repository. Work was completed in 2009 to review the background concentrations of radionuclides in surface water and soil across Canada. Background environmental data was obtained for important radionuclides that are rarely measured, such as carbon-14, chlorine-36 and iodine-129. Accelerator mass spectrometry methods were used to detect these radionuclides and to compare them with their more easily measured stable isotopes. These ratios can be used in future safety analyses. Following on this review, additional measurements were undertaken in 2010 to extend the dataset to provide better regional representation.

Safety case studies provide illustrative examples of repository safety under various conditions or assumptions and test and demonstrate the NWMO's safety assessment approach. Three major safety assessment case studies have been considered within the Canadian program: the Environmental Impact Assessment study (AECL, 1994); the Second Case Study (Goodwin et al., 1996); and the Third Case Study (Gierszewski et al., 2004b). These case studies provide an opportunity to assess and illustrate the safety implications of the deep geological repository concept in the crystalline rock of the Canadian Shield. Each of these studies considered a different combination of engineering design and site characteristics.

During the reporting period, a case study was completed, evaluating the potential impact of glaciation on repository safety. An extensive set of calculations was completed and will be presented in technical reports and articles to be published in 2011.

For the hypothetical site and repository considered, the calculated peak dose rates for this glaciation scenario were approximately of the same order of magnitude as for the corresponding constant (temperate) climate scenario and well below the International Commission on Radiological Protection dose constraint and average natural Canadian background dose rate. Thus, it can be concluded that for the hypothetical Third Case Study site and repository, the impacts of a deep repository would be below regulatory limits, including the effects of glaciation.

A new safety assessment, the Fourth Case Study, for a DGR for used fuel in crystalline rock was initiated in 2010. The repository is assumed to be at a depth of 500 metres and at a site broadly similar to the hypothetical Third Case Study site on the Canadian Shield (Gierszewski et al., 2004b). The safety assessment will examine a new repository design (with in-floor container placement) and the current reference (larger) used fuel container design.

Alternative Technologies

The NWMO monitors developments in used nuclear fuel reprocessing and alternative used nuclear fuel management technologies. Details of this work are provided in the section *Review, Adjust and Adapt Plans* of Chapter 6. Annually, we have published an overview of the findings (NWMO TR-2008-22 and NWMO TR-2009-32). Under separate cover, the NWMO has published a summary of the work of the past three years and answered specific questions related to the technical and financial viability of reprocessing and alternate disposal technologies (NWMO TR-2010-24).

The watching briefs have shown that while there have been some new technological developments in these areas, their pace of development has been slow. Note that the focus of the emerging technologies is evolving.

The current focus remains on alternatives to deep geological disposal; however, in the future, the focus may be on alternatives to various technical aspects of the repository program as it progresses to physical implementation (such as monitoring methods, encapsulation requirements, construction and placement methods, etc.).

Regulation

The NWMO provides annual technical program updates to CNSC staff, and interacts with them to identify and clarify regulatory requirements associated with the implementation of APM.

In 2007, anticipating the future licensing processes that would be required as APM progresses, the NWMO initiated a dialogue with the CNSC. These discussions produced a protocol agreement on the regulatory interface prior to licensing an APM facility, and identified day-to-day informal points of contact within both organizations and arrangements for cost recovery to allow CNSC staff to work on the NWMO file.

In 2009, the CNSC established a special project arrangement with the NWMO that included a CNSC pre-project review of APM conceptual repository designs and safety cases.

The NWMO has also made presentations and responded to questions at CNSC public meetings on the management of radioactive waste in Canada.

Monitoring Canadian and international regulatory developments for used fuel management facilities, the NWMO attended a planning meeting in Ottawa related to the development of the Canadian National Report for the 2009 review meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.



One of the used fuel container designs under consideration has a capacity of 360 used CANDU fuel bundles and consists of a copper outer shell and a steel inner vessel. The design life is estimated to be over 100,000 years. Other designs are possible, and design optimization studies for crystalline and sedimentary rock environments are planned.



Domestic and International Technical Collaboration

In addition to relying on our in-house capabilities, the NWMO has developed working relationships with a number of Canadian universities and consultants. When the NWMO assumed responsibility for directing and managing all aspects of the established technical research program on used nuclear fuel in Canada, more than 20 contracts previously held by OPG were transferred to the NWMO. Since that transfer, the NWMO has issued more than 30 additional contracts, including agreements with the following 14 Canadian universities: University of British Columbia, University of Alberta, University of Calgary, University of Saskatchewan, University of Manitoba, University of Waterloo, University of Western Ontario, University of Toronto, University of Ontario Institute of Technology, Queen's University, Royal Military College, McGill University, Université Laval and University of New Brunswick.

In order to further strengthen our collaborative work with universities, the NWMO is now a sponsoring organization and industrial partner for the Natural Sciences and Engineering Research Council's Industrial R&D Scholarship and Fellowship program, and to date has awarded three Ph.D. scholarships as well as one MITACS internship.

An important component of the NWMO approach to research is our interaction with national radioactive waste management organizations in other countries. This provides cost-effective access to the state-of-the-science facilities and projects, and ensures that our work is consistent with international understanding. In particular, we are active in joint research and demonstration projects at the SKB Äspö Hard Rock Laboratory in Sweden in crystalline rock and in the Mont Terri Project in Switzerland in sedimentary rock. We also benefit from our cooperation agreements with other national radioactive waste management organizations that include SKB in Sweden, Posiva in Finland, NAGRA in Switzerland and ANDRA in France.

The NWMO joined the Greenland Ice-Sheet Hydrology Project in collaboration with SKB, Posiva, the Geological Survey of Greenland and Denmark, the Geological Survey of Finland, the University of Indiana, and the University of Waterloo. The NWMO also joined AECL, SKB, Posiva and ANDRA in a cooperative project for monitoring the performance of a full-scale low-permeability shaft seal at the AECL URL in Manitoba.

We also support information exchange and best-practice initiatives through Canada's membership in the Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA). For example, the NWMO is actively involved in the OECD/NEA initiatives on Reversibility and Retrieval, on Methods for Safety Assessment, and the Forum on Stakeholder Confidence.

Over the past three years, the NWMO has hosted or participated in a number of international events, including:

- » hosting the 23rd International SKB Äspö Task Force meeting on modelling groundwater flow and transport of solute;
- » co-hosting the 2009 International Spent Fuel Workshop with the University of Western Ontario;
- » hosting the NEA Reversibility and Retrieval 2009 Project Meeting;
- » participating in project and annual meetings of the OECD/NEA Integration Group for the Safety Case, the BioProta working group for biosphere modelling, and the Clay Club; and
- » supporting the IAEA training course on Decision-Making and Stakeholder Involvement in Repository Development in Toronto, and the IAEA training course on safety assessment in Las Vegas.

In addition, the NWMO hosts an annual Geoscience Seminar, which brings together over 50 Canadian and international participants from universities, research organizations and consulting firms. Discussions focus on the NWMO geoscience work programs and address topics such as long-term climate change, radionuclide transport processes, seismology, geosphere evolution, and techniques for matrix pore water extraction and analysis. The seminar has brought together people with various areas of expertise and provided direction for future work to address challenging geosciences topics.

Through the period, the NWMO also provided technical presentations and workshops with Canadian universities, the consulting community and government organizations. Notable among these were:

- » workshops on used fuel container corrosion, on sealing materials technology development, and on glaciation scenario assessment;
- » an annual technical program update with the CNSC; and
- » presentations to students at Queen's University, Carleton University, Ryerson University, Lakehead University and the University of Ontario Institute of Technology.

NWMO technical staff have also participated in community engagement activities. At these activities, staff provide technical information to support discussions at community or municipal forums and open houses. However, these are also opportunities to learn about community interests and perspectives. In particular, technical staff have been involved in various activities with Aboriginal groups that bring a different perspective than normally provided through technical training.



The NWMO annual geoscience seminar attracts scientists from across Canada and internationally.



Provide Financial Surety

NWMO 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. 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 and protects enough money to ensure that the entire cost can be covered under a variety of social and economic circumstances, and within a required time frame.

The Adaptive Phased Management (APM) life cycle cost estimate is based on a deep geological repository and transportation system with an in-service date assumed at 2035 and a 30-year operational period followed by extended monitoring, decommissioning and closure of the facility. The conceptual design and cost estimate for the APM facility was completed in 2005 and published in the NWMO's Final Study Report. The cost estimate is based on the assumption of all-road transportation of used nuclear fuel to the deep geological repository. Specific escalation rates and estimated rates of returns on funds have been estimated. The NWMO has committed to update the baseline cost estimates and contribution requirements periodically, and as a minimum, every five years.

Work to update the APM conceptual design and cost estimate is underway and will be completed by 2012.

The first step in developing the funding formula involved identifying the key principles. During the study phase, the NWMO heard from many Canadians that the long-term management of used nuclear fuel must achieve a number of objectives, of which three apply clearly to the funding formula:

- » Fairness – to ensure fairness in the distribution of costs, benefits, risks and responsibilities, within this generation and across generations
- » Economic viability – to ensure the economic viability of the waste management system, while simultaneously contributing positively to the local economy
- » Adaptability – to ensure a capacity to adapt to changing knowledge and conditions over time

These objectives led to five key principles that were used to develop the funding formula:

- » Producer pays – cost sharing is based on repository usage and fuel quantities
- » Financial conservatism – the highest cost scenario of APM is used
- » Uncertainty analysis – contingencies to provide for unforeseen events
- » Intergenerational fairness – collection of funds over the economic life of the reactors
- » Fund growth – reasonable assumptions are used for growth

The next step was to develop key assumptions including economic factors and funding methodologies.

The draft plan was reviewed with the NWMO Advisory Council and Board of Directors. An External Expert Panel assessed the reasonability of the economic assumptions, the funding methods, the funding period of committed costs and the assumed start date of operations. The members of the Expert panel were Jean-Paul Baillet, Secretary General ANDRA (French national agency for radioactive waste management); Don Carmichael, financial consultant, former investment banker, Power and Energy Group, Scotia Capital Inc. (1996 to 2005), financial advisor to OPG; Donald Dewees, professor of economics, professor of law, University of Toronto, former vice-chair Market Design Committee, Ontario Electricity Sector; and Richard Ferch, nuclear consultant, formerly director, Wastes and Decommissioning, Canadian Nuclear Safety Commission.

The NWMO submitted a proposed funding formula to the Minister of Natural Resources in its 2007 annual report. Natural Resources Canada undertook a detailed review of the proposal, engaging in-house and external experts. An independent appraisal was completed by the secretariat of the Organisation for Economic Co-operation and Development Nuclear Energy Agency. Mercer reviewed the formula in accordance with generally accepted actuarial principles of the Canadian Institute of Actuaries.

The Minister of Natural Resources approved the funding formula in April 2009.

The NWMO is required to provide a range of financial information in each annual report as defined in the *Nuclear Fuel Waste Act*. This information is reported in Chapter 10, *Financial Reporting Requirements*.



Review, Adjust and Adapt Plans

NWMO 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.

Throughout the 2002–2005 study led by the NWMO and in the many engagement activities undertaken by the NWMO in recent years, the concept of adaptability was and continues to be identified by Canadians as a vital requirement for the long-term management of used nuclear fuel.

The long-term management of used nuclear fuel will necessarily be implemented over many decades. It is recognized that energy policies will change over that time, societal values and expectations will evolve, and technology will advance. There is an expectation that the NWMO's plans will keep pace with emerging developments, and the organization will have an active process in place for ongoing monitoring and review of new developments so that implementation plans can be adjusted as required. There is a societal expectation that the NWMO will be transparent in how it reviews emerging developments and adapts plans over time in response to the changing external landscape.

Adaptive processes that take into account new information and learning and provide for program flexibility are at the core of Canada's plan for used nuclear fuel. Incorporating new learning and knowledge into decision-making is a key strength of the Adaptive Phased Management (APM) program. We do not know what nuclear technologies or waste management methods may be available to future generations. We cannot predict today the specific types and volumes of used fuel that will need to be managed in the future. We do not know what the capacity of future generations will be to take an active role in managing this waste. Our obligation is to give them a real choice and the opportunity to shape their own decisions, and not impose a burden that they may not be able to manage. Through a phased implementation process with explicit stepwise decision points, new knowledge, new technology and societal change can be accommodated. The NWMO is committed to re-evaluating choices where warranted, maintaining the option to adjust course, and being prepared to act on new information and changing circumstances. Throughout the many phases, the NWMO's decision-making will continue to be guided by its vision and values.

The nature of this adaptation needs to be the subject of sustained dialogue with citizens and collaborative planning throughout implementation. For

transparency, the NWMO will seek multiple opportunities to engage citizens, specialists and affected communities on an ongoing basis to continually confirm the social acceptability of our plan. Since receiving the mandate for implementation in 2007, the organization initiated a process for monitoring, reviewing and reporting out on developments in societal expectations, energy policy and technology that could impact long-term used nuclear fuel management. Over the past three years, the NWMO has monitored and reported regularly on the evolution of knowledge in a number of areas that may be important for future planning: evolving energy policy, technical developments on nuclear waste management and societal expectations. The rolling five-year implementation plans for APM, initiated in 2008, are 'living' documents that reflect an ever-changing environment.

Energy Policy

The *Nuclear Fuel Waste Act (NFWA)* requires that the NWMO manage all Canada's used nuclear fuel – that which exists now, and that which will be produced in the future.

The amounts of used fuel to be managed in the future and the nature of that used fuel will be impacted by energy policy decisions. These energy policy decisions will not be made by the NWMO. They will be taken by provincial governments, nuclear energy corporations and regulators. For example, the lives of existing nuclear reactors might be extended through refurbishment projects. In addition, decisions may be made to build new nuclear plants, potentially using different reactor technologies. Such developments may increase the quantities of used nuclear fuel to be managed, with potentially different characteristics. In the 2008–2010 period, energy policy discussions continued to evolve as provinces addressed refurbishment plans and plans to build new nuclear reactors. For example, consideration has been given to introducing light water reactors in several provinces, a technology used elsewhere in the world that produces used nuclear fuel with characteristics different from those that Canadian nuclear operators now manage.

The NWMO recognizes these uncertainties in the operating environment and has put in place an active process for ongoing monitoring and review of new developments so that the organization is prepared to assume its legal responsibilities for managing used nuclear fuel in light of evolving energy policy.

Beginning in 2008, the NWMO began publishing information on current and potential future inventories of used fuel volumes and types on an annual basis. The reports consider used fuel that may be produced annually to end-of-life operation of each existing reactor, used fuel projected from various refurbishment projects, and used fuel from potential future new plants based on a range of possible reactor designs and fuel types, including enriched uranium. As these decisions are made by energy corporations and governments on nuclear generation and reactor technologies, the NWMO's forecasts will be updated.

In 2008, the NWMO published a report that outlines the financial implications of used fuel volume variations. In the NWMO's Final Study Report published in 2005, a total used fuel volume of 3.6 million bundles was assumed. As part of the NWMO's commitment to review and adapt its implementation plan in light of changing energy policy regarding the refurbishment of existing nuclear generating units and new build, the 2008 report provides an assessment of the cost of building and operating a deep geological repository

VOLUME OF USED NUCLEAR FUEL

As of June 30, 2010, Canada has produced approximately 2.2 million used fuel bundles.

If Canada's existing reactors operate to the end of their planned current lives, including planned refurbishments, the number of used fuel bundles that will need to be managed in the facility could more than double the current inventory.

A variety of new reactor designs are being considered by Canada's nuclear energy corporations, some of which operate with fuel types not currently used in Canada. Therefore, the total volume and type of future nuclear fuel wastes from these new reactors remains uncertain at this time.

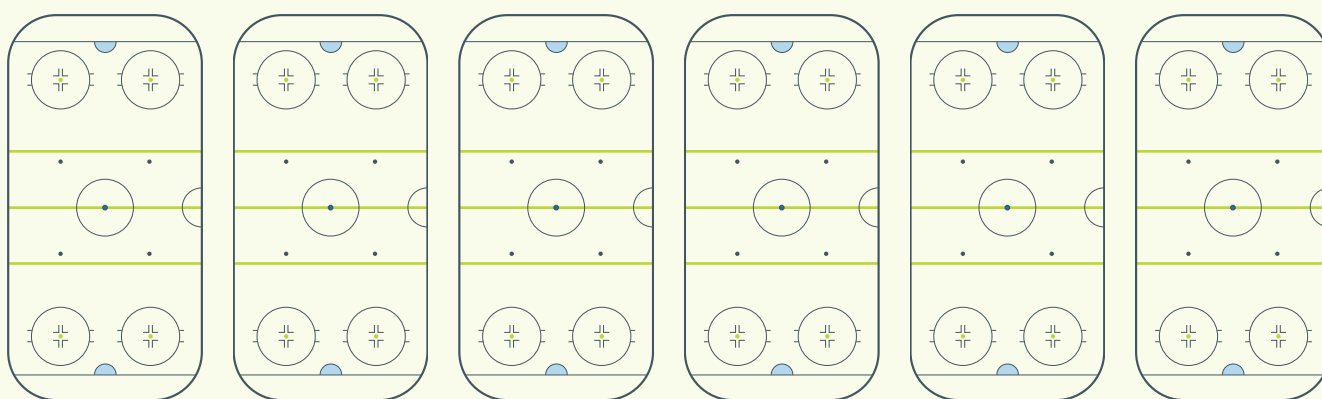
to accommodate 7.2 million bundles.

In 2009, the NWMO published a report that examines possible technical design implications of potential future changes in volumes and types of used fuel to be managed, including implications for repository dimensions and design and duration of used fuel transportation and active management. The report found that a single repository could be designed to accommodate a wide range of used fuel from existing reactors as well as from proposed new build reactors. Also, the footprint of the repository is largely determined by the heat load from the used fuel, rather than the volume of used fuel.

These reports are available on the NWMO website at www.nwmo.ca/adaption.

The APM site selection process, developed collaboratively over 2008 and 2009, recognizes that new reactors are possible in the future. The site selection process proposes a way forward on how the NWMO, communities, and others who are interested and potentially affected, can together manage change in light of uncertainty on future volumes of used fuel. The site selection process commits that the specific volume of used fuel to be placed in the repository will be agreed with the willing host community based on 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.

Throughout the implementation of APM, it will be important that the NWMO test the applicability of its plans for their social, ethical and technical appropriateness in light of new projections of used fuel types and volumes to be managed.



» A CANDU fuel bundle is approximately 0.5 metre long. Stacked like cordwood, all Canada's used nuclear fuel could fit into six hockey rinks.

Technological Developments in Managing Used Nuclear Fuel

Canadians emphasized that a component of Canada's plan should be a commitment to ongoing investigation and research in emerging technologies and international best practices to assess their potential for the future management of used fuel.

Used Fuel Reprocessing, Partitioning and Transmutation

Canadians have expressed an interest in knowing more about the possibility of recycling or reusing used nuclear fuel. In light of this area of interest, the NWMO made a commitment in its 2005 Final Study Report to keep a "watching brief" on technological developments in reprocessing and alternative waste technologies.

Reprocessing, partitioning and transmutation would require a deep geological repository for the long-term management of the residual high-level radioactive wastes.

The NWMO has been tracking developments on used nuclear fuel reprocessing, partitioning and transmutation (RP&T) and alternative technologies for the long-term management of nuclear fuel waste. In 2008, the NWMO published on its website a report on RP&T and other technologies for the long-term management of used nuclear fuel, subsequently updated in 2009 and 2010. The reports document recent developments in national and international research activities on these subjects, as well as their potential impact on radioactive waste management. In addition, a Background paper was produced in 2010 that summarizes RP&T issues.

In Canada, independent studies commissioned by the NWMO have concluded that for a number of reasons, reprocessing is considered highly unlikely to be a viable nuclear waste management method for Canada at this time. Reprocessing CANDU used fuel produces residual radioactive waste that could be more difficult to manage than used nuclear fuel in its un-reprocessed form (e.g., large volumes of highly corrosive liquid wastes that need to be further treated prior to placement in a deep geological repository). In addition, reprocessing is far from being economically viable at this time and potentially separates out material that could be used in the production of nuclear weapons (which raises additional concerns about security and proliferation issues).

Partitioning and transmutation involves the separation of the used nuclear fuel into its various radionuclide components and the subsequent destruction or conversion of the long-lived actinides into shorter-lived products; for example, by inducing fission with fast neutrons. This requires advanced reactor designs or accelerator systems that are decades away from even prototype demonstration units.

One potential benefit of the advanced reactor designs is the ability to recover additional energy from the used nuclear fuel via the fissioning of U-238 and other actinides.

WATCHING BRIEF ON REPROCESSING, PARTITIONING AND TRANSMUTATION (RP&T) AND ALTERNATIVE WASTE MANAGEMENT TECHNOLOGY

The NWMO provides a watching brief on international developments in reprocessing, partitioning and transmutation (RP&T) of used nuclear fuel, and alternative technologies for long-term management of nuclear fuel waste. APM was developed based on a once-through nuclear fuel cycle as currently practiced by all Canadian nuclear utilities and includes placement of used fuel in a deep geological repository. RP&T would still require a deep repository for the long-term management of the residual high-level radioactive wastes from reprocessing.

The first report published in 2008 was a broad survey of recent developments in RP&T.

The 2009 report focused on selected topics in RP&T:

- 1) the US situation arising from the virtual cancellation of the Yucca Mountain facility for used nuclear fuel;
- 2) a new European Union policy on nuclear power;
- 3) the revival of interest in thorium fuels;
- 4) an update on reprocessing costs; and
- 5) alternative waste management technology.

The 2010 report presents the current state-of-the-art of RP&T with regard to implications for the Canadian context.

» **Reprocessing** is a general term for applying chemical and physical processes to used fuel to separate out (**partition**) its components generally into five streams:

- a) the metal fuel cladding materials that hold the fuel pellets;
- b) uranium, which can be further processed or enriched to recover the remaining U-235 for recycling in fresh reactor fuels;
- c) other fissile isotopes such as plutonium-239, which can be recycled in fresh reactor fuels;
- d) fission products and other radioactive isotopes formed by neutron activation, which are generally not recovered for re-use; and
- e) minor actinides that have long half lives and are responsible for the long-lived radioactivity of used fuel.

» **Transmutation** involves forcing the minor actinides to fission in an intense flux of high energy neutrons provided by a fast reactor and/or an accelerator driven system with the purpose of converting them to shorter-lived fission products prior to geological disposal.

Should Canada reprocess used nuclear fuel in the future, the safe and secure management of the residual radioactive wastes from that process would need to be the subject of further dialogue and engagement with Canadians.

The NWMO continues to stay abreast of international developments in reprocessing technology and alternative waste management technologies. We note that reprocessing is not the current policy in Canada and implementing it would be a joint decision by the nuclear energy producers, the associated provincial governments and the federal government. Should such a decision be made to reprocess some or all Canada's used nuclear fuel, the NWMO would review its plans with interested parties with regard to the management of high-level wastes arising from reprocessing. Note that such a decision does not need to be made prior to the development of a used fuel repository. The used fuel in a repository could be retrieved for reprocessing/recycling if such a decision should be taken in the future. Regardless of any future decision on reprocessing, Canada will require a deep geological repository. Reprocessing leaves residual high-level radioactive wastes that must be safely managed over the long term.

Borehole Technology

One of the alternative waste management technologies that the NWMO continues to monitor is the very deep borehole concept that consists of placing stacks or strings of small used nuclear fuel packages nominally three to six kilometres deep in individual boreholes drilled from the surface. Sandia Laboratories in the United States has produced a preliminary evaluation of very deep borehole disposal of used fuel from the US reactors, indicating potentially acceptable long-term safety. The study also indicates that construction costs for very deep borehole disposal of light water reactor fuel would be competitive with a mined repository. However, estimates produced for the NWMO suggest that at present, the cost of constructing very deep boreholes for disposal of existing CANDU fuel waste in Canada would be significantly greater than that for light water reactor fuel due to the smaller size of the CANDU fuel bundle and the greater quantity of the natural (un-enriched) uranium fuel used in a CANDU reactor per megawatt of power produced. Further work would be required to adequately compare the total life cycle costs for very deep borehole disposal of Canada's used fuel with the current concept of APM. As well, use of the very deep borehole design would not meet the requirements of long-term monitoring and retrievability, key features in APM, the plan developed with Canadians.

While the NWMO maintains a watching brief on this management technology, it does not at present represent a preferred alternative to the deep geological repository concept currently planned for long-term management of Canada's used nuclear fuel.

APM requires that used nuclear fuel can be accessed and safely removed from the deep geological repository. The decision to close the repository will only be made once a future society and government institutions and processes of the day agree.

Retrievability of Used Nuclear Fuel

Retrievability is an important feature in keeping Canada's plan adaptive to future scenarios. During the study phase and in the 2007–2010 engagement activities, participants continued to emphasize the importance of keeping used fuel accessible and retrievable in the event of new technological developments and opportunities. Advances in technology might allow used nuclear fuel to be efficiently re-used as a future energy source or offer preferred approaches for long-term management. In anticipation of these and other technical advances, planning and implementation of APM must allow for the used fuel to be accessible and retrievable. Decisions made today should not preclude the possibility of applying new knowledge for managing this material. The incorporation of monitoring and retrievability of the used fuel into the repository design will give future societies the flexibility to retrieve the used fuel as required.

APM provides for retrievability of the used nuclear fuel throughout all phases of implementation.

In elaborating the technical design of the repository, the NWMO will address retrieval technology development and demonstration. Any features designed to facilitate retrieval of used fuel will not compromise the ultimate safety of the deep geological repository.

The NWMO's work program continues to develop options for retrieving used fuel containers from various designs of a repository in scenarios of both crystalline rock and sedimentary rock.

In support of this important aspect of managing used nuclear fuel, in 2009 and 2010, the NWMO participated in an international project that surveys the range of technologies and approaches developed across countries and explores technical and social issues. The NWMO participated in an international conference in 2010 for sharing of international plans and best practices.

Evolving Societal Expectations

The NWMO understands that the strength and acceptance of its approach to managing Canada's used nuclear fuel will come from a shared vision of where we are headed. As the NWMO has taken the first steps in designing and implementing APM, the organization has sought to do so in a way that meets societal values and expectations.

Throughout all engagement activities in the period 2008 to 2010, the NWMO listened to Canadians to confirm the continued social acceptability of implementing APM. Substantive discussions arose as part of our dialogue on the design of a process for site selection. The NWMO used a variety of engagement techniques to help ensure that a diversity of perspectives was heard. All the comments received were considered in the development of implementation plans.

Views to help benchmark public concerns were also heard from participants in Citizen Panels, through public attitude research studies conducted by the NWMO throughout this period, through submissions and surveys on the NWMO website, and through regular review of published media including news reports of comments made, letters to the editor, websites and blogs, and results from published public attitude research that track the evolution of the values, priorities and expectations of Canadians in a variety of areas. We also engaged practitioners active in the implementation of large development

projects in Canada to learn from their experience and develop best practices to ensure the needs and expectations of Canadians are addressed. Similarly, we engaged organizations and practitioners implementing similar projects in other countries to learn from their efforts to understand the needs and expectations of their citizens and the practices they are developing to respond to them.

Public Attitude Research

Canadians have told the NWMO that APM must be implemented in a manner that is responsive to citizens' expectations, priorities and concerns, even as these evolve over time. We have strived to understand the expectations of Canadians at large through public attitude research methods.

In late 2006 and through 2007, we engaged Navigator Ltd., a Canadian research firm, to convene a series of discussions with community opinion leaders in the four nuclear provinces. This qualitative research explored and confirmed the characteristics Canadians expect of an organization implementing a long-term management approach for used nuclear fuel. Many of the participants agreed to continue contributing to our social research by reconstituting into citizen panels for further discussions about the NWMO and nuclear waste management. Panelists were subjected to a standard research screening survey to ensure a diversity of age, gender and experience. Navigator Ltd. continued its work to recruit, organize, administer and report on the Citizen Panels. The locations for the panels were chosen to include major population centres in the nuclear fuel cycle provinces and regions so that a broad range of views might be heard. These Citizen Panels met several times through 2008 and 2009. A summary report of the panel sessions is published on the NWMO website at www.nwmo.ca/citizenpanels.

The NWMO also commissioned a number of public opinion surveys. During 2008, Ipsos Reid was commissioned to conduct a nationwide telephone survey of 2,600 Canadians to solicit input to the design of the siting process. The survey focused on:

- » national and community issues of importance (tracking questions);
- » the importance of and support for nuclear power for generating electricity (tracking questions);
- » familiarity with the nuclear waste management process (tracking questions);
- » awareness of and support for the NWMO (tracking questions);
- » weighing the risks and benefits of hosting a nuclear waste management facility;
- » the importance of factors to be considered during the site selection process;
- » the desired role for different actors in the site selection process;
- » views on the location and transportation of nuclear waste;
- » interest in learning more about the site selection process; and
- » who should be involved in the process of locating a nuclear waste facility.

The full Ipsos Reid results are posted on the NWMO website at www.nwmo.ca/report_on_nationwide_survey.

To support dialogue to collaboratively design a process for siting a deep geological repository, the NWMO undertook a second nationwide telephone survey. Conducted by the public opinion polling firm Pollara in October and

November 2009, the survey sought the views of more than 2,600 randomly selected Canadians. Questions tested and refined key components of the proposed process for selecting a site and tracked awareness on key variables related to the NWMO's work. Areas of focus included:

- » national and community issues of importance (tracking questions);
- » importance of and support for nuclear power for generating electricity (tracking questions);
- » familiarity with the nuclear waste management process (tracking questions);
- » awareness of and support for the NWMO (tracking questions);
- » importance of possible principles to guide decision-making;
- » importance of possible approaches to supporting communities that wish to consider hosting the project; and
- » approach to addressing concerns of other communities that may be affected.

The full Pollara results are posted on the NWMO website at www.nwmo.ca/review_nationwidesurvey.

The NWMO also commissioned qualitative research during the period. We conducted several sessions of focus groups on specialized questions during fall 2008. Two sessions, involving Aboriginal participants selected at random, reviewed an adapted draft version of the NWMO's corporate brochure. Their comments and suggestions led to refinements in the brochure before it was released in late 2008. The document was recommended by Niigani, the NWMO Aboriginal Working Group. We also commissioned focus groups to review the NWMO DVD. Participants provided helpful direction for future refinements of the presentation and for the production of DVDs on topics of interest to Canadians. Research reports for each of these activities are published on the NWMO website.

To further develop the site selection process, in 2009 the NWMO hosted two day-long dialogues with members of its Citizen Panels (facilitated by Ascentum Inc.), and five public discussion groups of randomly recruited citizens (facilitated by Navigator Ltd.). We also conducted several focus groups on specialized questions during 2009. This included review of selected backgrounders and the NWMO exhibit.

In addition to public attitude research, the NWMO received more than 200 written comments on its siting document, in the form of submissions, letters, "Contact Us" messages through the website, surveys completed on the website and workbooks returned. We received two petitions signed by approximately 60 people indicating they do not want the APM project sited in their community.

Understanding and Assessing Social, Economic and Cultural Effects

The *NFWA* requires that a broad approach be used to identify, assess and manage the potential effects of the preferred management approach on a host community. Over the past three years, we have heard from dialogue participants that a broad, holistic approach is an important component of any appropriate site selection process for Canada. In response to this need, work was initiated to explore and develop a broad framework for assessment under the umbrella of “community well-being.”

The NWMO would like to ensure that the well-being – the total of all social, economic and cultural effects – of any community that agrees to host Canada’s long-term management facility for used nuclear fuel will be fostered through the implementation of the project. The NWMO recognizes that community well-being can only be defined by the communities with which we engage, and that people with experience engaging communities in dialogue about community well-being can help in learning more about this concept and how it can be best operationalized. To stay abreast of evolving practices and learning about experiences with community well-being in Canada and around the world, the NWMO commissioned a series of papers and a workshop of practitioners to discuss experience and evolving best practices in this area. Reports from these activities can be reviewed on the NWMO website.

With confirmation through the dialogues of the appropriateness of the NWMO’s approach to assessment, the NWMO initiated work to develop a detailed framework for the assessment of social, economic and cultural effects. The NWMO invited independent experts with experience in a broad range of projects across Canada to assist in the development of the framework. Through a series of two workshops convened in 2009 and 2010, a framework was developed, reviewed and confirmed. The conversations during these workshops are published on the NWMO website.

The work was supplemented by two research papers prepared by Canadian academics, Brenda Murphy of Wilfred Laurier University and Annette Chrétien of Guelph University. These papers, prepared in response to a call for proposals, are published on the NWMO website.

Over the period, the NWMO has also worked with the Municipal Forum to identify and explore research topics of mutual interest. At the suggestion of Forum members, a project was launched to review, update and provide information about the potential economic benefits associated with APM for a host community, its surrounding area, economic region and province.

Conducted by a third-party contractor, AECOM, this work built upon an assessment of economic benefits originally presented in 2005. The new work, conducted over several phases, was designed to provide an “order-of-magnitude” indication of the possible economic benefits from siting of the APM project to a generic host community, economic region and host province. This work is published on the NWMO website. It will be updated as the cost allocation model for the project is refined and updated.

Ethical Considerations

The implementation of APM needs to be responsive to the values of Canadians even as these evolve over time. The way in which ethical considerations are addressed will be an important gauge for whether the NWMO and its activities continue to be responsive to the needs of Canadians.

An ethical and social framework for the NWMO's work was developed during the NWMO Study by a panel of preeminent Canadians with experience in the practical application of ethics in a number of fields. This framework was confirmed in dialogues conducted during the study and continues to guide the NWMO's work.

This framework has informed the NWMO's process of dialogue and collaboration with Canadians and has guided the development of key processes and plans over the past three years. Principles contained in this framework formed the starting point for NWMO dialogues conducted over the past three years. Through the dialogue process, these principles were examined, confirmed and evolved to a list of more operational statements designed to apply to the decisions at hand, specifically to the design of an appropriate site selection process. This framework also guided the development of the NWMO's approach to engagement and policies such as the NWMO Transparency Policy as part of the NWMO's effort to implement a values-based management process.

The NWMO understands the importance of continuous learning and the incorporation of best practices in this area. As part of this effort, the NWMO is a founding partner of the Canadian Business Ethics Research Network (CBERN), developed to bridge academic disciplines and economic sectors and weave together insights from business ethics, corporate social responsibility, sustainable development, triple bottom line and corporate governance research. The NWMO supports the CBERN in its drive to promote knowledge sharing and partnerships within the field of business ethics and across private, governmental, voluntary and academic sectors. We continue to learn through our participation in this important initiative.

Learning from Others

As we move forward, the NWMO will continue to engage citizens and specialists in a variety of areas to investigate a range of implementation questions. Over the period, the NWMO directly sought and commissioned a series of papers to support its work. It also invited proposals from researchers as part of its *Learn More Program* during 2008, and its *Research Support Program – Studies in the Humanities and Social Sciences* during 2009.

The NWMO continues to learn from and contribute to international developments in public engagement best practices concerning radioactive waste management.

We participate in the Forum on Stakeholder Confidence, a collaborative working group of the Organisation for Economic Co-operation and Development (OECD), an intergovernmental organization of industrialized countries, based in Paris. A focus of this group is sharing knowledge and experience in different countries regarding effective approaches for engaging citizens in nuclear waste management decision-making, and addressing the priorities and concerns of citizens in the development of policies, plans and facilities. Over the period, NWMO staff has presented updates on our public engagement experience and shared best practices with representatives of

the 15 other nuclear waste management programs. The NWMO has similarly contributed to international conferences and initiatives through presentations and participation in expert panels.

We expect the following areas will continue to be a focus:

- » What are the evolving approaches to dialogue, collaboration and dispute resolution?
- » How might the NWMO support the building of capacity among dialogue participants?
- » How might we best support the interweaving of Traditional Knowledge with that of natural, social and scientific research in decision-making?
- » What is the evolving framework of Canadian values that comes to bear on this topic?
- » How can we ensure the well-being of impacted communities?

APM will be implemented over many decades. The NWMO will have many opportunities to improve performance, enhance effectiveness, build understanding and address societal concerns. The nature and conduct of our social research will change as best practices evolve, and as interested citizens and organizations identify the issues of most interest and concern to them.

Interweaving of Aboriginal Traditional Knowledge with APM

Over the period, the NWMO has continued to build upon the process that began in 2003 of learning from Aboriginal Elders about Traditional Knowledge. The NWMO sought the guidance of Aboriginal peoples and Elders in the design of the framework for the study of approaches to the long-term management of used nuclear fuel. With the mandate to implement APM, the NWMO continues to learn about Aboriginal Traditional Knowledge (ATK) and how to reflect this insight and perspective in the design and conduct of its work. ATK will strengthen the implementation of APM.

We have talked with Elders, listened and learned a great deal. Our appreciation and understanding of the special relationship that Aboriginal peoples have with Mother Earth has grown. We have benefited from the wisdom of Elders in communities and from the members of the NWMO Elders Forum and Niigani.

ATK goes beyond knowledge and encompasses beliefs, understanding and ways of doing things. The NWMO does not presume to have achieved complete understanding or believe that it has fully integrated ATK. We are following a process of continuous learning and adaptation. We are not attempting to reconcile two different world views in an arbitrary or abstract manner, but rather to build on the basis of both.

The following sections describe examples of the application of ATK to the NWMO's work and our progress in learning more. The discussion focuses on planning, engagement and communications, areas that are common to all phases of the NWMO's work, from the establishment of the organization and study of options, to the design and implementation of the siting process.

EXTENSION OF UNDERSTANDING OF ABORIGINAL TRADITIONAL KNOWLEDGE TO PROCESS

...Applying these principles (for example, in any NWMO process) would involve the Elders and wisest speaking first, praying for assistance to make good decisions, constantly growing and evolving with new insights, involving the whole community, and considering the consequences of decisions we make today on seven generations into the future. It would recognize that people are part of and guardians of the land, understand and apply the consequences of breaking traditional law, and ensure strong accountability is integrated into the management strategy. This would involve consideration of the biophysical, economic, social, cultural and spiritual aspects of the environment while maintaining an emphasis on interrelationships.

Traditional Knowledge provides rules for: protecting the land while using it; clarifying and enhancing relationships among users; assisting in the development of technologies to meet the subsistence, health, trade and ritual needs of local people; and helping to create a world view that incorporates and makes sense of all of these in the context of a long-term, holistic perspective in decision-making.

Planning

One of the first activities that the NWMO undertook after it was formed was to host an ATK workshop (2003) to examine what is meant by “traditional knowledge” and how the NWMO and the study of options might best incorporate traditional insights and learning. Workshop participants included Elders, Traditional Knowledge holders, practitioners and academics. We learned that Traditional Knowledge is more than a simple compilation of facts drawn from local, and often remote, environments. It is a complex and sophisticated system of knowledge drawing on centuries of wisdom and experience. Traditional Knowledge and Aboriginal world views teach that people are part of the land, true guardians rather than owners of the land. The seven generation teachings require decision makers to consider the impact of their choices on future generations. Many principles of ATK identified in the Traditional Knowledge Workshop have influenced the NWMO’s work:

- » Honour the wisdom that can be garnered from speaking to Elders in both the Aboriginal and non-Aboriginal communities.
- » Respect opinions and suggestions of all who take the time to provide insight into this process.
- » Conservation, particularly as it applies to the consumption of electricity, must be a major part of the solution, not just a footnote in the NWMO process.
- » Transparency is essential to the process.
- » Accountability must be part of any solution, so that those responsible (whether for the concept or the delivery) are held to high account by the public for their actions.

These principles are reflected in the NWMO values of integrity, transparency, accountability and engagement. The NWMO’s values have guided the conduct of the study, have guided the NWMO in the early stages of the implementation of APM and will continue to guide the NWMO in the future.

The NWMO’s policies and plans have been developed through dialogue-driven and consensus-building processes that we believe respect the principles and values set out by Aboriginal peoples. The NWMO’s plans, processes and dialogue strive to include and demonstrate a diversity of views and balance the perspective of these views and specific disciplines in a holistic, overarching approach.

The assessment framework applied to the study of options was drawn from the insights of Aboriginal peoples among others and reflects the teachings of ATK.

ATK was reflected in the timelines for assessment. The 175-year time horizon coincides with the seven generations perspective for assessment of the implications of today’s decisions. Beyond 175 years, both ATK and future scenarios work conducted by the NWMO suggest it is not prudent to assume that social, institutional or environmental conditions will closely resemble those of today.

During the past three years, with the advice of the Elders Forum and through relationships with Aboriginal organizations and people throughout Canada, and with the ongoing insight provided through dialogue, the NWMO Aboriginal Policy was developed. The policy is built on five principles that recognize and honour the special relationship Aboriginal peoples have with the natural environment, their unique stewardship responsibilities, and that Aboriginal peoples are holders of ATK, which can bring value to decision-making processes.

NWMO Aboriginal Policy – Principles:

- » Good decision-making among Aboriginal peoples regarding the NWMO's work must be built on a foundation of knowledge to ensure that informed choices can be made by Aboriginal communities.
- » The NWMO recognizes and honours that Aboriginal peoples have a special relationship with the natural environment and have unique stewardship responsibilities that are part of this relationship.
- » Consideration for the safety and security of future generations is integral to the Aboriginal world view and fundamental to decision-making processes of Aboriginal peoples.
- » Open and honest relationships are built on a foundation of trust and sharing of knowledge and information.
- » The NWMO acknowledges that Aboriginal peoples are holders of ATK and recognizes the value that ATK can bring to decision-making processes.

Among the policy commitments is, "Aboriginal Traditional Knowledge can bring value to the decision-making process, and the NWMO will strive to interweave this knowledge with our work as appropriate. The NWMO will ensure that intellectual property is protected as agreed with those that are owners of the intellectual property."

The principles and values are also reflected in the guiding principles for the siting process (see discussion in the section *Collaboratively Design and Implement the Siting Process* of Chapter 6).

Over the period, the NWMO has also conducted a series of cultural education programs and opportunities, under the guidance of Niigani Elders, for Advisory Council members as well as NWMO staff. The purpose of these sessions is to increase sensitivity to and understanding of traditional Aboriginal practices, protocols, governance and history, and to aid communication and understanding across western science and Traditional Knowledge. One of the NWMO Aboriginal Policy commitments is cultural training sessions on an ongoing basis.



Niigani meets with the
NWMO Advisory
Council. »

Engagement

The NWMO is working to engage with potentially impacted Aboriginal peoples in a manner that is meaningful to both Aboriginal peoples and to the NWMO. Over the last three years, the organization has continued to build a way of working with Aboriginal communities that respects their decision-making processes.

The NWMO has provided support to Aboriginal organizations to design and implement dialogue processes to allow Aboriginal peoples to think through the issues in a culturally appropriate way, contribute their perspective and influence decision-making. Initially, we established agreements with national organizations as a means of achieving the broadest exposure possible. As the study progressed, we established agreements with regional and local organizations to strengthen direct contact at the local level.

Refinement of the proposed site selection process in 2009 included agreements with provincial Aboriginal organizations to collaboratively design and conduct regional dialogues to provide information and seek Aboriginal peoples' thoughts and their involvement.

The Elders Forum and Niigani meet with the NWMO regularly about the implementation of APM. At the request of the Elders, the format of gatherings includes the Aboriginal tradition of a 'talking circle' and prayers and ceremonies. Throughout the NWMO's engagement with Aboriginal peoples, ceremonies, prayers and ATK have been a key part of all activities and are reported as agreed with the knowledge holders. However, not all activities can be reported so that intellectual property, ceremonies, spiritual practices and stories are protected.

The engagement program is built on a number of understandings, many of which respond to direction from Aboriginal dialogues. These include:

- 1.** Judgments about acceptable risk and safety at each point in the process need to be made collaboratively with those most potentially affected.
- 2.** Detailed implementation plans need to be developed in an iterative and collaborative manner with those most potentially affected. Also responsive to direction from Aboriginal peoples is the recognition that social, economic and cultural effects may be felt in areas far removed from the physical location of the new project or facility, and that the linked issues of fairness and justice lie at the centre of many socio-economic concerns.
- 3.** Addressing the needs and concerns of affected site communities is a key goal of engagement. The internal cultural and social structure of Aboriginal communities may be vulnerable to pressures that arise from development activities.
- 4.** Transparency and openness in decision-making will be facilitated through the design and implementation of the engagement program.
- 5.** Continuous learning and adaptation are also important goals of the engagement program.
- 6.** The engagement program should preserve and sustain a sense of urgency and momentum throughout implementation.
- 7.** The conditions for educational outreach and the development of an informed citizenry as well as a culture of vigilance should be enhanced through the engagement process.
- 8.** A special responsibility is owed to potentially affected Aboriginal peoples.
- 9.** Consultation required by regulatory processes will be one among many components of the engagement program.

Enhancing Understanding

With the assistance and support of Niigani, special projects were conducted in 2007 and 2008 to build understanding of Aboriginal community life, culture, governance structures, protocols, spiritual life and Traditional Knowledge practices.

The NWMO convened a group of Aboriginal communication specialists to redesign the NWMO corporate brochure and the NWMO corporate video to better respond to the needs of Aboriginal peoples. The corporate DVD was substantially revised and is now available in nine Aboriginal languages.

One specially designed Traditional Knowledge project in 2008 involved NWMO staff and members of a First Nation fishing community. The project encouraged dialogue and exploration of the interweaving of these world views in the work of the NWMO through a variety of techniques, including traditional storytelling as used by Aboriginal Elders and facilitated discussions led by specialists in bridging understandings between Traditional Knowledge and Western science. The cultural immersion approach together with technical discussions helped participants engage at personal and professional levels. Through both traditional teaching methods (hands-on sensory with reflection) and academic approaches, participants better appreciated the value of both systems.

A Traditional Knowledge Workshop held in 2009 brought together people with experience in interweaving Traditional Knowledge with Western knowledge with the NWMO to discuss Traditional Knowledge concepts and best practices in projects and development underway in Canada.

In 2009, the NWMO pledged to provide \$105,000 over three years in support of the Chair in Indigenous Governance at Ryerson University.

Ensuring the Safety of a Site and Fostering Community Well-Being

Aboriginal peoples have a special relationship with the natural environment and have 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 and the processes that should be used in assessing the appropriateness of any site. This includes both the assessment of technical safety as well as factors beyond safety or community well-being.

ATK includes important knowledge about the land and ecology stemming from long contact with the land. It also includes knowledge about developing and maintaining effective and meaningful relationships between generations and within and between communities.

Traditional Knowledge systems assume that people are part of the land, not that they own the land, and are guardians of Mother Earth. ATK emphasizes the interrelationships between components of the environment.

Traditional Knowledge provides rules for protecting the land while using it; clarifying and enhancing relationships among users; assisting in the development of technologies to meet the subsistence, health, trade and ritual needs of local people; and helping to create a world view that incorporates and makes sense of all of these in the context of a long-term, holistic perspective in decision-making.

Appropriate consideration and respect must be given to factors such as:

- » spiritual and physical aspects of the land, people, wildlife and their habitat;
- » the relationships between various aspects of the environment, including humans;
- » the Aboriginal sense of responsibility and stewardship;
- » the health, trade and spiritual needs of people;
- » aspects of traditional community life such as culturally oriented activities, and the wide range of volunteer activities, recreational activities, housework and subsistence activities; and
- » the impact of our actions seven generations or more into the future.

ATK is a complex and sophisticated system of knowledge drawing on centuries of wisdom and experience. It constantly grows and changes with new information. The wisdom derived from this philosophy can be used when planning for the future. For example, the seven generation teachings require decision makers to consider the impact of their choices on future generations.

The NWMO will look to Aboriginal peoples as practitioners of Traditional Knowledge to be active participants in the site selection process, and to share that knowledge with the NWMO to the extent they wish to in order to help guide the decisions involved in site selection and ensure safety and the long-term well-being of the community. The NWMO will seek to engage in discussions with Traditional Knowledge holders to ensure that the factors and approaches used to assess the site appropriately interweave Traditional Knowledge and Western science throughout the steps in the siting process.

Reporting Out

The NWMO recognizes that many communities of interest will have important roles to play in the development and delivery of APM. As part of the organization's desire to keep Canadians updated and involved in the development of our plans, the NWMO has committed to report regularly on its evolving plans for implementing APM.

Our rolling five-year strategic plan, published annually and titled *Implementing Adaptive Phased Management* and known as the Implementation Plan, reflects the ever-changing environment and how we respond to it. It is reviewed and updated annually. The NWMO reports on progress against these plans in the NWMO annual reports.

The NWMO publishes its social and technical research and posts reports on the NWMO website at www.nwmo.ca.

GOING FORWARD – ABORIGINAL TRADITIONAL KNOWLEDGE

As potential host communities come forward, the NWMO will prepare frameworks for the detailed feasibility studies. One of these frameworks outlines what Aboriginal Traditional Knowledge means in our work, and while it will evolve over time as affected Aboriginal communities become involved, it will reflect the commitments made in the site selection process and discussions with Aboriginal peoples.

- » The NWMO is committed to the early involvement of affected Aboriginal peoples in the process for selecting a site. The NWMO will encourage any community interested in hosting this project to involve surrounding communities, regions and potentially affected Aboriginal governments as early as possible in conversations about the potential suitability of the community and site. As potentially interested communities begin to come forward, full opportunity will be provided to surrounding communities, including Aboriginal communities, to have their questions and concerns heard and taken into account in decision-making on a preferred site. In 2010, the NWMO began the communication process with Aboriginal communities neighbouring potentially interested host communities involved in the early steps of the site selection process in order to begin the development of the long-term relationship needed as site selection proceeds.
- » The NWMO will seek the wisdom of Elders of affected Aboriginal communities and will work together with them as well as the leaders and members of the community to interweave their Traditional Knowledge with the NWMO's work.
 - The NWMO will look to Aboriginal peoples as holders of Traditional Knowledge to be active participants in the site selection process, and to share that knowledge with the NWMO to the extent they wish to in order to help guide the decisions involved in site selection and ensure safety and the long-term well-being of the community.
 - The NWMO will ensure that Aboriginal intellectual property is protected, as agreed with the Aboriginal peoples who choose to share that knowledge with us.
 - Inclusion of traditional and spiritual practices as deemed important by affected Aboriginal peoples and acceptance that Aboriginal communities will identify areas that are "sacred" to them.
 - The NWMO will seek to understand the traditional laws, practices, decision-making processes and protocols, languages and culture, use of land and medicines, and varieties of and protection of species in order to ensure appropriate planning and agreements with affected Aboriginal peoples to sustain traditions and community life.
 - Recognition that historical experiences and the potential that lack of interweaving of Traditional Knowledge in decision-making processes in the past will impact the time and effort needed to accomplish this commitment.
 - Development through dialogue of a partnership approach to foster respect, stewardship and conservation ethics and values, consultation approaches and agreements with affected Aboriginal peoples and plan for transferring of knowledge between generations.
- » The process will ensure, through a regional study, that those who are potentially affected by locating the project at a particular site will have the capacity and the opportunity to be involved in planning how the project will be implemented.
- » The NWMO recognizes that the Traditional Knowledge of any area is unique and highly specialized to the Aboriginal peoples of that area and that there will be a diversity of cultures, practices and approaches among Aboriginal communities.
- » Aboriginal communities will have available to them the resources to participate in the process – as an interested and potentially willing community, or as a community that is nearby an interested community (as one of the surrounding communities).
- » The siting process will respect Aboriginal rights and treaties and will take into account that there may be unresolved claims between Aboriginal peoples and the Crown.
- » The NWMO will ensure availability of independent experts to affected Aboriginal communities.
- » The NWMO will work with the Crown in fulfilling its duty to consult with, and accommodate if necessary, all those Aboriginal communities impacted by the development of the site.
- » The NWMO will continue its cultural training of NWMO staff and representatives and will gradually focus on the history, culture, practices and protocols of affected Aboriginal peoples.



Ensure Accountability

NWMO 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 NWMO was created in 2002 by Canada's used nuclear fuel producers as a requirement of the *Nuclear Fuel Waste Act (NFWA)*. Accordingly, the waste owners are the Member corporations, and the organization is subject to the requirements of the *NFWA* and oversight by the Minister of Natural Resources Canada. The NWMO's annual and triennial reports are submitted to the Minister of Natural Resources and are made public at the same time. They are also tabled in both Houses of Parliament by the Minister.

Members

The founding Members – Ontario Power Generation, Hydro-Québec and NB Power Nuclear – are bound by a membership agreement and bylaw, both updated in 2007, which set out their roles and responsibilities in furtherance of the objectives of the *NFWA* and the NWMO's mandate. They, along with Atomic Energy of Canada Limited, are required to fund the NWMO's operations and to set aside trust funds to pay for the long-term management of used nuclear fuel (www.nwmo.ca/trustfunds).

Board of Directors

The Member corporations appoint a Board of Directors. The directors, representing a range of perspectives from within and outside the nuclear industry, are responsible for oversight of the organization and taking a leadership role in the development of the corporation's strategic direction. In the interest of openness and transparency, the Board of Directors posts the minutes of its meetings on the NWMO website at www.nwmo.ca/boardminutes.

Advisory Council

The Board also appoints an Advisory Council that is required by the *NFWA* to review and comment on the NWMO's work. These independent comments must be included in the NWMO's triennial reports, which are submitted to the Minister of Natural Resources and made public (Chapter 14, *Advisory Council Comments*). The Council also meets regularly with the NWMO to provide ongoing advice on the organization's plans and activities. This guidance is summarized in the NWMO's annual reports. The Council directs that minutes of its meetings be posted on the NWMO website at www.nwmo.ca/advisorycouncilminutes. Current membership of the Advisory Council represents a broad range of expertise, including geosciences, strategic communications, environment, health physics, engineering, medicine, political science and Aboriginal Traditional Knowledge.

Independent Technical Review Group

In 2008, following the NWMO having been given full responsibility for managing and directing research on used nuclear fuel in Canada, the NWMO's Board of Directors established an Independent Technical Review Group (ITRG) to review the organization's technical research program on an ongoing basis. Membership on the ITRG comprises specialists from Canada, Sweden, Switzerland and the United Kingdom with significant experience in technologies associated with implementing nuclear waste geologic repository projects. The group annually informs the Board of Directors and the Advisory Council on whether the technical program is based on appropriate scientific approaches and methodologies, is consistent with international practices, broadens and advances the NWMO's technical knowledge to adequately support implementation of Adaptive Phased Management, and has sufficient resources to achieve its mission.

The ITRG reports, and the NWMO's responses to them, are posted on the NWMO website each year at www.nwmo.ca/itrg.



Independent Technical Review Group meets with NWMO staff. »

MEMBERS OF THE INDEPENDENT TECHNICAL REVIEW GROUP

- » **Allan Hooper** is the Chair of the Independent Technical Review Group. He is an independent consultant who specializes in the safe, long-term management of radioactive waste for the UK and other national programs since 2007. He has held a number of senior management positions in the UK repository development program, including Director for Science. Dr. Hooper currently acts as the Chief Scientific Advisor to the UK Nuclear Decommissioning Authority Radioactive Waste Management Directorate, and in 2008 was appointed Visiting Professor in the Department of Earth Science and Engineering at Imperial College London.
- » **Kaj Ahlbom** has 30 years of experience in the Swedish radioactive waste program concerning site selection, site characterisation and interaction with stakeholders. Since 2002, he has been the Site Manager for SKB's (Swedish Nuclear Fuel and Waste Management Company) site investigation for a repository for spent nuclear fuel at Forsmark, Sweden. He has been involved in all aspects of site selection, from formulating site selection criteria to participating in the site selection process and investigating candidate municipalities and sites.
- » **Lawrence Johnson** is a senior scientist and research and development coordinator at Nagra (Swiss National Cooperative for the Disposal of Radioactive Waste), where he has worked since 1999 on various aspects of engineered barriers performance. He is the author of over 110 reports and journal papers covering many areas related to materials performance aspects of engineered barrier systems, as well as a number of studies dealing with long-term safety assessment.
- » **Derek Martin** has been a professor in the Department of Civil and Environmental Engineering at the University of Alberta, Edmonton, since 2000. Dr. Martin has reviewed nuclear waste programs for countries around the world. He is a scientific advisor to the Swedish nuclear fuel and waste management program, as well as a member of the Geoscience Review Group for Ontario Power Generation's Deep Geologic Repository project for Low and Intermediate Level Waste.

Quality Management

In preparation for, and in its first year of operation as an independent employer, the organization began implementing a management system to provide Canadians with assurance of the high quality of its work. Beginning in 2008, work commenced on a plan to achieve ISO 9001 compliance. Appropriate policies, procedures and standards were prepared and implemented for all activities in support of site selection and development of repositories for the long-term management of nuclear waste, including: public engagement; social, technical and financial studies; geoscientific research and investigation; engineering design; and environmental and safety assessment.

A Quality Policy was adopted describing the organization's management approach to ensuring the best knowledge, understanding and innovative thinking is used in analyses, public engagement and decision-making. The policy identifies the use of quality plans, monitoring and regular performance review to achieve continual improvement.

In 2010, following an external audit, the NWMO management system was certified compliant with the ISO 9001 Quality Management Standard. Audits will be conducted annually to ensure the organization maintains its certification at the premier internationally recognized standard for quality management.

Policies

The NWMO is committed to excellence to meet the needs and expectations of its members, communities and stakeholders. Over the past three years, the organization has established policies and procedures in support of its mandate. Among them:

- » A **Health and Safety Policy** that requires that managers assess and manage risks, design the work environment, and plan and execute work in a manner that protect workers and the public. The policy also commits the organization to continually improve health and safety performance.
- » A **Transparency Policy** that commits the NWMO to making information created, received and analyzed in support of the organization's work accessible to the public. The policy also describes how information that is legally privileged or protected will be managed.
- » An **Aboriginal Policy** that describes NWMO commitments to its relationships with Aboriginal peoples, including working with communities and entering into mutually beneficial agreements. The policy also commits to bringing Aboriginal Traditional Knowledge into the decision-making process as appropriate.
- » An **Environment Policy** that provides minimum requirements for environmental management in all NWMO work. The policy also requires implementation of an environmental management system compliant with the ISO 14001:2000 Environmental Management System Standard.
- » A **Code of Conduct** that provides overall direction to all NWMO employees regarding expectations of the organization about business transactions and individual professional behaviour. The Code describes expectations for employment practices, relationships, transparency, communications, information, environmental responsibility, financial integrity, intellectual property, conflict of interest and outside business activities.
- » A **Training and Development Policy and Procedure** that describes accountabilities for training and development and guidelines for identifying staff for training.
- » A **Performance Planning and Review Policy** that sets out minimum requirements for establishing, monitoring and reviewing individual performance plans and linking these to the organization's business objectives and targets.
- » A **Human Resources Policy** that commits the NWMO to employment equity, diversity, human rights, and prevention of workplace violence and harassment.
- » **Financial Policies** that describe how capital assets, revenue, estimates, research and development, and financial instruments and statements will be managed and prepared. These policies provide direction and additional management control by linking major project deliverables to approved budgets.
- » A **Media Communications Policy** that describes the responsibilities and accountabilities of employees when receiving and responding to media enquiries, committing the NWMO to engaging the media in an open, honest and positive manner that is consistent and effective.



Build and Sustain a High-Performing Organization

NWMO 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.

Managing used nuclear fuel is a very long-term mandate. It requires a steady and stable organization with a long-term outlook.

Following the federal government's selection of the Adaptive Phased Management (APM) approach in 2007, the NWMO began its evolution from a small study-based group to a sustainable corporation with full responsibility for implementing the plan. Work was undertaken to enhance the organization's long-term viability and improve its capacity to recruit and retain personnel. Investments were made to ensure resource capacity, expertise and sound administrative and management policies and practices to provide a foundation for fulfilling the mandate.

On January 1, 2009, the NWMO became its own employer with all the necessary supporting infrastructure including finance, legal services and human resources. Staffing levels increased from 27 at the end of 2007 to 81 a year later, with further increases to 120 by year-end 2010.

Implementing a long-term management plan for used nuclear fuel requires an understanding of the many social issues and concerns associated with this issue. Our workforce has been reinforced with the addition of specialists in the fields of social research, public, government and Aboriginal engagement, communications and new media.

The NWMO technical research program focuses on used fuel storage and repository engineering, geosciences and safety assessment. Research also informed development of the siting process and continues to support its implementation. Specialized professionals with extensive experience in the nuclear and mining industries have been hired in the areas of geoscience, safety assessment, repository engineering and regulatory affairs.

The largest staff additions resulted from an agreement between the NWMO and Ontario Power Generation (OPG) to transfer to the NWMO all the willing OPG personnel who had been working on both NWMO programs and the OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste. A significant benefit of this arrangement was the acquisition of the experience base of an established nuclear waste management and repository team.

Services Agreement

Along with the OPG employee transfer in 2009, the NWMO contracted with the electricity generating company to provide support services in order to develop and license OPG's proposed Deep Geologic Repository Project for Low and Intermediate Level Waste in Kincardine, Ontario.

The agreement increases the NWMO's capacity to implement APM by providing first-hand experience in important areas, including relationship building with a host community and licensing a repository through the regulatory system, as well as design, development, safety assessment, environmental assessment and construction of a deep repository. The NWMO's role in this project is described in the section *Other Activities: OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste* of Chapter 6.

Development and Training

NWMO employees are highly skilled professionals who regularly participate in specialized development and training to complement their technical, professional and academic backgrounds. All new staff are required to complete Core Business Needs training. The organization has developed modules in Corporate Awareness and Core Foundation Skills designed to provide a foundational set of knowledge, skills and competencies in the NWMO's business. Additional training and development modules, such as Supervisory Fundamentals and Advanced Business Fundamentals are designed to provide further skill and competency development.

Staff performance reviews are undertaken annually. Technical training needs are identified by managers through discussion with

employees and form part of an employee's personal development program. Instruction is delivered by specialized third-party training organizations and can include special assignments, presentation of conference papers or further education through universities or technical and professional training providers.

External Resources

Our research is supported through contracts with more than a dozen Canadian universities. The organization works with an extended group of consultants, practitioners and academics from across Canada and internationally to ensure that APM benefits from the best available research and experience.

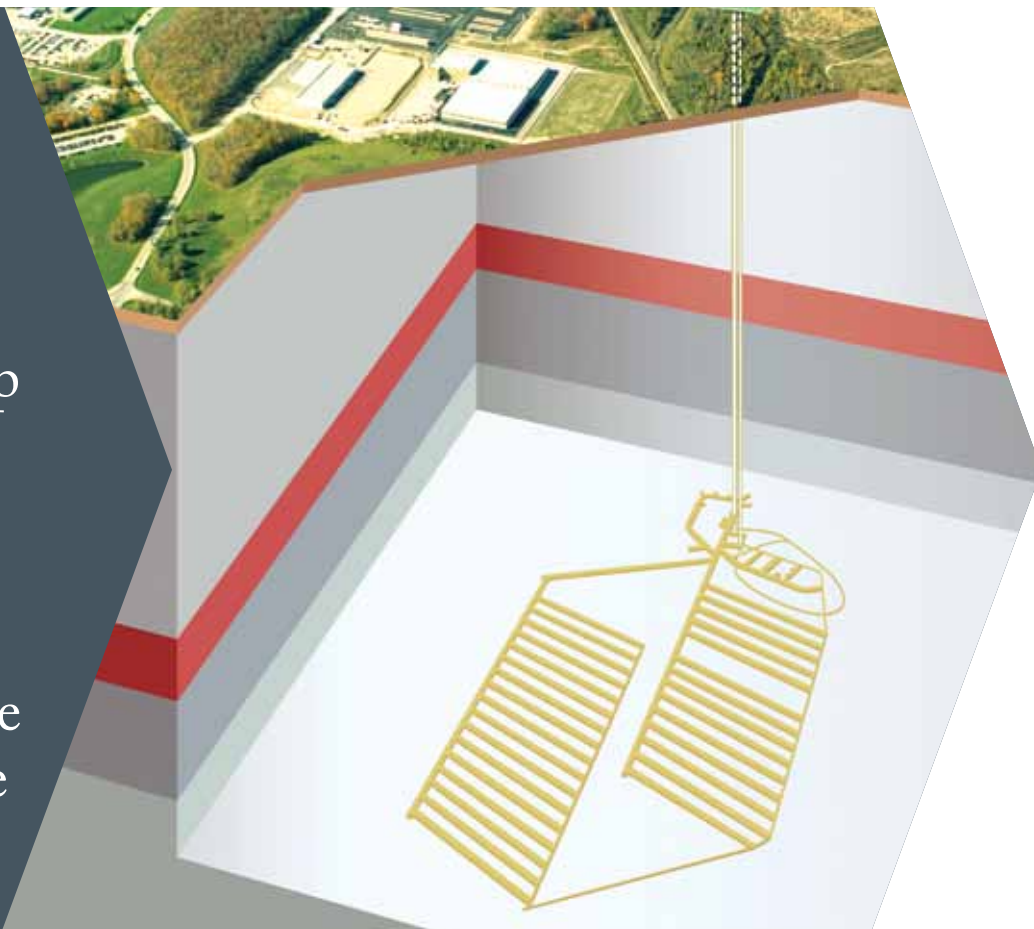
The NWMO also has contacts with many international organizations and has exchange agreements with national radioactive waste management organizations in Sweden, Finland, Switzerland and France to ensure that best international practices are incorporated in all our activities.

Looking Long Term

The NWMO continues to recruit in all key skill areas. Opportunities are advertised through appropriate media, including general interest newspapers, employment, university and Aboriginal websites, the NWMO website, as well as brochure distribution at conferences and on university campuses.

Looking ahead, and recognizing the importance of keeping the public informed and engaged over the long term, efforts are made to include as many younger-generation employees as possible in public engagement activities. The organization has also developed succession plans to ensure a sustainable senior management team is in place for the future.

Other Activities: OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste



On January 1, 2009, Ontario Power Generation (OPG) contracted the NWMO to provide technical services and other support in order to obtain the regulatory approvals for its Deep Geologic Repository (DGR) Project for the safe, long-term management of its low and intermediate level nuclear waste (L&ILW). This is a separate activity from the NWMO's implementation of the Adaptive Phased Management approach for used nuclear fuel.

The OPG project originated in 2001 when the Municipality of Kincardine approached OPG to assess the feasibility of managing, for the long term, L&ILW received from OPG's Pickering and Darlington nuclear stations and the Bruce Power stations, and L&ILW stored on an interim basis at the company's Western Waste Management Facility

(WWMF) on the Bruce nuclear site. If approved, the DGR will be located adjacent to the WWMF. The L&ILW DGR will not be licensed or designed to accept used fuel and will never be used to store used fuel.

With the 2009 agreement, willing OPG employees who had been engaged in the DGR project became employees of the NWMO. The transfer has provided the NWMO with important first-hand experience in the planning and development of a DGR, including relationship building with a host community and licensing a repository through the federal regulatory approvals process.

Ongoing DGR Project activities initiated by OPG, and conducted by the NWMO in 2009 and 2010 in support of the regulatory approvals process for a site preparation and construction licence,

have included geoscientific site characterization, safety assessment, facility engineering/design, environmental studies and community engagement.

In 2009, the NWMO became responsible for the multi-phase geoscientific investigation that had been launched by OPG in 2006 to confirm the suitability of the Paleozoic-age sedimentary bedrock at the Bruce nuclear site to safely implement the proposed DGR for L&ILW. During the 2009–2010 reporting period, the NWMO oversaw:

- » the drilling and coring of two steeply inclined deep boreholes to characterize the nature of the vertical bedrock structure and its effect on DGR implementation; and
- » borehole testing, including geophysical logging and hydraulic testing of the two steeply inclined boreholes to determine the different bedrock layers and bedrock permeabilities.

These studies, along with previous work conducted by OPG, confirm that the geologic setting is suitable for implementing a DGR for L&ILW.

All activities were completed safely without a lost-time incident involving the NWMO, OPG or contractor staff. Throughout the course of the geoscientific investigation, over 50 individuals from more than 20 service, specialized consultant and university groups contributed to the successful outcome of the site characterization work.

Building on the geoscientific work, preclosure and postclosure safety assessment reports have been developed by the NWMO for inclusion in OPG's regulatory submission to the Joint Review Panel.

Collection of data to describe the baseline environment began in 2007 and was continued by the NWMO in 2009. Field work was undertaken to update information previously compiled on surface water quality, aquatic and terrestrial species populations, social and economic conditions, and public attitude. These data provide the starting point from which the potential effects of the DGR project on the environment, including the physical, cultural, social and economic components, are being assessed.

In 2009, the NWMO Board of Directors established the Technical Review Group (TRG) to review and provide expert opinion on the DGR design and construction of the facility. The TRG is comprised of independent technical experts who collectively have extensive experience in the fields of deep underground mine construction, mine ventilation, mine hoisting, tunnelling, geomechanics and nuclear waste material handling.

DGR communication activities conducted by the NWMO since 2009 have included the continued issuance of DGR project newsletters and other publications, a new DGR website, speaking engagements, open houses, briefings to key stakeholders and attendance at public events. The DGR mobile exhibit is present at local community events.

In September 2009, the NWMO, in conjunction with OPG, undertook a series of engagement activities in Michigan to provide key politicians, officials and environmental groups with information on the DGR.

Engagement activities continued with the Saugeen Ojibway Nation (SON), with a protocol completed in March 2009, including the SON, OPG and the NWMO as signatories. A Participation Agreement between the Historic Saugeen Métis (HSM) Community, OPG and the NWMO was signed in 2010, which provides a framework and capacity for HSM's participation in the DGR project regulatory approvals process. Negotiations are currently underway for a Participation Agreement with the Métis Nation of Ontario.





7

Moving Forward - The Next Five Years

Overview of APM Strategic Plan 2011 to 2015



This section provides highlights of the 2011–2015 strategic plan.

The *Nuclear Fuel Waste Act* requires that the triennial report of the NWMO include its strategic plan for the next five fiscal years to implement Adaptive Phased Management (APM).

Every year, the NWMO publishes a five-year strategic plan, titled *Implementing Adaptive Phased Management*. In the period immediately following the government decision, the NWMO initiated with interested Canadians the identification of strategic objectives to guide the early years of implementing APM. These seven objectives, outlined on page 142, represent work program areas that are key to successful implementation of APM and are the

starting point for the annual review and update of the business plan. The plan describes the key initiatives in each of the strategic areas.

Publication of the draft plan each year reconfirms and demonstrates the NWMO's commitment to engaging and collaborating with Canadians in defining how we go forward. It 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 2011 to 2015 was published in draft

in October 2010, for a period of public review. To further explore potential challenges and opportunities over the next five years, the NWMO hosted three dialogues with participants with expertise in siting large projects, ethics, public engagement and international progress in siting a deep geological repository. The results of this period of review and dialogue are described in the section *What We Heard – Strategic Plans* of Chapter 9.

The full strategic plan is presented in Appendix 1, *APM Strategic Plan 2011 to 2015*.

The period 2011 to 2015 marks a new phase in the continued implementation of APM. The focus of this five-year period will be siting and working with potentially interested communities as they move through the steps of the siting process.

When communities request screening and assessments of the suitability of potential sites, the NWMO will be ready to support the process through activities such as learning more, site evaluation and engagement. We expect that the site selection process will advance over the five-year period such that the NWMO must be ready to undertake feasibility studies and potentially detailed site investigations towards the end of the period.

The NWMO will continue to refine generic designs and safety cases 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.

The plan for the next five years is organized along seven strategic objectives outlined in the following pages. Milestones for the five-year planning period are presented on page 143. This 2011–2015 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 2011–2015

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, 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.

NWMO multidisciplinary teams collaborate to advance NWMO plans. »



STRATEGIC PLANNING MILESTONES: 2011 TO 2015

<i>Building Relationships</i>	» Implement communications and media relations programs to raise awareness and understanding of APM and the site selection process among Canadians. » Develop and sustain relationships with communities that choose to engage in the site selection process and the surrounding areas. » Brief nuclear host communities about progress and plans for future transportation. » Develop and maintain relationships with federal, provincial, local and Aboriginal governments in nuclear provinces. » Seek advice of Elders and advance understanding of cultures, traditional practices, protocols and governance of Aboriginal peoples. » With Natural Resources Canada, implement Memorandum of Understanding on statutory obligation to consult Aboriginal peoples. » Support multi-generational involvement in APM project through program of engagement, education, outreach and capacity building.
<i>Siting</i>	» Assist communities in learning more about APM project and in developing capacity to consider potential interest. » Develop community-specific information and exhibits to support local and regional discussions. Seek advice of municipal associations, Elders and Aboriginal organizations on materials and tools for community engagement. » Conduct initial screenings and feasibility studies on request of communities. » Refine tools and methods for detailed geoscientific assessments in both crystalline and sedimentary rock, and environmental, social, cultural and economic factors. » Engage surrounding communities, regions and Aboriginal peoples. » Organize and help conduct regional studies in discussion of APM project. » Develop and confirm a process for selecting one or more suitable willing communities to progress to detailed site characterization. » Establish centres of expertise in communities hosting detailed site characterization. » Review the process periodically with Canadians to ensure it continues to meet needs and expectations.
<i>Design and Safety Case for APM Deep Geological Repositories</i>	» Complete conceptual designs and cost estimates for used fuel transportation system and deep geological repositories in both crystalline and sedimentary rock. » Issue APM conceptual design and illustrative postclosure safety assessments to the Canadian Nuclear Safety Commission (CNSC) for pre-project review. » Develop, evaluate and demonstrate used nuclear fuel container technology. » Maintain and improve performance assessment models and safety assessment. » Continue involvement in joint research activities and international programs.
<i>Financial Surety</i>	» Complete update of total cost estimate for APM. » Incorporate new total cost estimate into APM funding formula. » Identify implications for funding formula of potential new reactors or owners. » Track financial implications of potential future scenarios of used fuel to be managed.
<i>Adapt Plans</i>	» Track citizen priorities and expectations of APM. » Publish reports on projected used fuel inventories, emerging technologies and impact of potential new nuclear reactor units for APM plan. » Track best practices in engagement and community well-being. » Advance understanding of how to interweave Aboriginal Traditional Knowledge.
<i>Governance</i>	» Convene meetings of NWMO Members, Board of Directors and Board Committees. » Hold Advisory Council meetings and address appointments as required. » Interact with the CNSC for regulatory information and reviews on APM project. » Conduct ongoing reviews of technical program by Independent Technical Review Group.
<i>Build the Organization</i>	» Further develop staffing capability, contractor capability, and business systems and processes. Provide intern program to engage young people. » As required, provide for regionally based staff and local information offices to support the communities engaged in the site selection process.

Other Activities: Overview of Support to OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste 2011 to 2015



This section provides highlights of the NWMO's work planned for 2011–2015 in support of Ontario Power Generation's (OPG) Deep Geologic Repository Project for Low and Intermediate Level Waste. Additional information is presented in Appendix 2, *Support to OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste 2011 to 2015*.

Future work on the design, development, safety assessment, environmental assessment and construction of a deep geologic repository (DGR) for OPG's low and intermediate level nuclear waste (L&ILW) will continue to increase the NWMO's organizational capacity to implement Adaptive Phased Management.

Over the coming years, the NWMO will continue to support OPG in its efforts to obtain regulatory approvals for OPG's proposed

Deep Geologic Repository Project for the safe, long-term management of L&ILW. Also, under a further agreement (reached in February 2011), the NWMO will manage the design and construction phases of the project pending successful regulatory approvals. OPG will continue to provide strategic direction, oversight and approval as it has with all previous NWMO work programs and activities undertaken on the project.

Key milestones for the project in

the coming years include: submission by OPG of an Environmental Impact Statement (EIS) to a Joint Review Panel in support of the project; a public review period followed by a public hearing; and a decision by the Government of Canada on the acceptability of the EIS. Pending acceptance of the EIS, a site preparation and construction licence could be issued in late 2012 or early 2013. The NWMO would continue to manage design and would be responsible for construction that would begin thereafter, and the facility could be in-service in the 2018–2020 time frame.



Water sampling to help establish baseline data for the OPG DGR project Environmental Assessment. »





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 2011 to 2015 Adaptive Phased Management (APM) strategic plan, which is presented in Chapter 7, *Moving Forward – The Next Five Years*.

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 2011–2015 strategic plan for APM is presented in Appendix 1, *APM Strategic Plan 2011 to 2015*.

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 CNSC Financial Guarantee, the Ontario Energy Board (OEB) and the Financial Accounting Reporting, as well as providing annual report of life cycle 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 2011 to 2015 are presented below.

Total Projected Costs (\$ million)					
Program	2011	2012	2013	2014	2015
APM	41.4	51.0	58.9	77.3	117.2
OPG's DGR for L&ILW	41.1	30.3	177.3	181.9	191.1
LLM	3.0	1.9	1.8	1.9	2.0
Proposed Plan	85.5	83.2	238.0	261.1	310.3

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

APM Budget Forecast: 2011 to 2015

The budget forecast supports the major APM work program objectives described in the five-year strategic plan in Appendix 1, *APM Strategic Plan 2011 to 2015*. 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 Proposed Plan (\$ million)					
Program	2011	2012	2013	2014	2015
Build Sustainable Relationships	4.2	4.5	4.7	4.6	4.8
Collaboratively Implement the Site Selection Process	9.2	13.2	19.0	32.3	68.6
Refine and Further Develop Generic Designs and Safety Cases for a Deep Geological Repository	9.2	11.1	9.4	12.6	14.4
Provide Financial Surety	0.2	0.1	0.1	0.1	0.1
Adapt Plans	0.8	0.8	0.8	0.8	0.8
Ensure Governance and Accountability	0.9	0.9	0.9	0.9	1.0
Build and Sustain a High-Performing Organization	10.1	13.6	16.8	18.4	19.2
Common Services	6.8	6.8	7.2	7.6	8.3
Total	41.4	51.0	58.9	77.3	117.2

APM Project Costs

The 2011 to 2015 business plan period covers the early years of implementation of APM.

The strategic plan, set out in Appendix 1, *APM Strategic Plan 2011 to 2015*, 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 life cycle cost estimate for the APM program will be concluded no later than 2012, 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 2015 budget forecast shows an increase over the planning period. This assumption of gradual ramping up of activity is based on the expectation that potentially interested communities will come forward to 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, surrounding communities and regions, and Aboriginal peoples 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 stepwise and collaborative decision-making approach and will only proceed to the next step after careful consideration and only when satisfactory social conditions exist.

NWMO Staffing

Planning Considerations for Organizational Growth: 2011–2015

The NWMO is building an organization with a full range of capabilities necessary to implement APM. Management of used nuclear fuel is a very long-term mandate. The NWMO must be steady, stable and long term in its outlook and actions. This requires investment in the organization to ensure resource capacity, expertise, and sound administrative and management policies and practices that provide a foundation for operations through each phase of planning, implementation and operation.

The NWMO's main business functions related to the implementation of APM include engagement, communication, social research, technology development, safety and environmental assessment, engineering, licensing and project implementation. Common Services functions include finance, information technology, business planning, cost control, procurement, records management, quality management, occupancy, legal and human resources. The growth in the NWMO's work program during the business plan period as APM proceeds through the siting phase will require an increase in staff resources.

For the 2011 to 2015 period, the table below outlines projected growth in the NWMO's staff complement as APM proceeds through the siting phase and as preparations are made for the OPG L&ILW DGR construction phase. Common services grow in response to the increased support required in the areas of finance, information technology, business planning, cost control, procurement, records management, quality management, occupancy, legal and human resources.

Staffing plans will enable the NWMO to maintain and develop specialized technology and methods related to deep geological repositories that are not readily available externally. The NWMO continues to look to external suppliers for delivery of certain more generic activities and for logistics, facilitation and third-party reporting for dialogues.

The NWMO intends to review the projection throughout the business planning period to refine work program needs and assess whether the balance between internal staffing and external contracting has been optimized.

Total Year-End Head Count					
Program	2011	2012	2013	2014	2015
APM	90	110	128	131	131
OPG's DGR for L&ILW	45	53	64	63	63
LLM	8	8	7	7	7
Proposed Plan	143	171	199	201	201

APM Considerations

In the period, staffing levels related to the implementation of APM are forecast to grow to 131 by 2015. Staff levels to support the siting process increase as the work on siting is projected to intensify during the business planning period. Work up to 2010 was focused on the design of the process. Work in subsequent years focuses on delivery of siting, potentially in a diversity of regions across the country. The proposed schedule of hires over time assumes the NWMO may be called upon to provide support to individual potentially interested communities that come forward as the siting process proceeds.

Over the planning period, the NWMO is expected to establish for the first time a regional presence outside of head office, to support communities engaged in the site selection process.

The APM site selection process will require a growth in program staff for 2011–2015 to ensure resources to:

- » provide engagement and capacity-building support to communities that come forward to learn more and engage in the site selection process;
- » conduct initial site screening and evaluation for communities interested in learning more about the siting process;
- » conduct preliminary feasibility studies and assessments of a technical and social nature, including preliminary field investigations, and assessments of social, economic and cultural considerations;
- » work in partnership with communities to establish and co-manage Memoranda of Understanding for capacity building and resources to support citizen engagement and developing community well-being frameworks with communities. Working closely with communities as they access capacity-building tools and resources, conduct visioning, design and deliver dialogues with citizens, and assess the community well-being implications of APM;
- » work with communities to deliver regional studies, and involve surrounding communities and Aboriginal peoples, engaging transport communities and others in the region with an interest in the project;
- » expand relationship building with affected Aboriginal communities, organizations, treaty organizations and councils as communities express interest in the siting process and as regional studies are planned (steps 3 and 4 of siting process);
- » conduct detailed geoscientific site investigations including subsurface drilling for communities agreeing to advance to this stage;
- » prepare preliminary engineering designs and safety assessments at potential candidate sites;
- » foster and maintain relationships at national, provincial, municipal and community levels as communities begin to express interest; strengthen capability to support work with Aboriginal organizations and potentially affected communities, and manage development and delivery of protocols and projects with national and regional, and later, local, Aboriginal organizations;
- » continue focus on government relations at federal and provincial levels;
- » manage communications and work with media, continuing to build awareness of the site selection process; and
- » provide project management, oversight and quality assurance for site selection.

A higher level of interaction with federal and provincial departments will be required in coordinating duty to consult obligations of the Crown.

For APM repository design development and the development of the safety case, the proposed growth in staffing levels during 2011–2015 will:

- » improve the NWMO's capability to assess, evaluate, develop and demonstrate used fuel repository technology;
- » further improve the reference designs for a deep geological repository in both crystalline rock and in sedimentary rock;
- » prepare illustrative safety assessments, improve understanding of processes and further increase confidence in repository safety to support the siting process;
- » provide a sound technical basis to update the cost estimate for used fuel management; and
- » support the regulatory pre-licensing review of reference designs and safety cases.

Looking beyond the 2015 business planning period, staff will be required to support evolving stages of site assessment, community engagement, and detailed site investigations and safety case development in preparation for future regulatory processes. While the geographical focus of these activities will become more concentrated as interested communities are identified, the scope and demands on NWMO staff time will intensify as both technical and community engagement work in potential host communities and their surrounding regions becomes more complex. As potential host communities identify themselves, the siting process necessitates engagement of transport corridors, multiple levels of provincial, regional, local and Aboriginal governments, and dedicated resources to support communities in their socio-economic considerations of willingness to host.





9

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 Government of Canada's selection of Adaptive Phased Management (APM) as Canada's plan in June 2007, the NWMO began to assume the role of implementer. The NWMO's engagement with Canadians over the past three years has focused on the collaborative development of plans, policies, processes and communication material needed to implement Canada's plan.

Key areas of engagement and collaborative development in this period included the NWMO's strategic plans and yearly review and refinement; the NWMO's Aboriginal Policy and Transparency Policy; and the process to be used to select a site for the deep geological repository and associated facilities required for implementation of APM.

These 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 on which the NWMO has built its processes and plans during this period, important and strong differences in view also came to light. These differences often reflected strongly held positions about how best to proceed. They need to continue to be examined and discussed as APM proceeds, and the existing processes and plans are reviewed for their continued alignment with the values, priorities and concerns of Canadians.

With the initiation of the site selection process in May 2010, the NWMO has begun to engage potentially interested communities in the direct and participatory collaboration outlined in the process.

In the sections that follow, the NWMO reports the results of its public engagement activities convened over the last three years.



Adaptive Phased Management involves an ongoing dialogue between the NWMO and interested or potentially affected Canadians.

What We Heard – Strategic Plans



One of the NWMO's initial tasks as an implementing organization was to seek input to guide development of the first Adaptive Phased Management (APM) strategic plans. The NWMO invited interested individuals and organizations to get involved.

Foundation for Strategic Plan: Expectations for Implementation of APM (2007)

With the decision by government in June 2007, the NWMO began the process of reconnecting with those who had been involved in the NWMO's study and those who may have an interest in, or be potentially affected by, the implementation of APM. Engagement activities focused on understanding expectations of

the NWMO as it moved from being a study organization to an organization leading the implementation of Canada's plan for long-term used nuclear fuel management.

The principal activities during 2007 included individual briefings and group presentations, meetings of several citizen panels and outreach through

the NWMO website. To help launch discussion during this phase of work, we prepared a brief concept paper, *Preparing for Implementation*. It outlined initial thoughts on strategic objectives and posed some questions designed to be helpful in starting the dialogue. Within this same period, we also released a new corporate brochure to introduce people to the NWMO and APM as Canada's approach for the long-term management of used nuclear fuel.

Over the course of these activities, we heard a general message of confidence in the organization and its processes. For instance, the NWMO was advised to "stay the course" in terms of its values and commitment to engagement, openness and transparency. There was a consistent message to continue our work and to proceed with plans and collaborative processes appropriate for each stage of implementation. Many organizations expressed interest in working with the NWMO, with some expressing interest in developing protocol agreements to formalize collaboration and communications.

We heard that international collaboration is considered critical in ensuring that the NWMO adopts best practices and learning. There was also considerable discussion of the changing energy landscape, including new nuclear build, and most suggested to us that the NWMO proceed to incorporate implications of new build into our plans for implementing APM. A more complete description of what we heard is available on the NWMO website at www.nwmo.ca/what_we_heard, or can be reviewed in detail through individual consultant reports, also available on the NWMO website.

In these initial conversations, people also talked with us about the challenges they believe the NWMO will need to address in implementing APM and how the NWMO might begin to address these challenges in the development of early processes and plans and the design of its activities. We heard these challenges are difficult ones that are not amenable to simple solutions or firmly established benchmarks. As we continued dialogue over the three-year period covered by this Triennial Report, people continued to raise and discuss these challenges as part of discussions about how they might best be addressed at each phase of work.

Build broad awareness and understanding: The NWMO needs to work to increase awareness of the organization and its activities, the properties of used nuclear fuel and Canada's plan for its management, and how Canada's plan compares with that of other countries. We heard the NWMO needs to allow sufficient time to build the broad awareness that is needed to support decision-making. This will be challenging, given that nuclear waste is not a top-of-mind issue and the technical dimensions of APM are necessarily more demanding of time and effort by citizens to comprehend than other public policy issues.

Engage citizens: The NWMO must involve citizens, Aboriginal peoples and communities early, and sustain this engagement over time. The NWMO must also engage young people and must plan for inter-generational transfer of knowledge over the decades of implementation. The NWMO was encouraged to maintain a broad scope to its engagement, reaching out to citizens across the country – both those interested as well as those uninterested and/or unaware – since many see the management of nuclear waste as a potential issue of concern to all citizens. We heard that effective engagement requires both awareness of the NWMO and its activities and inclusion of a broad diversity of perspectives. This will be challenging, given that the general low awareness of the project and the fact that few will feel personally impacted by the issue before a potential site is identified.

Trust and credibility: The NWMO needs to earn and maintain the confidence of citizens. The NWMO must demonstrate that its core values and activities focus first and foremost on protecting the public interest. For some, this will be challenging for the NWMO given its governance structure in which, consistent with the “producer pays” principle, waste producers are a majority on the Board of Directors. Independent peer/third-party review and strong regulatory oversight and governance were raised as important supports for building trust and credibility. These need to be given a strong role in NWMO processes. The NWMO has also heard that the trust and credibility of the NWMO can be influenced by the public perception of activities of other nuclear organizations in Canada. Some have suggested that a coordinated approach to decision-making concerning nuclear waste management overall and across Canada may help to build and sustain confidence in the activities of the NWMO.

Transportation: Many identified the issue of transportation, including the potential impacts to communities along the route, as a key issue that deserves attention. The challenge identified is that fear is the starting point for many members of the public in learning about the long-term management of used nuclear fuel. We heard that this fear must be recognized and addressed by the NWMO in its first interactions with people and throughout the entire relationship-building process. Concern was also expressed that, unlike for the host community and surrounding region that will materially benefit from the implementation of the project, transportation communities may not see a similar benefit.

Continuous learning: The NWMO heard that a robust scientific and technical research program, including international collaboration, is important. We heard the NWMO needs to communicate its scientific and technical research program, outline the program’s role in guiding implementation and involve people in its review. APM needs to continue incorporating the best knowledge and practices throughout its implementation.

Adapting plans: We heard that the NWMO must adapt its processes and plans throughout the implementation of APM to address advances in knowledge and changing societal values, expectations and circumstances while continuing to meet the commitments it has made to Canadians. We heard a range of views about what adaptability should entail at any point in the implementation process. For instance, we heard the NWMO needs to address the impact of changing nuclear energy policies on the implementation of APM, specifically issues such as potential nuclear expansion. Most, although not all, told us they expected the NWMO to proceed to incorporate implications of new build into our plans for implementing APM.

Respect for Aboriginal peoples and duty to consult:

Aboriginal peoples reminded the NWMO that section 35 of the *Constitution Act* (1982) has recognized the special rights of Aboriginal peoples that the NWMO must respect in the implementation of APM. Engagement with Aboriginal peoples needs to be understood to be unique in terms of the legal requirements, their access to resources and cultural sensitivities. We heard that dialogue does not constitute formal consultation and that Aboriginal peoples want to design and implement their own process, independent of the NWMO. Best practices concerning respectful involvement of Aboriginal peoples in decision-making, in light of the special obligation that is owed, continues to be interpreted by courts and be evolved in project implementation across Canada. The NWMO will need to adapt its activities as expectations and practices continue to evolve.

Interweave Aboriginal Traditional Knowledge with Western science:

Aboriginal peoples, and other interested individuals and organizations, have underlined the value of and need to interweave Aboriginal Traditional Knowledge with Western science in ongoing work. This is important in order to appropriately involve Aboriginal peoples in decision-making as well as to ensure that any decisions that are made have considered the broad range of factors and considerations that should be addressed as part of an inclusive and holistic decision-making process.

Ongoing Direction on Strategic Plans

Strategic Plan Reviews (2008, 2009, 2010)

The NWMO has sought opportunities to refine its strategic plan each year. Building on the input received, the organization's first plan was released in late 2007 for review and comment by Canadians. Titled *Implementing Adaptive Phased Management 2008 to 2012*, the Plan describes how the NWMO will implement APM in the planning period. The focus of engagement activities was to identify adjustments and course corrections needed in order to better respond to the needs of Canadians at a very early stage in the planning of the organization and to ensure as much as possible that the NWMO's activities reflect a shared vision of how the work of the NWMO should proceed.

The NWMO sought the input of interested Canadians through: posting of the draft Implementation Plan on the NWMO website; mailing of the draft Plan to subscribers, interested individuals and organizations, provincial and federal government agencies and regulatory bodies; reviewing during meetings of several Citizen Panels; convening an e-dialogue; inviting Canadians to complete a web survey or comment form, or make a submission; and holding ongoing individual briefings and group presentations.

Overall, comments received on the first draft Implementation Plan were generally supportive. The draft plan was received as a well-thought-out, high-quality document. There was support for the objectives and the activities set out in the plan for implementing APM over the next five years, although some expressed interest in seeing more detailed plans. There was also support for its design as a 'living' document that will continually be adjusted over time with knowledge and experience. The commitment to openness and transparency demonstrated in the plan was consistently applauded. A more complete description of what we heard through these engagement activities is summarized in *What We Heard – Comments About Draft Plan*, or can be reviewed in detail through individual consultant reports, available on the NWMO website.

Questions raised about the plan, and suggested adjustments, continued the conversation about the challenges that will need to be addressed in implementing APM and the activities that might be put in place. These challenges continued to be points of discussion in engagement activities throughout the three-year period covered by the Triennial Report.

Allowing sufficient time while preserving a sense of urgency: Some concern was expressed that the NWMO was overly ambitious and that it may well take longer to achieve the milestones identified, particularly with respect to allowing sufficient time to build the required level of awareness among citizens across the country and Aboriginal peoples and identifying a willing community to host the project. Conversely, some expressed concern that the time frame for the work of the NWMO is longer than it needs to be and would like to see greater urgency with respect to the NWMO proceeding with the launch of the siting process specifically. We heard that ensuring the NWMO demonstrates through its activities that it is both taking the time that is needed to support inclusive engagement and good decision-making, and moving forward expeditiously to implement APM, will be important for project success.

Demonstrating accountability: Some concern was expressed that the NWMO find ways to demonstrate accountability. Questions were raised about how the NWMO will monitor and assess its progress in completing the plan

over time. Interest was expressed in how the NWMO's progress against its commitments will be measured and how this progress will be independently verified, while maintaining a site selection process for which the pace and manner of implementation is set in large part by interested communities rather than controlled by the NWMO alone.

Focus on nuclear provinces: In reviewing a draft of the NWMO's first plan, the NWMO heard the desire for greater clarity by some who wanted to understand why the NWMO would limit its focus to the existing nuclear provinces when other provinces may join the nuclear group in the future. More generally, the question of how best to anticipate an uncertain future in the development of NWMO plans is a topic of continuing discussion.

Confusion concerning repeated reference to Aboriginal peoples: Some participants in the dialogues were unaware of the special obligations owed to Aboriginal peoples as laid out in the *Constitution Act* (1982) s.35 and therefore raised questions about why Aboriginal peoples, as a specific group, receive the attention they do in the plan. There was speculation and concern expressed, incorrectly, that Aboriginal peoples are receiving this level of attention because the NWMO has a site in mind that is on Aboriginal territory. We heard that the NWMO needs to address this misunderstanding in its communication material.

The NWMO's second plan (2009 to 2013) was released in June 2009. The third plan (2010 to 2014) was released in draft in November 2009.

Engagement activities included mailing the draft plan to subscribers, interested individuals and organizations, provincial and federal government agencies and regulatory bodies; inviting Canadians to complete a web survey or comment form, or make a submission; and holding ongoing individual briefings and group presentations. A more complete description of what we heard through these engagement activities is summarized in *What We Heard – Comments About Draft Plan*, available on the NWMO website.

The work programs related to siting were of particular interest to readers. Many of the comments echoed those heard in dialogues specifically directed at collaboratively developing the site selection process. For example, a comment was received suggesting that the NWMO select sites that from a geological, economical and transportation perspective, lend themselves to the safe, long-term storage of used nuclear fuel rather than waiting for communities to come forward to trigger the assessment process. As well, questions were raised about how the concept of "community" is best defined, through what means communities will be informed about the potential effects of the project, how the willingness of a community will be measured, who will be involved (surrounding communities, broader region), how decisions will be made, and how governments and independent third parties will be engaged throughout the process. On the topic of transportation, questions were raised about the safety of transportation of nuclear waste, how emergency situations will be handled, how emergency response capabilities will be implemented along the route, and how communities on the transportation route will be involved.

We also heard a desire to know more about progress on finding durable containers for the waste; the potential to recycle used nuclear fuel in breeder reactors; health risks associated with the geological repository; research on the potential environmental impacts and environmental assessment methodology; rationale for studying sedimentary rock as well as crystalline rock for the deep geological repository; and how safety will ultimately be defined and assessed.

Questions were also raised about the fate of nuclear waste other than used nuclear fuel, specifically the potential for storage of contaminated equipment from decommissioned nuclear plants in the deep geological repository and the broader holistic approach to nuclear waste management within which APM fits.

In summary, comments received have generally been supportive of the plan throughout the three-year period of engagement covered by the Triennial Report. Comments have endorsed the objectives and activities and its design as a 'living' document to be updated regularly, and our commitment to openness and transparency was consistently roundly supported. Comments have also highlighted a range of challenges that will need to be addressed in implementing plans.

Strategic Plan Review 2011

The NWMO's fourth plan (2011 to 2015) was released in draft for review and discussion in November 2010.

Overall, comments received on the most recent draft Implementation Plan (2011 to 2015) were generally supportive of the plan. As we begin to proceed with the implementation of the site selection process, comments have begun to focus on the more detailed and near-term challenges in implementing what is generally perceived to be a strong plan. Through letters, faxes, web surveys, submissions to the website, and informal conversations sparked by review of this plan, comments have continued the conversation about the challenges that will need to be addressed going forward. Recent comments have focused on the following challenges:

Ensuring interested communities have the capacity to fully participate:

Small communities that may be 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 of the community. The NWMO will need to support capacity building in these communities to fully participate in the process and to successfully address and manage these pressures. We have heard that this is likely to require substantial resources from the NWMO, including ongoing relationship building and other support.

Ensuring communities will benefit from the project: The NWMO has committed to ensuring the community that ultimately hosts the project benefits from it. One of the challenges that the NWMO will need to address over the next five years, according to the comments received, is the potential for the project to be transformational for a community, including economic development, values and priorities. It is important that focus be kept on the broad well-being of the community in assessing and managing potential impacts, including spiritual and cultural dimensions, and not just the impact on economic factors or wealth. This will help ensure that communities are both fully informed about the potential effects and are in a position to manage these effects to the benefit of the community.

Sustaining direct and participatory collaboration: The site selection process requires direct and participatory collaboration with the community. This not only requires communities have the capacity to fully participate, and resources may be required to ensure this as discussed above, but it also

requires that the community have “space” to identify its own interest and consider this interest with respect to the project in the way in which it sees fit. The way in which each community engages its citizens in dialogue may be unique to that community, reflecting the decision-making and citizen involvement processes that have evolved in that community over time. We heard the NWMO needs to find ways to support communities in implementing the decision-making processes that they choose and to address activities of outside interests that may wish to influence the community-led process.

Ensuring free, accessible and credible information on risk to

communities: Like many major initiatives undertaken in our society today, the implementation of APM requires making decisions in the face of some uncertainty and risk. Although there is a high level of confidence that the uncertainty and risk inherent in the project is manageable through the knowledge and technological capacity we have today, some concerns continue to be raised. The challenge in this area concerns how differences of view and competing facts might best 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.

Sustaining involvement of interested organizations: As the site selection process becomes more locally driven, 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.

Building trust in the NWMO and ensuring accountability: 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 is in the balance that will need to be struck between providing communities space to reflect and make their own decisions, and the NWMO openly and transparently reporting on detailed activities as they are undertaken over the course of the site selection process.

Adapting plans: As mentioned earlier, there is general agreement that the NWMO must adapt its processes and plans throughout the implementation of APM. However, as we proceed with the site selection process and move to a more local focus, questions are being raised about the implications for communities that may wish to host the project. The challenge that the NWMO will need to address throughout the process, we have heard, 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.

Policy Development

NWMO Transparency Policy

In order to seek comment and advice on the development of a Transparency Policy, the NWMO released a discussion document in April 2008. Engagement activities included reviewing during Citizen Panels in four provinces; posting a discussion document with questions on the NWMO website; and mailing the discussion document with questions to interested individuals and organizations and those on the NWMO subscriber list.

A number of submissions were received from individuals and organizations, as well as government agencies. Comments were generally supportive, and based on the feedback received, changes were made to the Policy, primarily for clarification. The Transparency Policy that emerged from these discussions can be viewed at www.nwmo.ca/transparencypolicy.

NWMO Aboriginal Policy

In its June 2008 meeting, the Elders Forum initiated discussions to provide advice and guidance to the NWMO on the development of an Aboriginal Policy. Over the course of three meetings, including an *in camera* session, the Elders Forum developed their thoughts on the key elements and principles for the NWMO Aboriginal Policy. Through these sessions, they brought together the elements of their mission statement and the unique viewpoint of Aboriginal peoples in providing advice to the NWMO. A draft of the document was also distributed to national and provincial Aboriginal organizations requesting their input and was posted on the NWMO website for public input.

In providing direction on an NWMO Aboriginal Policy, the Elders discussed how objectives such as the following might best be achieved through the design of the policy:

- » Build respectful relationships with First Nations, Inuit and Métis of Canada
- » Fulfill duty to consult
- » Implement appropriate dispute resolution processes
- » Acknowledge diversity among Aboriginal peoples (different circumstances, different needs)
- » Respect Aboriginal and treaty rights protected by section 35 of the *Constitution Act*, 1982
- » Respect and honour Traditional Knowledge
- » Respect and honour traditional ceremonies and spiritual practices
- » Ensure appropriate capacity building
- » Identify principles to guide all activities
- » Respect and show concern for future generations

The Aboriginal Policy that emerged from these dialogues can be viewed at www.nwmo.ca/aboriginalpolicy.

Communications

The NWMO sought input and advice on the development of its information materials in order to better understand how to communicate with Canadians about its work in a way that is accessible, understandable and appropriate. A number of activities were conducted between 2008 and 2010 in order to seek this input and advice.

Over the three-year period, we brought together randomly recruited citizen opinion leaders to review and give advice on: the NWMO Implementation Plan (portions); Site Selection Process document (portions); NWMO Transparency Policy; the NWMO corporate video; backgrounders on the Regulatory Framework, Project Description, Who We Are, Monitoring and Retrieval, and Transportation; and the NWMO exhibit. Comments were also received from the Elders Forum, Municipal Forum and Youth Forum. Throughout these discussions, people consistently underlined the importance of the following and often identified substantial opportunities for improvement:

- » well-written, clear and concise text;
- » accessible language that keeps technical jargon to a minimum and is widely understandable;
- » a narrative approach that engages interest;
- » a simple and clear layout that incorporates visual images and white space, but is not “glossy”; and
- » evidence of a commitment to transparency, inclusiveness and safety.

For example, we sought input to the development of the NWMO corporate video, *Moving Forward Together*, from six groups of randomly selected citizen opinion leaders. Participants used hand-held electronic “perception analyzers” to measure their ability to understand the video and react to it. A post-video discussion was also led by a moderator. During these discussions, we heard that the use of animation was particularly helpful in understanding what a deep geological repository might look like. We also heard that shorter, topic-specific videos would be preferred over a longer video presentation covering a number of topics. There was also some suggestion that the NWMO put in place a system in which the viewer could choose between videos of varying complexity or detail. We heard that when facts are quoted, it is important to show the source in order for viewers to be confident about accuracy. Participants also commented on the tonality of the video and gave advice on information gaps that need to be addressed in future iterations. Highlights from this discussion, and others conducted during the three-year period, including development of an interactive exhibit, can be viewed through individual consultant reports produced for each discussion at www.nwmo.ca/social_research_and_dialogue. Suggestions made through these discussions have guided our communications activities going forward.

As part of our program to develop culturally appropriate material, the NWMO has turned to Aboriginal organizations, such as the Assembly of First Nations, Native Women's Association of Canada and others to prepare information and communication materials suitable for Aboriginal peoples. The NWMO has also sought advice from the Elders Forum. In addition, the NWMO commissioned a group of Aboriginal communication specialists to develop a corporate brochure for the NWMO, and in 2009 and 2010, the NWMO corporate video was translated into nine Aboriginal languages. In 2008, the NWMO engaged two randomly selected groups of Aboriginal peoples to review the brochure and provide advice and guidance on its development. Their direction was incorporated in the refinement of the brochure that can be viewed at www.nwmo.ca/aboriginalbrochure. Highlights from these two focus group sessions can be reviewed at www.nwmo.ca/communicationeffectiveness.



The NWMO conducts research to help ensure its information materials are clear and understandable.



What We Heard – Site Selection Process



Adaptive Phased Management (APM) involves the centralization of Canada's used nuclear fuel at a single site. Public engagement throughout 2008 was designed to establish a foundation for the development of the site selection process.

In 2008, the NWMO received direction on what an appropriate site selection process for the long-term management of used nuclear fuel in Canada would look like. We also heard about some important points of continued debate.

Overview

We began the collaborative development of the site selection process by engaging interested individuals and

organizations in discussions to help identify the values and objectives that any appropriate site selection process for Canada should address. In order to set the foundation for the discussion, the NWMO assembled the comments made by Canadians during the NWMO study on management approaches about the principles and objectives that should guide site selection. This was used as a starting point for discussions about what is important in a site selection process.

We heard about the need for the

process to be fair and to lead to a decision in which Canada's used nuclear fuel would be safely contained and isolated for the very long period of time required. We heard about the need for a principles-based approach and a series of steps that capture how people will be involved and issues will be addressed. We heard about the need for the process to be driven by communities that may be interested in the project, but that we must also continue to involve Canadians throughout. This 'common ground' of principles and objectives shared by Canadians that ought to drive the site selection process emerged over several phases of dialogue described in the discussion that follows.

Principles and Objectives to Guide Site Selection

Although the siting process was not a specific focus of discussion during the NWMO's study of management approaches (2002–2005), many people shared their thoughts about basic requirements for siting decision-making as an important component of any appropriate long-term management plan for used nuclear fuel in Canada. Comments received during the study phase of work are outlined in the Final Study Report *Choosing a Way Forward: The Future Management of Canada's Used Nuclear Fuel*, available at www.nwmo.ca/studyreport.

Key direction during the study phase about the design of a siting process that formed the starting point for the discussion of principles and objectives included the following:

Responsibility: We heard that the starting point for any discussion is the sense of responsibility we as a society share to put in place a plan to manage the used nuclear fuel that our generation has been responsible for creating. Used nuclear fuel exists. The management of this waste is not a legacy we should leave to future generations to address, and we need to begin now to implement a management plan.

Develop the site selection process with Canadians: We heard that the siting process should be developed and implemented collaboratively with potentially affected communities of interest. We heard that the siting process, and the engagement process that will support it, needs to be the subject of a specific dialogue.

Ensure decisions about risk and safety about a site involve citizens: The design of the site selection process should begin with the understanding that judgments about acceptable risk and safety at each point in the process should be made collaboratively with those most potentially affected; detailed implementation plans should be developed in an iterative and collaborative manner with those most potentially affected; transparency and openness in decision-making should be facilitated through the design and implementation of the process; continuous learning and adaptation need to inform the process; educational outreach and development of an informed citizenry, as well as a culture of vigilance, should be enhanced through the process; and a special responsibility is owed to potentially affected Aboriginal peoples.

Ensure safety is the primary consideration: Safety needs to be central to decision-making about a site.

It is only fair to start the search for a site in the provinces involved in the nuclear fuel cycle: Canadians who participated in the study told us that fairness is best achieved with the site selection process focused within the provinces directly involved in the nuclear fuel cycle because these provinces have benefited from it. Communities in other regions that identify themselves as interested in possibly hosting the facility should also be considered.

The host community must be informed and willing: We must seek an informed, willing community to host the long-term management facility.

Respect Aboriginal rights: The site selection process must respect Aboriginal rights and treaties. The NWMO also recognizes that there may be unresolved claims between Aboriginal communities and the Crown to be taken into account in relation to a proposed site.

The process should be principles-based: Any appropriate site will need to address scientific and technical siting factors to ensure protection for present and future generations, other life forms and the biosphere as a whole into the indefinite future. A number of social and ethical principles should also be addressed, including:

1. Be open, inclusive and fair to all parties;
2. Ensure that groups most likely to be affected by the facility and associated transportation are given full opportunity to have their views heard and taken into account, and that they are provided with the forms of assistance they require to present their case effectively;
3. Include special attention to Aboriginal communities that may be affected;
4. Be free from conflict of interest, personal gain or bias among those making the decision and/or formulating recommendations;
5. Be informed by the best knowledge – in particular, the best natural science, the best social science, the best Aboriginal knowledge, and ethics – relevant to making a decision and/or formulating a recommendation;
6. Be in accord with the precautionary approach, which first seeks to avoid harm and risk of harm. If harm or risk of harm is unavoidable, place the burden of proving that the harm or risk is ethically justified on those making the decision to impose it;
7. Ensure, in accordance with the doctrine of informed consent, that those who could be exposed to harm or risk of harm (or other losses or limitations) are fully consulted and are willing to accept what is proposed for them;
8. Take into consideration, in so far as it is possible to do so, the benefits, costs and risks of the siting decision, including their physical, biological, social, cultural and ethical aspects; and
9. Ensure that those who benefited most from nuclear power (past, present and perhaps future) are bearing the potential costs and risks of managing spent fuel and other nuclear materials.

Ethical obligations, which should shape the way in which the site selection process proceeds, include:

- » Respect for life in all its forms, including minimization of harm to human beings and other sentient creatures;
- » Respect for future generations of human beings, other species and the biosphere as a whole;
- » Respect for peoples and cultures;
- » Justice across groups, regions and generations;
- » Fairness to everyone affected, and particularly, to minorities and marginalized groups; and
- » Sensitivity to the differences of values and interpretations that different individuals and groups bring to the dialogue.

Observations and questions from the review of siting processes around the world, both those that were successful and those that were not, were also added to the discussion document to help start broad conversation on the question of what is important in a site selection process.

Dialogue in 2008

The first phase of discussion to collaboratively develop the site selection process was initiated in August 2008 with the publishing of *Moving Forward Together: Designing the Process for Selecting a Site*. Engagement activities conducted at this stage are summarized in the table *What We Did to Identify Expectations for the Site Selection Process* in the section *Collaboratively Design and Implement the Siting Process* of Chapter 6.

A more complete description of what we heard through these engagement activities is summarized in *What We Heard: Collaborative Development of the Siting Process (2009)* at www.nwmo.ca/designingasitingprocess, or can be reviewed in detail through individual consultant reports, available on the NWMO website at www.nwmo.ca/what_we_heard.

In the dialogues initiated with the discussion document, we largely heard that the principles that emerged out of the NWMO study phase of work are a good starting point for the design of the site selection process; however, there was some desire to see these principles expressed in a more concrete way. People wanted to know how these principles would actually be applied in the process. Dialogue participants also made suggestions on areas they believed would be important to address in the design of the decision-making process. These suggestions are summarized below.

Pre-planning: In order to be successful and to invite the interest of communities, the siting process needs to be framed in a positive manner. This includes a statement of why the project is needed, how the project contributes to the national interest and what opportunities the project offers for a community. Although there was general agreement on the need to include statements in these areas, the dialogue suggested that even with the same facts in hand, different people assess the need, national interest and benefits associated with the project differently and would find different statements appropriate. This will continue to be a challenge to the site selection process. We heard that the siting process also needs to include a series of steps, a set of clearly defined principles and criteria, definition of some key concepts, and acknowledgement

of the broader context within which the process is being designed and implemented.

Project description: It is important to describe the project in as complete, fair and appropriate a manner as possible. This involves clearly outlining the potential benefits to a community, immediately and over time, as well as fairly stating the risks and uncertainties associated with the project. Although there was general agreement on the importance of addressing these areas in the project description, there were differences of view on how potential benefits and risks are best presented to ensure the description is fair and complete. We heard that the project description should include an outline of the size of the facility, the volume of waste to be managed, and the time frames involved – in plain language.

Early screening: It is important that safety be a preeminent consideration. Safety should not be compromised, for instance, for willingness in the selection of a site. With this in mind, screening that eliminates the consideration of unsafe sites early is preferred. Municipal decision makers were also interested in receiving early feedback on the potential suitability of a community for the project so that time and effort is not devoted to a project for which they cannot meet basic safety-related requirements.

Transportation: There was a high level of concern about how best to factor in transportation considerations in the design of a site selection process. A number of issues or questions were raised as ones that will need to be addressed. First, what ought to be the role of communities along the transportation route in the siting decision? Second, how can the potential for disruption of transportation by opposition groups and/or by terrorist attacks be minimized through the siting decision?

Role for third parties: There was much discussion about the challenge of ensuring that information about the project is easily accessible and is balanced, especially concerning descriptions of the potential benefits associated with the project, and the limitations and any uncertainties in knowledge. Dialogue participants saw part of the answer in the role that third parties are assigned in the process. The desire for the involvement of third parties emerged out of a concern that the NWMO may have a self interest in the way in which information is conveyed. Confidence would be built by having information provided or delivered by a neutral trusted source, and/or verified and advice provided by a third party. However, there was debate concerning who would qualify as a neutral trusted source or independent third party.

According to dialogue participants, resources should also be provided to communities and others to seek support of third parties of their own choosing. Some expressed concern about the capacity of communities and other interested individuals and organizations to understand some of the technical dimensions of the project without the support of experts. Ensuring communities and others have the capacity to engage third-party experts is considered by some to be essential in ensuring that communities hear balanced information as they inform themselves about the project.

The concept of community: The term “community,” we heard, is a complex concept to many in thinking about the design of a site selection process. Questions, such as what boundaries are implied in “community” (for example, geographical, political), who needs to be informed and willing, who should have

a veto, and who else ought to have a say, were raised as difficult questions for which there are no easily identifiable best responses. We heard that it is important that these questions be addressed in the design of the site selection process.

Willing community: Willingness and consent are crucial issues that must be addressed in the design of a site selection process, according to dialogue participants. There was much discussion about both how to define “willing community” and how best to design the site selection process to ensure this outcome. For instance, people were divided in terms of how best to initiate the siting decision-making process. Should the NWMO identify potentially suitable areas or regions and target the communities in them to become involved in the site selection process, or should a funneling process, which starts broadly and invites interested communities to become involved, be used? We heard that targeting communities has the advantage of ensuring that only potentially suitable communities are allowed to enter the process, thus preserving safety as a key driver and reducing the likelihood that a community will invest time and effort in a project for which they are not suitable. However, it runs the serious risk of being seen to pressure communities that may not be interested in the project.

Some felt that proactive efforts may be required to solicit interest from communities and that it will not be enough to sit back and wait for communities to enter the process. Others cautioned that too proactive an approach would raise concerns about the NWMO trying to inappropriately “sell” the project to a community.

There was much discussion about how we might recognize that a community is truly willing. We heard that certainly it must include the involvement of both political representatives, associations and organizations, but must also extend to citizens at the grassroots. Dialogue participants were also clear that there must be a role in decision-making for surrounding communities. Rather than a host community, this project is likely to demand a host region.

There was much discussion about what degree of consent is necessary to proceed. A referendum was seen to be a good way of ensuring consent although there was no consensus on the threshold for agreement. Ensuring the community is truly informed before making its decision was also a key area of concern among dialogue participants. There was much discussion about the nature of the efforts that need to be made to make sure a community is informed.

Throughout the dialogues, substantial interest was expressed by participants in the experience of other countries, particularly those in which willing host communities have been identified. Participants were interested to understand on what basis communities were willing to accept the project and how we might build this into the design of the site selection process. Building on the lessons from others, for some, is a way of reducing the risk that no community will be sufficiently interested to come forward in the process.

Roles and responsibilities: An important component of any appropriate site selection process, according to what we heard, is ensuring both broad inclusiveness and that roles and responsibilities are clear. The municipality should, rightly, be the decision maker. However, dialogue participants also saw an important role for scientists, other experts, elected representatives and residents of the community, and provincial and federal levels of government and regulatory agencies.

Increasing awareness and interest: Dialogue participants talked about the need for the site selection process to be implemented with the awareness and scrutiny of Canadians. Many participants expressed concern that low levels of awareness and understanding among Canadians may prevent the level of general scrutiny they would like to see from being exercised. The process should be the subject of ongoing review, questioning and challenging. Such an ongoing review will help ensure the process continues to be fair and appropriate.

Concern was also expressed that it might be difficult to engage many Canadians in the site selection process prior to a preferred site being identified and a transportation route being proposed. Some dialogue participants expressed concern that experience in siting waste facilities in Canada has consistently shown that, despite the best efforts of the proponent to create broad awareness of their plans, most people will not become involved in the siting process until it has the potential to directly affect them.

Adapting plans: Some dialogue participants noted that public attitudes are shifting and it is possible that new nuclear plants will be built in the future. The site selection process needs to be designed in a way that can respond to changing conditions such as these.

Key Points of Debate

The discussion of what an appropriate site selection process would look like is nested for some in a larger conversation among Canadians about the appropriateness of the continued use of nuclear power and what responsible action today looks like in thinking about the design and implementation of the site selection process. A key point of debate as part of this conversation is when and under what circumstances a site selection process should be initiated. Should site selection begin now, in order to implement APM as expeditiously as possible, or should site selection wait until decisions about the future of nuclear power have been made? This larger conversation about the future of nuclear energy also framed the views of some during the NWMO's earlier dialogue, from 2002 to 2005, on the question of what an appropriate approach for the management of used nuclear fuel in Canada would look like.

The NWMO continues to hear ongoing debate in its dialogues on the question of what ought to be the future of nuclear power. Many of those who oppose the use of nuclear power feel strongly that the site selection process should not be launched before a plan has been put in place to end the use of nuclear power. Those who support the use of nuclear power, or see the need for it to meet the energy needs of Canadians, are more likely to feel it is important to move forward with the long-term management plan, including the site selection process, as expeditiously as possible. Since waste exists, it must be dealt with and a plan must be put in place for its management, irrespective of the future of nuclear power in Canada. This latter view is the predominant view among Canadians.

How We Responded to Input Received

Input received during the 2008 dialogues was reviewed by the NWMO and was used as the basis for the development of a draft site selection process. This draft site selection process was published as a discussion document in May 2009. With this discussion document, the NWMO sought direction on whether it had listened well to the comments and direction received, incorporated them appropriately in the design of a process, and the further refinements needed to make this an appropriate process for Canada. This discussion document was used to launch the second phase of dialogue.

As mentioned, the important question of context concerning the future of nuclear power has been raised in dialogues throughout the NWMO's work. We acknowledge these comments. The NWMO makes no judgment about the appropriate role of nuclear power generation in Canada and suggests that those future decisions should be the subject of their own assessment and public process.

What We Heard – Review of a Draft Site Selection Process



Dialogue activities were conducted throughout 2009 to refine a proposed site selection process developed to reflect the input received during the 2008 dialogue.

Canadians were invited to consider a proposed process developed by the NWMO to reflect the input received in 2008 and share their thoughts on whether it was appropriate and what changes, if any, needed to be made. To initiate and facilitate conversations, a discussion document outlining the proposed process, *Moving Forward Together: Designing the Process for Selecting a Site*, was widely distributed and was the basis for engagement throughout the year. *What We Did to Confirm the Site Selection Process* is outlined in the section *Collaboratively Design and Implement the Siting Process* of Chapter 6.

Overview

The proposed process was composed of three components: a set of principles to guide decision-making, a sequence of steps, and a set of evaluation factors to assess the suitability of a site. Overall, the proposed guiding principles were seen to be on track and cover generally what is essential and most important. Similarly, the site selection process steps were generally seen to meet the test of fairness and safety. The proposed evaluation factors to assess the site were also generally

well received. Over the course of the dialogue, we received suggestions designed to improve each of these components of the siting process.

With a draft site selection process on the table for discussion, participants delved deeper into some of the issues raised during the 2008 dialogue and provided more specific direction on refinements that would strengthen the process.

Necessary Background

Many people who participated in the dialogue were new to the topic of the long-term management of used nuclear fuel, and as a result, they had a number of more general questions before they could begin to consider the design of the site selection process. Although these questions are not specific to the siting process, it is clear that answers to these questions are necessary background information for it. Participants in the dialogues noted that in-depth information and a better understanding of the nuclear fuel cycle, nuclear energy production, and the safety, security and impacts of a deep geological repository on future generations and the environment are needed for full participation in the site selection process.

What is the nature of the hazard associated with used nuclear fuel, and can it be safely and securely managed over the long term? Many of the people who came to the NWMO regional information sessions, in particular, had little knowledge about used nuclear fuel. Much of their fear and concern was reduced through learning more about what used nuclear fuel is, how it is currently being managed in federally licensed facilities, the open and inclusive approach of the NWMO to its work, and the robust regulatory framework that Canada has in place to oversee the long-term management of used nuclear fuel. It is apparent from public attitude research conducted across Canada that awareness and understanding in these areas is low, and for this reason, fear and concern may be the initial reaction of many citizens to this project. This will require information and time to address.

Why Adaptive Phased Management (APM)? Some of those who were new to the issue and unfamiliar with the NWMO's three-year study asked why APM, rather than another approach, was selected as Canada's plan.

Questions raised about APM included what is it; how was it developed; what were the options that were considered; why was it selected by the government of Canada as Canada's plan; how does it compare with the long-term management plans of other countries; and what is the management plan for other radioactive waste.

Can used nuclear fuel be reused? Some wanted to know whether used nuclear fuel can be recycled or reprocessed before it is sealed underground in the deep geological repository. Many continue to feel that even if the technology or business case does not exist today, used nuclear fuel may well be 'recycled' in the future.

Can the institutions involved be trusted?

Consistent with the “producer pays” principle, the *Nuclear Fuel Waste Act* tasked the companies that produce nuclear waste to create an organization to implement a plan for the long-term management of this fuel, and they formed the NWMO. Some told us they would have preferred that an organization that is independent from the waste producers be set up for this role and continue to be concerned that Canada’s plan will not be implemented appropriately because of this governance structure. Some mentioned examples of cost overruns and other problems with existing nuclear facilities to illustrate their lack of trust in the nuclear industry. Concerns were also expressed by some that regulatory standards are not sufficiently rigorous.

Questions about APM components.

Some wanted to know more about aspects of APM. Monitoring is an example: how will monitoring be conducted to ensure safety; how long will this monitoring extend; and how will the community be involved. Retrieval is a second example and included questions such as: under what conditions might waste be retrieved; and who would be involved in decision-making.

Can used fuel be transported safely?

Many people had questions and concerns about the safety of transportation and expressed a desire for transportation distances to be limited. Many expressed interest in how the NWMO planned to deal with transportation safety issues regarding potential impacts on communities and the environment.

Will this facility manage foreign waste?

Many described their strong sense of responsibility to put in place

a plan to manage the waste we have created in Canada. However, for many, this sense of responsibility does not extend to the management of foreign waste. Many wanted assurance that foreign waste will not be placed in the deep geological repository.

What will be the effects of the project on people and the environment?

During the dialogues, we heard concerns about whether used nuclear fuel can be safely managed for the long period of time required, and questions about how we can be sure that APM will safely and securely contain and isolate the used fuel for hundreds of thousands of years. There is anxiety about the possible effects of the nuclear waste on the environment, the efficacy of geological barriers, the disruption of groundwater flow and the potential for seismic activity. Questions included what are the health effects and worst-case scenarios for the host community and transportation communities, and how will they be managed; what are the effects on the environment, people, plants and medicines, and how will they be managed; and what are the health effects and effects on the environment in the future.

How will the host community and region benefit from the implementation of the project?

Over the course of the dialogue, questions arose concerning the nature and magnitude of the benefits that would be enjoyed by the community in hosting the project. There was strong agreement that the host community should benefit from the project and that the benefits need to be substantial enough to attract the interest of communities. We heard that care must also be taken to avoid taking advantage of a vulnerable community and that quality of life must not be compromised for economic gain.

Principles

Overall, the guiding principles outlined in the draft document were judged to be on track and cover generally what is essential and most important. Some additions and refinements were also suggested. Those who participated in dialogues underlined the importance of the following:

- » The NWMO must make it clear that the current generation has a responsibility to put a plan in place for the waste we have created. This is the foundation for proceeding with the siting process. The current generation must demonstrate social and ethical responsibility for taking proper care of the nuclear waste that has been created.
- » The NWMO must continue to make substantial efforts to build awareness, understanding and confidence in APM, including how used nuclear fuel will be safely transported from reactor sites to the central facility.
- » The site selection process must be adaptive in order to take advantage of new knowledge and expertise from around the world throughout the process.
- » Those who are potentially affected must be involved in decision-making, and they must have the resources they need to support their participation. This is crucial to a fair process.
- » The long-term well-being, or quality of life, of the host community must be fostered through the project. The community must benefit from hosting the site, and risks must be mitigated. A broad range of aspects of the well-being of a community must be considered.
- » The rights of Aboriginal peoples, traditional practices and Traditional Knowledge must be respected in decision-making.
- » Transparency in the process and third-party review are important components of the process to ensure fairness. Communities must have access to their own sources of information and expertise to assess the project.

RESULTS FROM A NATIONWIDE SURVEY 2008

Importance of Site Selection Process Principles

During October and November, Pollara conducted a national survey of 2,600 people on behalf of the NWMO. The results suggest that the proposed principles to guide the siting process reflect a common-ground consensus among Canadians. Asked to rate the importance of each principle on a scale of one to seven, respondents provided the following views:

It is important that ...	% who rate the principle 6 or 7 on a 7-point importance scale
Safety, security and protection are central to the process	95
The community is informed about the risks and benefits	92
Construction does not start until after a regulatory review	92
The safety of the project has been confirmed by independent review	85
The community is willing to accept the project	78
The community is involved in each key decision	75
The project ensures the community benefits from it over a long period	74
The best information is used throughout the process	72
The views of surrounding communities are addressed	71
The process respects Aboriginal rights and treaties	69
Communities are able to withdraw until late into the process	54
The process focuses on the nuclear provinces	47

Steps

The site selection process steps were generally seen to meet the test of fairness and safety, although some important refinements were suggested. The community-driven approach and inclusion of public participation throughout the process were identified as particularly important. We heard this requires the involvement of citizens of the possible host community and surrounding areas and others potentially affected – not just political representatives – in determining whether a community is informed and willing to host the site. This public participation role needs to extend through all stages of the site selection process, as well as construction and operation of the facility, and include all points of view. Many of the suggestions for improvement in this area focused on ensuring that those potentially affected by the siting decision are brought in to decision-making as early in the process as possible.

In discussing siting process steps, dialogue participants identified several areas in the draft process that needed improvement or refinement.

Earlier involvement of provincial governments and regulatory authorities:

Provinces and regulators need to play a larger role earlier in the process. The draft siting process was felt by some to downplay the involvement of provincial governments and regulators. Explicit and clear involvement of provinces was identified as important because of their specific regulatory powers, and their responsibility for regional development, municipal governments, and the provision of some infrastructure and Crown lands.

Some participants were looking for assurance that provincial and federal governments have started thinking about the design of the environmental assessment and regulatory frameworks for the repository. Since these frameworks will govern the safety, environmental and other criteria that the NWMO will be required to apply to the project, they explained that, in their view, it is essential that these processes and requirements be agreed to early in the process by the Canadian Nuclear Safety Commission and other federal and provincial authorities. Participants were clear that the regulatory framework cannot be an afterthought; it needs to be developed in advance.

A number of participants recommended that the steps in the siting process (site assessment criteria and public engagement processes) should be better integrated with the environmental assessment process.

Greater geographical focus: Some participants argued that geophysical and logistical constraints ought to preclude certain areas of the four nuclear provinces from being suitable sites. In these participants' view, the NWMO should be more directing and develop additional criteria to focus the site selection process at the inception of the process. The early identification of excluded areas was suggested as both a cost-saving measure for the NWMO and a way to reduce potential

burden and stress for communities.

Some also suggested that other types of criteria might also be used to preclude certain areas, such as population density or transportation distance.

A greater role for other affected communities beyond the willing host community:

Many participants recommended that the support of surrounding communities needs to factor more strongly into the site selection process.

Several participants argued that surrounding communities, including Aboriginal communities, should be involved earlier than Step 4 in the process, as had been proposed in the discussion document.

Although participants agreed that the proposed regional study of social, economic and cultural effects is an appropriate step for involving surrounding communities, some felt that this study should be initiated in Step 3 of the process to ensure earlier engagement of these communities.

Definition of community and focus on region:

Throughout the dialogues, many addressed the question of what constitutes a community and who should ultimately need to demonstrate willingness in order for the project to proceed.

Some participants believed that the formal agreement should include more parties than just the NWMO and the willing host community, using a regional approach that includes all communities incurring risk or receiving benefits from the project.

Several participants stated that a willing host community is not sufficient and that this principle should be broadened to encompass a willing region. A few talked about the need for a willing province.

A number of participants stated that the evaluation of community well-being factors should be regional in scope, a scale that they believed

would be more appropriate in terms of addressing ecological sensitivities and associated impacts on land use.

Several participants stated that the project's benefits must be shared with the surrounding communities and that the equitable distribution of benefits is as important as their actual size.

Greater importance to transportation considerations: We heard from many that transportation is likely to be one of the major challenges for the site selection process.

Many expressed concern that the shortness of the section on transportation-route communities in the document does not do justice to their potentially pivotal role in the site selection process.

Many participants raised concerns about the ability of communities on transportation routes to put in place emergency response plans and the need to put in place activities that will ensure they have the capacity to react to an emergency situation.

Strengthening discussion of volume (and type) of waste to be managed:

Some expressed concern that used nuclear fuel from nuclear power plants that may be built in the future is not addressed. Participants expressed a range of views on how this should be addressed in the document, from ensuring its inclusion to ensuring its exclusion. Most called for greater clarity in this area.

Timing of construction of underground demonstration facility:

Some expressed concern that the NWMO will require a licence to construct the underground demonstration facility, and for this reason, the construction of the facility should be moved further back in the process.

Strengthening the discussion of willingness:

Some, although not all, were of the view that the criteria that will be used to assess willingness of

the host community be identified in the siting document and the processes to demonstrate this willingness be prescribed. Although there was much conversation on this issue, there was no agreement among participants on the nature of the criteria or processes that should be prescribed.

Reduce potential for conflict of interest in steps 5 and 6: Some told us that the NWMO was in a potential conflict of interest position in steps 5 and 6 of the process in that the process suggested the NWMO may work individually with multiple communities to help develop a draft hosting agreement in Step 5 and then select the preferred community and agreement in Step 6.

Traditional Knowledge: We heard that all processes involving the environment, including the siting process, need to consider Traditional Knowledge. Many participants indicated that a clearer acknowledgement and commitment in this area was needed.

Premise initiation of the site selection process on a moratorium on nuclear energy: Some participants, and in particular those who oppose the continued use of nuclear power, expressed a strong need for the site selection process to proceed only once a moratorium on the construction of new nuclear plants has been implemented. Some expressed the need for site selection to wait for a moratorium that would end use of existing plants as well.

Throughout this conversation, a number of opposing factors or trade-offs were raised to be addressed in the refinement of the site selection process and its ongoing implementation. Although we express here what we heard in terms of predominant and alternative view, there is a need to achieve some form of balance on these issues that acknowledges the importance of each to some Canadians as set out in the table below.

PREDOMINANT VIEW	VS.	ALTERNATIVE VIEW
» The site selection process should be dialogue-driven.	vs.	» The site selection process should be led by decisions by governments. » The site selection process should be focused primarily on meeting regulatory requirements.
» We have a responsibility to future generations to begin the process to seek and select a site.	vs.	» We should not initiate the site selection process before the future of nuclear power has been decided. » We should not initiate the site selection process before awareness and understanding has been increased among Canadians and Aboriginal peoples.
» The site selection process should be flexible in order to encourage and allow for learning throughout its implementation.	vs.	» The site selection process should be prescriptive in order to build confidence.

The NWMO encourages readers to visit the NWMO website to review the independent consultant reports that summarize the comments raised in individual engagement initiatives, as well as the individual submissions received to learn more about the broad range of themes and detailed comments that were raised. The NWMO will continue to refer to this large body of comments for guidance as it develops communication materials to support the implementation of the siting process, and detailed programs and plans to support the unfolding of individual steps in the siting process.

Evaluation Factors Ensuring the Safety of a Site and Fostering Community Well-Being

Overall, the evaluation factors outlined in the discussion document to assess the safety and appropriateness of any potential site were generally seen to be appropriate for the purpose of a high-level framework to guide the site selection process. The detailed approach taken to the development of specific measures and indicators will be important to ensuring the needs and expectations of Canadians are met, including regulatory authorities. This will continue to be an area of discussion with communities and with interested individuals and organizations throughout implementation of the site selection process.

Discussion of Social, Economic and Cultural Considerations

We heard during the NWMO Study (2002–2005) that a broad approach needs to be taken to identifying, assessing and managing the potential effects of the preferred management approach on a host community. We heard this needs to include potential effects relating to economic activity, environmental disruption, social fabric and culture on the host community and other affected communities, as well as learnings from Aboriginal Traditional Knowledge. We heard about the need to implement a community-oriented strategy for long-term sustainability with the community that would support the host community's vision for its social, cultural and economic aspirations, consistent with closely held values and priorities. We heard about the need to implement measures to enhance community competence, adaptability and infrastructure; provision for planning and technical assistance to help build community capacity to participate; and measures designed to enhance the community's share of benefit from the project.

Over the course of dialogues on the collaborative development of the site selection process, participants confirmed and expanded upon many of these ideas in the context of the discussion of community well-being. During these dialogues, we heard about the importance of the project being implemented in a way that helps foster the long-term well-being and sustainability of the host community, as determined by the community itself. We heard confirmation that any site and community will need to be assessed against factors including: health and safety; sustainable built and natural environments; local and regional economy and employment; community administration and decision-making processes; balanced growth and a healthy, livable community; and the impact on physical and social infrastructure. Participants underlined the importance of incorporating factors identified by Aboriginal Traditional Knowledge into the assessment.

Over the course of the dialogues, participants discussed the right of the community to receive a sustained net benefit and the need to ensure that the involvement of communities is fair and appropriate. The direction from dialogues on this topic includes:

- » Communities have a right to benefit from hosting the long-term management facility because they are performing a national service.
- » There is a need to identify risks, as well as benefits, to potentially affected communities.
- » Communities should be provided appropriate resources (funding, experts) to help them build capacity to understand the potential effects of hosting the project on their community and make informed decisions.
- » There is concern among some that the provision or promise of financial and economic benefits presents the risk of bribery or coercion, especially to economically disadvantaged communities.
- » There is a need to recognize and engage communities beyond the immediate host community, potentially including the adjacent region, the watershed, the province and/or transportation communities.
- » Communities should be encouraged to engage in a planning process to develop a long-term vision for sustainability, to assess community resources and assets (social, economic, environmental) and to develop a long-term plan to achieve its vision. This may include visioning exercises, community asset mapping and integrated community planning.

Discussion from Dialogues Led by Aboriginal Peoples

Aboriginal peoples who engaged in dialogue and review of the draft site selection document shared a range of suggestions, comments and concerns in reports from organizations provided to the NWMO, through participation in multi-party dialogues and in meetings of the Elders Forum. In discussion of the design of a site selection process, there appeared to be much common ground on individual design elements of the process, such as the design of principles and steps. There were also differences of view, primarily centred on the question of what would constitute the ideal conditions upon which the site selection process should proceed. The reports shared by these organizations are published on the NWMO website, and we encourage readers to review these reports in their entirety.

In the discussion that follows, we outline some of the key themes that emerged from the review of these reports and dialogues.

Safety: Participants in the dialogues underlined the paramount importance of safety and security to the success of the program, and that broad confidence must be built in these areas. Dialogue participants wanted to understand how the repository would affect the health and safety of workers, the public and the environment in order to begin building confidence in the project. Participants also expressed concern about transportation of used nuclear fuel and the need to know more about how it will be implemented in a safe and secure fashion, particularly as this may affect traditional territories, the methods for preparing Aboriginal communities for this transportation and potential emergency response processes needed.

Building awareness and understanding: We heard that in order to begin to participate in discussions about nuclear waste management and siting, Aboriginal peoples will need to learn a great deal and much background information will be required. Examples of basic questions to be addressed in this material include:

- » How did we get here?
- » What is nuclear waste?
- » What is APM?
- » Is there potential for reuse?
- » Should we continue with nuclear energy and produce more waste?
- » Should we deal with foreign waste?
- » How will we protect future generations?

The task of understanding this basic information is considered more complex by its technical nature. We heard from some that time and resources are needed to help build capacity to become full participants in decision-making, and a long-term effort is needed.

Dialogue reports underlined the importance of education in addressing and overcoming fears associated with hosting a nuclear waste management deep geological repository. This education is best led by Aboriginal peoples, independent of the NWMO at a pace suitable to Aboriginal peoples. Youth engagement must be at the forefront of these efforts.

Understanding potential effects:

Clear and understandable discussion of impacts and benefits for Aboriginal territories is needed. Concern was expressed about the effects of a repository on hunting and gathering practices, particularly in the event of an accident, and the mitigation and compensation that would be needed.

Importance of healing: We heard through the dialogues about the need

for healing, the healing journey of Mother Earth and the healing journey of man. We heard that we have a responsibility to seek opportunities within this project to contribute to healing. These opportunities include building relationships of mutual trust and respect, and taking appropriate action to protect the environment and people over the very long future.

Respecting Aboriginal and treaty rights:

Treaty and Aboriginal rights must be respected throughout the implementation of the project. This means involving affected Aboriginal peoples in decision-making throughout the entire implementation of the project and seeking their agreement to proceed. It is important that Aboriginal peoples and the NWMO work together to find solutions and make decisions.

Building relationships: We heard that people need the time to share their personal experience, their knowledge and their concerns with the NWMO as a necessary part of a process to build mutual understanding, and ultimately, a foundation for decision-making. This may involve Aboriginal peoples sharing with the NWMO their experience of past hurt or disrespect toward culture, traditions and Aboriginal peoples. This may involve expressions of strong conviction as Aboriginal peoples speak about their sense of responsibility for stewardship of the land and responsibility to people living in the community today and in the many generations to come.

The importance of continuing efforts to build relationships between the NWMO and Aboriginal peoples was discussed as necessary to overcome scepticism and mistrust born from past experience of Aboriginal peoples. Many suggestions were offered concerning what is required from the NWMO over time to build relationships of trust. Included in this, importantly, is the

need for the NWMO to build confidence that it is genuinely seeking the views of Aboriginal peoples and will treat these views as a key input to decision-making.

Capacity building and independent assessment: Independent resources are needed for Aboriginal peoples so that they can lead their own process of dialogue, engagement, education/capacity building and decision-making. Financial resources are needed to support discussions both among leadership and at the community level. Standards of safety and security need to be defined with the involvement of Aboriginal peoples using their own experts.

Learning from Traditional Knowledge: The inclusion of Traditional Knowledge in the site selection process is paramount to the success of this project. Understanding of traditional land uses in gathering of plants, food and animals and land-use mapping are needed for good decision-making. Aboriginal peoples' knowledge of the change that has occurred over time can help more accurately predict

future conditions for sites considered for the deep geological repository.

Timing of the initiation of site selection: For some, the site selection process should not be initiated before putting in place a plan to end nuclear power. For some, site selection should not begin before broader awareness and understanding has been built among leadership and at the community level, stronger relationships have been built with the NWMO, and greater confidence in the safety of the facility has been established.

Managing economic development effects: Economic development is an important effect of the implementation of APM, and it has the potential to benefit communities if appropriately managed. However, there is strong concern that impoverished communities may come forward as potential host communities out of economic desperation alone, and measures to ensure the well-being of these communities need to be put in place. Benefits must extend to future generations.

Citizen Panels contributed to the design of the site selection process.



How We Responded to Input Received

In response to the questions, comments and suggestions received, the NWMO made refinements throughout the siting document. Some of these refinements are described in the discussion that follows.

- » *Build awareness and understanding of the project.* The site selection process was revised to help ensure that a sustained effort is made throughout the process to build broad awareness and understanding of the project. It is the first step in the site selection process, as well as an activity that will continue throughout the process. The first step in the site selection process is designed to provide information, answer questions and build awareness among Canadians about the project and the siting process. Increasing awareness and understanding is expected to take a sustained effort throughout the entire site selection process, extending over more than 10 years.

As the siting process proceeds, and potential willing host communities and regions come forward, awareness-building activities will both intensify and become more focused on those who are most likely to be affected by the implementation of the project. Steps 2, 3 and 4 in the process are designed in part to facilitate the exploration of the safety of the site, and through working collaboratively with the NWMO in this work, they provide an extended period of learning for the community before deciding whether they are willing to host the project. The community will be supported in this learning process through provision of resources designed to help build the capacity of the community to identify and act upon its own interest.

- » *Foreign waste.* In response to the input received during dialogue, an explicit commitment to excluding foreign waste (used nuclear fuel from outside of Canada) from the repository has been made.
- » *Earlier and more prominent role for regulator and provincial governments.* The siting process was revised to include early and ongoing involvement of provincial governments and regulatory authorities throughout the process. The NWMO will seek regulatory guidance throughout the siting process to ensure that its work continues to be informed by regulatory expectations. The siting process was revised to clarify that the regulatory requirements for this project will inform the site assessment activities and approach to engagement of citizens from the inception of the siting process.
- » *Advance availability of resources for the involvement of surrounding areas and region.* Refinement of the siting process was made to add greater flexibility in the timing of involvement of surrounding communities, potentially affected Aboriginal peoples and regional study. Rather than being tied to a specific step in the siting process, a commitment is made to completing these activities as early as possible, as actual circumstances allow, within steps 2, 3 and 4. A commitment to capacity-building resources to support this earlier involvement by communities has similarly been advanced in the process.
- » *Ensuring a more regional focus in both assessment of the project and distribution of benefits.* Refinement was made to the siting process to recognize more clearly that the project will affect a broad region. A commit-

ment is made to involving the broad region early in the process beginning in Step 3; those potentially affected will have the opportunity and resources to influence the decision, including through the regional study in Step 4.

- » *More prominent role assigned to transportation considerations throughout the process.* Refinement was made to the siting process to acknowledge the importance of transportation considerations. Specifically, the process was revised to underline that in order for a site to be considered technically safe, a transportation route must be identified, or be capable of development, by which used nuclear fuel can be safely and securely 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.
- » *More streamlined process for initial screening in order to give communities early insight on their suitability.* Technical studies conducted by experts in the field confirmed the difficulty of accurately conducting pre-screening of the technical suitability of potential sites. In lieu of a technical pre-screening, the initial screening step was advanced and streamlined. The process was designed to ensure the community has early feedback on its potential suitability (Step 2 of the process) before beginning to assess its interest in earnest.

Beyond the refinement of the site selection process, the NWMO has instituted a number of activities in response to direction received through dialogue. For instance, in order to help build awareness and understanding of the issues involved in the long-term management of used nuclear fuel, the NWMO initiated the development of:

- » Several new backgrounders, or short information documents, each designed to focus on specific topics of interest. Some existing backgrounders were also revised to better address the questions and concerns raised. These backgrounders will be published on the NWMO website as they are developed.
- » Video presentations for the website on key topics of concern, such as a description of the project and transportation requirements.
- » An interactive, travelling exhibit designed to, for instance, facilitate exploration of these issues by encouraging the visitor to manipulate models and experience a virtual deep geological repository.

With respect to the important matter of earning the trust and confidence of Canadians, the NWMO is committed to implementing the project in a way that it is responsive to the values and concerns of Canadians and Aboriginal peoples. The NWMO will work to establish a track record that earns and builds confidence in the organization. The NWMO will also seek to build trust and confidence in the siting decision-making process. The NWMO will seek to do this by ensuring adherence to the guiding principles and steps, including transparency, inclusiveness, multiple forms of oversight and review, and capacity building for those potentially affected to ensure they are in a position to think through their own interest and act upon it. Substantial effort over an extended period is expected to be required from the NWMO to earn the trust and confidence of Canadians.

Throughout these dialogues, Canadians have shared many comments and suggestions to help ensure the implementation of APM in general, and the site

selection process specifically, meets the needs and expectations of Canadians.

The NWMO will continue to refer to this large body of comments for guidance as it develops communication materials to support the implementation of the siting process, and detailed programs and plans to support the unfolding of individual steps in the siting process. Please refer to page 91 for the steps in the siting process.

Dialogue Continues

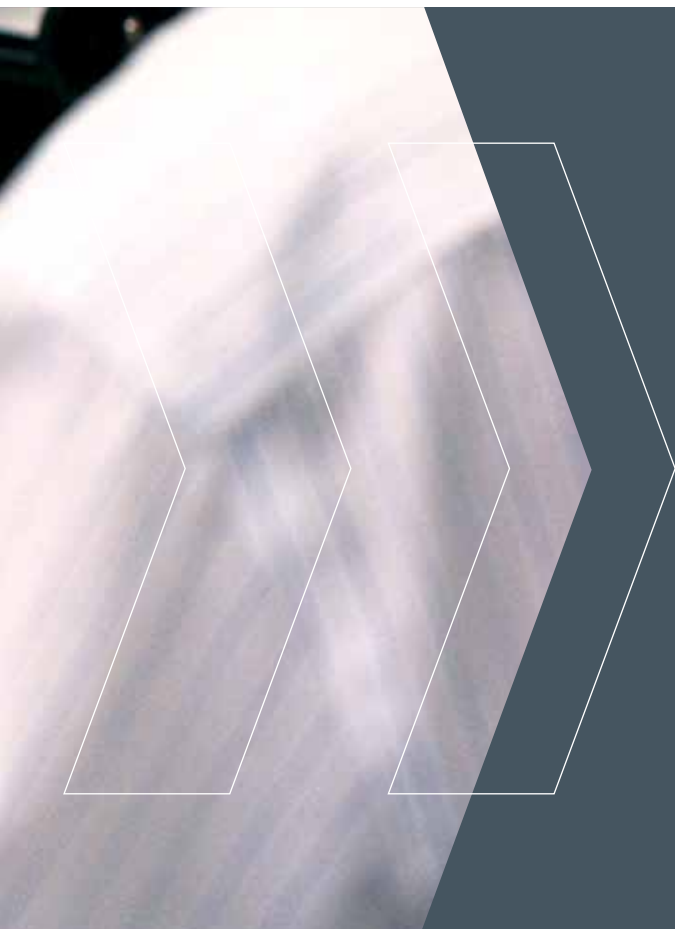
The site selection process is designed to serve as a road map for communities considering hosting the project to explore and understand how their well-being could be affected, including what challenges they might face, how they might benefit, and what commitments they will have to make before deciding if they wish to be considered to host the facility.

In the early months of engaging with the NWMO on the site selection process, interested communities have begun to further shape the site selection process by articulating their specific information needs and the manner in which they would like to receive this information, as well as the support they require to consider their interest in the project and strengthen their capacity to participate in the site selection process. In response to these early conversations with communities, a number of initiatives and activities have been launched. These include:

- » The shape and form of initial briefing sessions;
- » The shape and form of supporting information materials, such as brochures and backgrounders, information kiosks and exhibits;
- » Mechanisms to ensure transparency in the early stages of the process, including notification of community and media of the activities of the community concerning the project;
- » The value of early visits to interim used nuclear fuel storage sites;
- » The form, nature and timing of third-party information and support that is helpful;
- » Effective approaches for engaging community members; and
- » The importance and manner of early engagement of surrounding communities, regions and potentially affected Aboriginal peoples, and how to accomplish this using existing networks and building new ones.

We expect these conversations to continue and more detailed plans to be developed as the NWMO continues to work collaboratively with potentially interested communities, and surrounding communities and Aboriginal peoples, to seek and select an informed and willing host for APM.





10

Financial Reporting Requirements

The *Nuclear Fuel Waste Act (NFWA)* (2002) specifically addresses the future financial obligations for managing used nuclear 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*.

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 \$2.1 billion as of the end of 2010. 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

REQUIREMENTS OF THE *NUCLEAR FUEL WASTE ACT* (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 *Nuclear Fuel Waste Act (NFWA)*. Furthermore, in the unique situation as described in the *NFWA* paragraph 16(3)(a), the Minister is required to approve the funding formula to be used to finance the long-term management of nuclear fuel waste, together with the amounts of the deposits required for the next fiscal year by each nuclear energy corporation and Atomic Energy of Canada Limited (AECL).

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.

16(3) The formula referred to in paragraph (2)(d) and the amount of each deposit referred to in paragraph (2)(e) are subject to the approval of the Minister when proposed in

- (a) the first annual report after the date of a decision of the Governor in Council under section 15 or subsection 20(5); and
- (b) the first annual report after the issuance, under section 24 of the *Nuclear Safety and Control Act*, of a construction or operating licence for an activity to implement the approach that the Governor in Council selects under section 15 or approves under subsection 20(5).

Owner	Trust Fund Balance (\$ million)
December 2010	
Ontario Power Generation	1,950
Hydro-Québec	70
NB Power Nuclear	77
Atomic Energy Canada Limited	33
Total	2,130

will be preserved for the intended purpose. The *NFWA* built in explicit provisions to ensure that the trust funds are maintained securely and used only for the 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.

Funding Formula Approval Process

The NWMO submitted a proposed funding formula to the Minister of Natural Resources in its 2007 Annual Report.

Expert Panel Review

Prior to the submission of the funding formula, an independent expert panel reviewed the proposed funding formula. The panel concluded that the funding formula, as proposed, was reasonable and made a series of recommendations for its enhancement. These were accepted by the NWMO and were incorporated in the funding formula.

Ministerial Approval:

The *NFWA* paragraph 16(3)(a) requires that the funding formula and the amounts of each deposit in the next fiscal year must be presented to the Minister of Natural Resources for approval in the first annual report after the date of decision by the Governor in Council. This was a unique requirement for the 2007 Annual Report.

The following was presented for approval by the Minister in the 2007 Annual Report.

» **Cost Estimate**

The estimated cost of managing used fuel will be based on the highest cost of feasible planning scenarios. As of March 2008, the cost estimate of the long-term management of used fuel will be based on an assumption of a geological repository in service by 2035. The highest cost scenario and cost estimate will change in future years as planning scenarios are further developed and estimates are refined.

The escalation rates applied to account for the future escalation of costs will be based on long-term economic forecasts.

» **Investment Income**

The funding formula assumes that the funds deposited by each of the nuclear energy corporation and AECL will earn investment income. The estimated rates of returns on trust funds will be the best estimates by the individual trust fund owners. The estimates may vary from year to year and company to company.

» **Schedule of Financial Contributions**

Annual *NFWA* trust fund contributions will comprise two components: (1) Funding for “committed” fuel bundles generated up to June 30, 2006, and (2) Funding for “future” bundles generated from July 1, 2006, onwards.

The funds necessary to meet the cost of the long-term management of the “committed” fuel bundles consistent with the highest cost option as identified above, will be fully deposited by 2035, in equal installments adjusted for the time value of money. This time period is consistent with the end of life of the fleet of existing nuclear reactors. The life expectancy of the nuclear reactors varies from reactor to reactor. The actual life will depend on planned or likely refurbishments. It is reasonable to assume several of the existing reactors will be operational for a further 25 to 30 years.

The funds necessary to meet the complete construction costs of the facility will be available at the time construction commences.

The funds necessary to meet the cost of the long-term management of the “future” bundles will be deposited in the year following the generation of the bundles. For example, the 2008 deposits to the trust funds will allow for the recovery of incremental costs for fuel bundles generated between July 1, 2006, and June 30, 2007. A contribution rate per bundle based on the incremental cost of transferring to the repository, facility expansion, and additional operating and monitoring costs will be applied to the bundles generated.

» **Cost Sharing**

The cost sharing percentage by each nuclear fuel waste owner will be based on the number of fuel bundles produced up to June 30, 2006, adjusted to account for the assumed timing of transfer of used fuel to the repository. The cost sharing percentages will be updated periodically and as a minimum on a five-year cycle based on updated fuel bundle inventories and other factors. Costs specific to a nuclear fuel waste owner such as special fuel, special packaging or transportation cost will be attributed to the owner.

» **Deposit Amounts for 2008**

The amounts of the deposits required to be paid during the next fiscal year (2008) are \$121 M by OPG, \$7 M by HQ, \$7 M by NBP, and \$2 M by AECL. The rationale for these amounts is based on the items above.

The funding formula received the Minister’s approval in April 2009.

Financial Guarantees as Required by the *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 – Ontario Power Generation Inc. (OPG), Hydro-Québec (HQ) and NB Power Nuclear (NBPN) have provided to the Canadian Nuclear Safety Commission (CNSC). These guarantees for year 2011 total \$13 billion and equal 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 \$12 billion (at year-end 2010), 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 on page 200.

Total Cost Estimate as Required by the *NFWA* Section 16(2)(b)

The *NFWA* requires that the NWMO address the cost and funding of the long-term management of used nuclear fuel. In its 2005 Final Study Report, the NWMO estimated the cost of APM to be in the range of \$5 billion to \$6 billion (stated in present value as of January 1, 2004), assuming 3.6 million used fuel bundles are produced over the life of Canada's nuclear reactors. When updated to January 1, 2011, present value, the estimated cost of Adaptive Phased Management (APM) is in the range of \$7 billion to \$8.5 billion. These cost estimates include costs for reactor site storage that are carried out and funded by the individual waste owners, and 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.

The next generation of baseline cost estimates is expected to be completed no later than the year 2012. 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's Annual Report.

The highest present value cost scenario for long-term management of Canada's used nuclear fuel assumes a deep geological repository would be available starting in 2035. For the purpose of determining the funding requirements for the long-term management of used fuel, the cost estimate is further segregated into two parts:

- A. The cost of developing and building a repository, transporting the used fuel and operating the repository in 2035 for the estimated 2.2 million fuel bundles produced as of the end of June 2010 would be approximately \$5.4 billion (stated in present value as of January 1, 2011). This amount represents the "committed" portion of the total cost of the long-term management of used fuel already generated. The costs of interim storage at the reactor sites and recovery of the used fuel from storage are not included since they are the responsibility of the waste owners.
- B. The incremental cost of fuel bundles generated after June 30, 2010, including the transport to the repository, facility expansion and additional costs are identified as the "future" portion of the total cost of the long-term management of used fuel. These costs will be dependent on future production levels.

Cost to be Funded Through the *NFWA* Trusts

The \$5.4 billion present value cost estimate of a deep geological repository for an estimated 2.2 million used fuel bundles includes \$1.7 billion to develop the repository to a point of obtaining a construction licence and \$3.7 billion to complete construction, transport the fuel to the repository, and operate, close and monitor the repository.

The *NFWA* requires that post-construction licence costs (currently estimated at \$3.7 billion) must be funded through contributions to the *NFWA* trust funds established by OPG, HQ, NBPN and AECL.

As of December 2010, the total values of these funds including investment income was approximately \$2.1 billion.

Budget Forecast for 2011 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 \$1.7 billion (as stated in present value as of January 1, 2011) to site the long-term management option, develop its detailed design, evaluate its environmental impacts and obtain a construction licence from the CNSC. For 2011, the NWMO Board of Directors approved a budget envelope of \$41.4 million. Annual costs beyond 2011 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 the *NFWA* Section 16(2)(d)

Development

Following the submission of its Final Study Report in November 2005, the NWMO commenced work on developing a funding formula in consultation with financial experts, including those from its member companies. Based on a review of international practice and the results of the extensive engagements with Canadians in the development of APM, principles were established and adopted for guiding the development of the funding formula. These are listed below.

Funding Principles

The principles and approach used by the NWMO for calculating costs and trust fund deposits 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.

These funding principles used to develop the funding formula are:

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 as documented in the 2007 Annual Report proposed that each waste owner's proportionate share of the "committed" portion of the used fuel long-term management cost be funded by equal present value contributions over the period 2008 to 2035. These contributions are to escalate annually based on the respective assumed rate of return of each waste owner's fund. For the "future" portion of the total cost of the long-term management of used fuel, a contribution rate per bundle is calculated based on the incremental cost of transferring to the repository, facility expansion, and additional operating and monitoring costs. Each bundle would incur the same cost in present value terms taking into account the time value of money. The contribution amount will be determined based on the actual number of bundles produced. The funds necessary to meet the costs of fuel bundles created in annual cycles will be deposited in the following year.

The funding formula was approved by the Minister of Natural Resources in April 2009.

The five-year used fuel production for each waste owner is shown in the table below.

Used Fuel Bundle Production (Historical and Forecast)						
Owner	June 2006 Inventory	2007* Actual	2008* Actual	2009* Actual	2010* Actual	2011* Projection
OPG	1,640,481	71,104	71,673	73,528	69,271	82,549
HQ	101,130	4,651	2,800	3,864	3,728	4,500
NBPN	109,298	4,668	7,792	–	–	1,120
AECL**	32,623	–	–	–	–	–
Total	1,883,532	80,423	82,265	77,392	72,999	88,168

* From July 1 (previous year) to June 30 (current year)

** Updated by AECL in 2008

It should be noted that the small quantities of research reactor fuel waste are not included in the AECL used fuel inventory listed in the table above.

Cost Sharing

For the purpose of sharing NWMO costs, this 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 Hydro-Québec, New Brunswick Power Nuclear and AECL, this transfer is assumed to start in 2050. The resulting cost sharing percentage among the waste owners is approximately: OPG: 90.8%, HQ: 3.9%, NBPN: 4.2%, and AECL: 1.2%.

These percentages apply to the sharing of both pre- and post-construction costs. Cost 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

At the request of the Minister of Natural Resources, the NWMO has begun a process of engagement by contacting a number of stakeholders to solicit their views on the development of a funding formula that could apply to used fuel from new reactors. Any revisions to the funding formula will be done in a fair and equitable manner, balancing the interest of current and new waste owners, and based on the funding principles that form the basis of the current funding formula.

Trust Fund Deposits 2006 to 2010 as Required by the *NFWA* Section 16(2)(e)

Beginning in 2002, nuclear used fuel waste owners have been making annual contributions to the *NFWA* Trust Funds. The contributions for each waste owner are shown in the table below.

Contributions to the
NFWA Trust Funds



Total Deposits to Trust Fund (\$ million)					
Owner	2006	2007	2008	2009*	2010
OPG	100	100	100	153	136
HQ	4	4	4	9	7
NBPN	4	4	4	14	4
AECL	2	2	2	2	2
Total	110	110	110	178	149

* 2009 contributions include additional funding required for 2008 contributions under the funding formula that was approved in April 2009.

Trust Fund Deposits for 2011 as Required by the *NFWA* Section 16(2)(e)

The *NFWA* Trust Fund deposits for 2011 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:

- » Funding for historical used fuel bundles (Committed Liability)
- » 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 used fuel bundles in inventory up to June 30, 2010. Contributions for the “committed”

liability are to be amortized to year 2035 in equal present value payments. The rationale for this amortization period is that 2035 is consistent with the planned end of life of the current nuclear reactors that created the 2.2 million used fuel bundles, and it 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 any future bundles produced beyond June 30, 2010. Each future used fuel bundle would incur the same cost in present value terms, taking into account the time value of money.

The 2011 Trust Fund Deposits are shown in the table below.

Total Trust Fund Deposits:
Year 2011



	Trust Fund Balances as at December 2010 (\$ million)	2011 Deposits to Trust Funds Required by Waste Owners* (\$ million)
Owner	Dec 2010	2011
OPG	1,950	139
HQ	70	7
NBPN	77	5
AECL	33	2
Total	2,130	153

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

Status of Financial Guarantees

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 was updated annually by means of an annual report provided to the CNSC.
- » 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 that 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 2007 to support its application to update the Financial Guarantee for the period from January 1, 2008, to year-end 2012. The CNSC hearing for this application was held in November 2007. The CNSC accepted the Financial Guarantee proposal on November 29, 2007.

The Annual Report to the CNSC for year 2011 shows a Financial Guarantee requirement of \$11.578 billion. This will be satisfied by a segregated fund balance at year-end 2010 of \$11.246 billion and a Provincial Guarantee of \$1.545 billion. The Provincial Guarantee value has been accepted by the CNSC at a fixed amount that will cover all remaining years until 2012.

The value of the OPG *NFWA* Trust Fund as of year-end 2010 is \$1.95 billion. This value forms part of the segregated fund balance shown above.

Hydro-Québec

Hydro-Québec 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 Hydro-Québec that provides a guarantee of payment until December 31, 2011, and the HQ *NFWA* Trust Fund.
- » The HQ *NFWA* Trust Fund contained \$70 million as of December 31, 2010.

NB Power Nuclear

NB Power Nuclear 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 2011. 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, 2010, was approximately \$504 million and was comprised of the following:
 - Used Fuel Fund – \$264 million
 - Station Decommissioning Fund – \$163 million
 - *NFWA* Trust Fund – \$77 million

Atomic Energy of Canada Limited

The AECL 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 \$33.4 million as of December 31, 2010.





11

The Organization

Members, Board of Directors, Officers



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 Inc. (OPG), New Brunswick Power Corporation and Hydro-Québec are the founding Members, and along with Atomic Energy of Canada Limited, are required to fund the NWMO's operations.

The Member corporations develop the underlying governance structures for the organization and also the cost-sharing provisions for the NWMO's operating expenses. In 2007, following the change in the NWMO's role to implementer of the Adaptive Phased Management (APM) approach, the Members confirmed a new general bylaw and membership agreement as proposed by the Board of Directors. At each of their annual general meetings (AGMs), they received and commented on reports from the Board on the NWMO's activities for the previous year, the organization's audited financial statements and the NWMO's fulfillment of its obligations under the *NFWA*.

At their June 2010 AGM in Toronto, Members were updated on the process to select a site for a deep geological repository, collaboratively developed over the previous two years with interested citizens and organizations through a broad program of public engagement. They discussed NWMO plans to build awareness of the site selection process over time and other work underway,

including a pre-project review with the Canadian Nuclear Safety Commission of the design and safety case for a repository and the updating of cost estimates for the project. They re-appointed Deloitte and Touche LLP as the external auditor for the purposes of the 2010 audit.

Board of Directors

The NWMO Board of Directors is responsible for administering the affairs of the NWMO in accordance with good governance practices, including ensuring that the organization's objectives are properly carried out, overseeing all aspects of its operations, ensuring financial stability and overall performance, and supervising management and senior staff.

As of December 31, 2010, the NWMO Board was composed of nine individuals. Dr. Gary Kugler continues to serve as Chairman, and Mr. Ken Nash is President and CEO. Other OPG appointees are Mr. Pierre Charlebois, Mr. Donn Hanbidge, Mr. Ron Jamieson, Dr. Deborah Poff and Mr. C. Ian Ross. Ms. Josée Pilon is appointed by Hydro-Québec, and Mr. Darren Murphy is appointed by NB Power.

The Board convened five meetings in 2010. Minutes of those meetings are posted on the NWMO website at www.nwmo.ca/board.

Each year, the Board reviews the NWMO's Annual Report and approves the audited financial statements for the previous year. They also discuss and approve rolling five-year business plans and budgets.

Board members regularly discuss strategic planning issues. In 2007, they agreed on a set of draft strategic objectives and a process for the NWMO to collaboratively develop its first five-year implementation plan. The plan is assessed and refined annually based on new information, advances in technology and science, changes in societal values and evolving public policy.

Following the government's selection of the APM plan in 2007, a major area of Board focus was facilitating the NWMO's transition to an implementing organization. The Board provided guidance on labour relations and human resource planning, beginning the process for the NWMO to become an employer in its own right with its own financial and business support systems. This transition was completed in 2008, and effective January 1, 2009, the organization became its own employer with all the necessary supporting infrastructure.

A significant early Board task was reviewing a funding formula in support of implementing APM. The formula, which was first submitted to an expert panel for review, was proposed to the Government in the 2007 Annual Report as required by the *NFWA* and was approved by the Minister of Natural Resources in May 2009. The Board has ongoing discussions about the funding formula and how it might be adjusted in light of evolving energy policy in Canada.

Other important early work addressing oversight and governance was the development of a framework for the Advisory Council for the implementation phase. The Board approved a revised Terms of Reference for the Council and provided direction for a review of the Council's composition to ensure the appropriate breadth of expertise for implementation.

One critical Board decision regarding oversight was to establish an Independent Technical Review Group in 2008 to review and report annually on the NWMO technical program. The Group's members are internationally recognized specialists in their fields with significant experience in technologies

associated with nuclear waste repository projects. Their impartial reports are posted on the NWMO website at www.nwmo.ca/itrg.

In 2008, the NWMO Directors oversaw work on a services agreement with OPG. The contract that became effective January 1, 2009, calls for the NWMO to develop and license OPG's proposed Deep Geologic Repository Project for Low and Intermediate Level Waste in Kincardine, Ontario. Please refer to section *Other Activities: OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste* of Chapter 6.

The NWMO Board takes a particular interest in the activities of the NWMO Elders Forum and its working group Niigani. Individual directors, including the Chair, attend annual Elders Forum meetings, and Board members requested and received Aboriginal Cultural Training provided by Niigani in 2009.

In 2010, the Board oversaw completion of the collaborative design of the site selection process for a deep geological repository and the start of its implementation.

Also regularly reviewed and approved by the directors as part of the business planning process are the NWMO's technical and social research programs and public engagement plans. At each of their meetings, the Board received financial updates and reports from the chairs of the Advisory Council and Board committees.

Committees of the Board of Directors

Audit, Finance and Risk Committee

The Audit, Finance and Risk Committee provides oversight of external audits of the NWMO's financial statements. The Committee also advises the Board annually on the selection of auditors for the following year and terms of the Audit Service Plan. Meetings are held with the auditors each year to discuss their findings.

The Committee regularly reviews in-year financial statements, business risk, the Chair's and President's expenses, financial policies, business plan progress and budgetary planning.

Importantly, in 2007, the Audit, Finance and Risk Committee discussed the proposed funding formula for APM, including holding a special session to consider the findings of the expert review panel it appointed to review the proposal. In 2008, much of the Committee's work focused on the NWMO's transition to becoming its own employer, including reviewing transition agreements with OPG and providing oversight for the establishment of an NWMO pension plan. The Committee continues to oversee the financial aspects of the pension plan.

As of December 31, 2010, there were four directors on the Audit, Finance and Risk Committee:

- » Ian Ross, Chair
- » Ron Jamieson
- » Josée Pilon
- » Donn Hanbidge

Siting Committee

In 2007, the Board established a Siting Committee to provide focused attention on the collaborative design and implementation of plans and activities to identify an informed and willing community to host a deep geological repository. The Committee examined and reported to the Board on the organization's readiness to engage the public on designing a process in 2008, and reviewed the outcomes of those activities in 2009. In 2010, the Committee reviewed plans and readiness, and recommended to the Board initiation of the siting process, which is now underway.

As of December 31, 2010, there were four directors on the Siting Committee:

- » Ron Jamieson, Chair
- » Deborah Poff
- » Pierre Charlebois
- » Darren Murphy (replaced Sharon MacFarlane – April 14, 2010)

Human Resources and Compensation Committee

The Human Resources and Compensation Committee was established by the Board of Directors in 2008 to provide oversight of the NWMO's human resources functions, including compensation practices, human resources policy, organization design, labour relations and pension plans. The committee convenes regular meetings and conducts conference calls as required.

As of December 31, 2010, there were four directors on the Human Resources and Compensation Committee:

- » Ian Ross, Chair
- » Pierre Charlebois
- » Josée Pilon
- » Deborah Poff

Members of the Board of Directors



» Dr. Gary Kugler – Chair

Dr. Gary Kugler is the retired Senior Vice-President of Nuclear Products and Services at Atomic Energy of Canada Limited (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 Ontario Power Generation. He holds an Honours B.Sc. in Physics and a Ph.D. in Nuclear Physics from McMaster University.



» Ken Nash – President and CEO of the NWMO

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 Ontario Power Generation 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

Pierre Charlebois is the retired Executive Vice-President and Chief Operating Officer at Ontario Power Generation (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.



» **Donn Hanbidge**

Donn Hanbidge is the Chief Financial Officer at Ontario Power Generation (OPG). He was appointed to his current position in 2005 and is responsible for providing financial leadership and operational support to OPG's business units. He has overall accountability for the controllership function, risk management, accounting, reporting, taxation, business and investment planning, treasury, pension, financial communications and nuclear fund management. Prior to joining OPG, Mr. Hanbidge held various financial management roles with Union Gas Limited. He began his career at Ernst & Young. Mr. Hanbidge obtained an Honours Bachelor of Arts in Business Administration from the University of Western Ontario and is a Chartered Accountant.



» **Ronald (Ron) L. Jamieson**

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.



» **Darren Murphy**

Darren Murphy is Vice-President, Finance and Chief Financial Officer of NB Power Holding Corporation. He became a member of the NB Power executive on January 20, 2007, when he was appointed Vice-President, Distribution and Customer Service; and subsequently was given the additional responsibility of Vice-President, Transmission. Mr. Murphy began his career with NB Power in 1990 as a Business Trainee and has held positions of increasing responsibility within Distribution and Customer Service. He was named Regional Manager of Customer Service for the Southern Region in 1996 and the Eastern Region in 2001. He is a past member of the Canadian Electrical Association Distribution Council and Transmission Council and also a past member of the Northeast Power Coordinating Council's Board of Directors. Mr. Murphy is currently on the Board of Directors for the NB Investment Management Corp.



» Josée Pilon

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.



» Dr. 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 for Ethics in Leadership. She is the founder and editor of the *Journal of Business Ethics*, *Teaching Business Ethics* and *Journal of Academic Ethics*. She is the editor of *Business Ethics in Canada* and the section editor on business and economic ethics on the forthcoming *Encyclopedia of Applied Ethics* to be published by Elsevier Press. Dr. Poff is currently working on a book on ethical leadership and the future of university governance. She is currently the President of the National Council on Ethics in Human Research.



» C. Ian Ross

Ian Ross served at the Richard Ivey School of Business at the University of Western Ontario from 1997 to 2003. Most recently, 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 Ontario Power Generation, and is Chair of Growth-Works Canadian Fund Ltd. He is also a member of the Law Society of Upper Canada.



Elizabeth Dowdeswell
Special Advisor to the Board
(2007 to 2009)



Sharon MacFarlane
Director
(June 30, 2007 – April 14, 2010)

Officers

Chairman of the Board

Dr. Gary Kugler

President and CEO

Kenneth E. Nash

Vice-Presidents

Angelo Castellan – Environmental Assessment & Corporate Support

Steve Cavan – Treasurer & Chief Financial Officer

Frank King – Chief Engineer

Patrick Moran – General Counsel & Corporate Secretary

Sean O'Dwyer – Human Resources

Ian Pritchard – Design & Construction

Kathryn Shaver – APM Engagement & Site Selection

Executive Committee



Executive Committee

Left to right: Kenneth E. Nash, Sean Russell, Kathryn Shaver, Frank King, Steve Cavan, Ian Pritchard, Angelo Castellan, Patrick Moran, Jamie Robinson and Sean O'Dwyer

The NWMO Team

Our Head Office

The head office of the NWMO is located at:

22 St. Clair Avenue East, 6th Floor
Toronto, Ontario M4T 2S3
Canada

From 2002 to June 2007, the NWMO was located at 49 Jackes Avenue, Toronto, Ontario M4T 1E2.

As of December 31, 2010, the NWMO had 120 full-time staff. The organization grew during the year from 109 individuals at the end of December 2009.



Social Research & Dialogue

Left to right: Michael Borrelli, Timothy Weber, Ellen Meadd and Jo-Ann Facella

Municipal & Community Engagement

Left to right: Angela Ciccotelli, Kathryn Shaver, Gillian Morris, Jessica Gosbee, Peter Simmons and Lisa Epstein



Communications

Left to right: Elena Mantagaris, Nicole DiCarlo, Jamie Robinson, Alejandro Covarrubias, Mike Krizanc, Wendy Yan and Daniel Molina

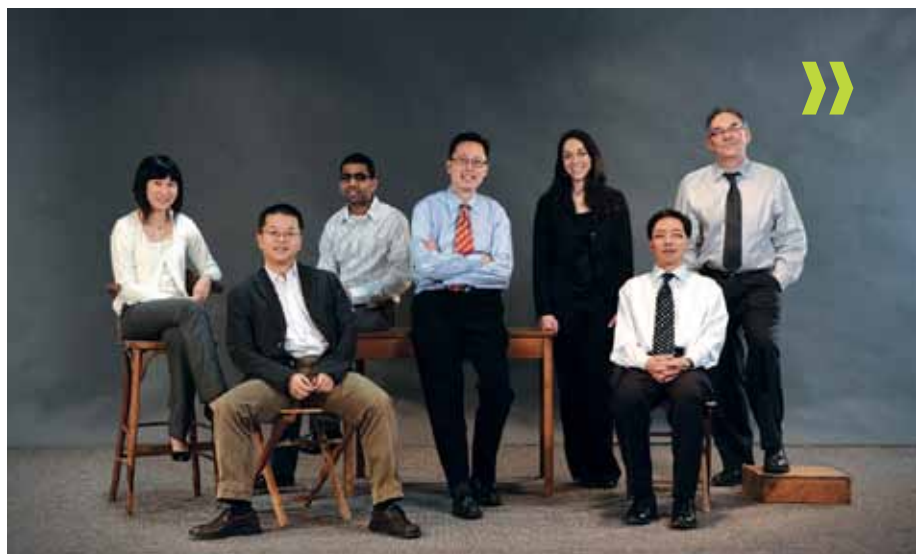


Aboriginal Relations

Left to right: Jessica Perritt, Cynthia Jourdain, Pat Patton and Jamie Matear

Liability Management & Business Planning

Left to right: Karen Poon, Wei Song, Vaneet Gupta, Michael Hung, Daniela Heimlich, Tiger Liu and John Kennard



Human Resources

Left to right: Janet David,
Lori Lucas, Phyllis Pandovski
and Sean O'Dwyer



Information Technology / Procurement

Left to right: Kent Feng, Boye Abdul,
Ivana Ivanovic, Ryan Robertson,
Kitty Lee and Larry Starecky

Office Services

Left to right: Nicola Moore,
Viva Isbasoiu, Maria Simone,
Laura Grant and Sally Clark-Mills



Controller

Left to right: Kevin Tsang,
Stella Shiv, Joyce Chen,
Maryam Dabir, Deb Rzeplinski,
Kevin She and
Gowie Garcia D'Aguanno



Business Planning & Cost Management

Left to right: Steve Cavan, Christopher Vardy,
Mike Budge and Ian Walker

APM Geoscience

Left to right: Jennifer McKelvie,
Mahrez Ben Belfadhel,
Andres Urrutia-Bustos,
Maria Sanchez-Rico Castejon
and Alexander Blyth



Repository Safety

Left to right: Helen Leung, Paul Gierszewski, Chantal Medri, Neale Hunt, Erik Kremer, Kelly Sedor, Frank Garisto and Mark Gobien



Regulatory Affairs / Technical Assessment & Planning / Quality Assurance

Left to right: Frank King, Mike Garamszeghy, Mihaela Ion, Atika Khan, Cornelia Vazdauteanu, Ginni Cheema, Lisa Lang, Monica Dias and Paul Hader

DGR Public Affairs / DGR Environmental Assessment

Left to right: Kevin Orr, Melissa Mayhew, Diane Barker, Angelo Castellan, Joanne Jacyk and Marie Wilson



Repository Engineering

Left to right: Gloria Kwong, Sean Russell, Ulf Stahmer, Jorge Villagran, Peter Maak, Ken Birch, Alan Murchison and Jose Freire-Canosa



OPG's DGR Project Team

Left to right: Bill Forbes, Derek Wilson, Jennifer Noronha, Andrew Boushy, John Van Heerden, Richard Heystee, Katie Demois and Ian Pritchard

DGR Geoscience & Research

Left to right: Tom Lam, Branko Semec, Eric Sykes, Mark Jensen, Tammy Yang, Andre Vorauer, Andy Parmenter, Richard Crowe and Toivo Wanne







12

Advisory Council

The NWMO Advisory Council was established by the Board of Directors in 2002 in accordance with the *Nuclear Fuel Waste Act (NFWA)*.

The Council is composed of 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 and Aboriginal Traditional Knowledge. The Honourable David Crombie has served as the Council's Chair since its inception. The Council was reconstituted in 2008 with 10 members, including seven of its original nine, and three new appointees. Following the death of Dr. Daniel Rozon in 2009, Mr. Michel Rhéaume was appointed in 2010. Members are profiled on pages 224–227.

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 included in Chapter 14, *Advisory Council Comments*.

Council Operations

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 and 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. Individual Council members often participate in the NWMO activities outside of formal Council meetings 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 together annually for an informal exchange of views.

Governance

As the NWMO prepared to implement Canada's plan for the long-term management of used nuclear fuel, the Advisory Council expressed its views on governance. Members advised that the Board of Directors should continue operating under the principles established by the NWMO during its study phase, and that it maintain its vision for Adaptive Phased Management (APM). The Council advocated that the principles of transparency and openness be made explicit in the organization's vision, mission and values.

The Advisory Council reflected on its own mandate for the implementation phase. In 2007, they accepted an invitation from the Board Chair to consider their future membership and terms of reference. During the discussion, they stressed the importance of maintaining their independence and providing independent advice while offering counsel to the NWMO.

As implementation began, the Advisory Council noted the importance of a peer review process for the NWMO technical research program to earn and maintain public confidence in the organization's scientific work. Following this, the Council was kept updated through 2008 on the formation of an Independent Technical Review Group, and late that year and in subsequent years, was provided presentations of the Group's reports and offered comments on them.

Throughout 2008, 2009 and 2010, the Council considered its role in relation to the NWMO's work on Ontario Power Generation's Deep Geologic Repository Project for Low and Intermediate Level Waste. While members noted that the *NFWA* does not require the Council to monitor and comment on the project, they said it is important that members be kept informed on technical and

engagement aspects of the work due to its relevance and possible impacts on APM.

The Council was kept abreast of the NWMO's transition to a stand-alone employer and was regularly updated on hiring plans and the capabilities provided by new recruits. The Council agreed the organization has been strengthened in accordance with its 2005 recommendation that the NWMO required broader skills to implement Canada's plan for long-term nuclear waste management.

Ongoing Advice

Following the government's selection of the APM approach, the Advisory Council focused on the NWMO's planning for implementation. Each year, Council Members are briefed on in-year work plans and the five-year implementation plan. In 2007, they offered advice on the draft strategic objectives proposed by the NWMO to guide early work. In subsequent years, they reviewed findings from public engagement on the evolving plan and provided counsel on its incorporation, as well as their own advice.

Just as it did during the 2002–2005 study period, the Advisory Council continued to provide significant input into the development of NWMO engagement programs. Members suggested that the time required to build relationships is one of the NWMO's greatest challenges, and that proceeding in stages, providing information, inviting discussion and reporting back is advisable. The Council encouraged the NWMO to remain flexible in the timing of its work throughout implementation.

Relationship Building

The NWMO's engagement of the many and varied stakeholder groups interested in, or potentially affected by, the long-term management of used nuclear fuel is a key focus of the Advisory Council. In particular, members have encouraged relationship building with Aboriginal peoples, elected officials and youth.

Aboriginal Peoples

Each year, individual Advisory Council members attended the annual Elders Forum to listen first hand and participate in discussion between Elders and the NWMO. The Council strongly endorsed formation of Niigani, the Aboriginal Working Group proposed by the forum, and soon after its establishment in 2007, extended an invitation to meet with the working group for an exchange of views and to set the stage for further discussions. Niigani and the Council have since agreed to meet annually.

In 2009, Council members participated in cultural training presented by Elders. They also benefited from a session on traditional healing offered by their colleague Dr. Marlyn Cook, who discussed many of the challenges facing Aboriginal communities.

The Council regularly examines the Aboriginal dimension of the NWMO's work reflecting on how the organization interweaves Aboriginal Traditional Knowledge. Throughout, members have kept a close watch on relationships between the organization and Aboriginal peoples and encouraged the NWMO to include Aboriginal peoples in all areas of work and to continue involving Niigani in as many discussions as possible with Aboriginal groups.

Youth

Recognizing the long-term nature of used nuclear fuel management, and the importance from an ethical perspective of incorporating youth opinions in decision-making that will have impacts far into the future, the Advisory Council encouraged the NWMO to invite comment from young people in the organization's broader engagement activities. The use of modern communication opportunities to make dialogue accessible to youth was strongly supported.

The Council welcomed the creation of a youth engagement strategy and advised on the design of a Youth Roundtable, involving young people with a diversity of perspectives, to guide its development. The Advisory Council was pleased in 2009 to meet with representatives of the roundtable and receive a report of its work. The quality of the content and its relevance was impressive. The Council later reviewed and commended the NWMO's response to the advice.

Government Engagement

The Advisory Council has stressed the importance of involving elected officials and government departments at the federal, provincial and municipal levels in the implementation of APM. The Council regularly reviews and comments on the organization's efforts in this regard and supports the NWMO's delivery of briefings at the federal level and of provincial governments in the nuclear provinces.

The Advisory Council provided extensive input into the NWMO's plans for engaging municipalities. Noting that local engagement will be increasingly important as APM is implemented, the Council supported strengthening relations with municipal associations to bring forward local perspectives. Members agreed on the value of creating an umbrella organization composed of representatives from national, provincial and regional municipal associations to act as an interface with communities. Following its establishment of the Municipal Forum in 2009, Advisory Council member Eva Ligetti attends the group's meetings and regularly briefs the Council on its activities.

Council Activities (2008–2010)

Siting

The Advisory Council was engaged at every step in the development of the process to select a site for a deep repository. In 2007, the Council commented on the proposed direction for collaboratively designing the process, and in early 2008, members offered advice on the discussion document prepared to support dialogue with citizens on the matter. Later, the Council reviewed plans for communicating and engaging on the draft plan and then evaluated readiness criteria to proceed with dialogues. Some Council members attended some of the engagement activities to hear discussions directly. The full Council was provided reports on the citizen panels and multi-party dialogues that were convened for input.

In 2009, following engagement on the draft siting process, the Advisory Council offered advice to refine the document. The Council suggested that siting success will be determined by the quality of the NWMO's partner and

that the organization should consider the profile and values of potential hosts. The NWMO was encouraged to elaborate on anticipated community impacts over the different phases of implementing the project and to better address the subject of community well-being. The Council proposed that the NWMO emphasize in its communications that plans could change as APM is implemented, and in particular, to further articulate the retrievability aspect of the plan.

Before the siting process document was finalized in 2010, the Advisory Council considered revisions arising from the public review and offered its own further comments. Importantly, the Council suggested adding further clarity and firmness to emphasize that Canada's deep geological repository for used nuclear fuel will not accept foreign waste. Members advised it should be made clear in the document that those who will regulate the project are independent and at arm's length from the NWMO, and that Environment Canada's role should be mentioned.

The Advisory Council was concerned about how the volume of used nuclear fuel to be managed should be addressed in the siting plan. Members suggested that clarity was needed in discussing used fuel associated with planned nuclear reactor refurbishments, and acknowledging that used fuel volumes from new reactors would not be known until decisions on new build are made, such fuel should only be placed in the repository with the agreement of the host community. The NWMO confirmed that the regulatory review process required before the project proceeds will be

open and transparent and will be based on a specific volume of used fuel.

As the NWMO launched the process in 2010 to identify a host community for the repository project, the Advisory Council underscored the importance of the organization understanding local and regional landscapes in which communities are expressing interest, and to devote resources to developing and maintaining understanding. The Council provided a range of considerations for the NWMO before it decides whether or when to establish an NWMO presence in communities that ask to learn more about APM.

The Council strongly supported the NWMO providing funds for communities to participate in the siting process. Noting that the process enables communities to request peer reviews and engage independent experts, the Advisory Council underscored the importance of assuring the quality and credentials of third-party expertise engaged by communities to preserve the integrity of the process. Among other things, Council members suggested professional societies that could be asked to offer advice or maintain a roster of potential qualified experts communities might wish to engage.

The Advisory Council questioned how Aboriginal communities will be involved in the siting process. They asked whether Aboriginal processes for developing community consensus had been considered within the siting process. They also encouraged the NWMO to ensure that Aboriginal communities are involved early in the process when potential host communities step forward.

External Landscape

The Advisory Council acknowledges that the NWMO is required by the *NFWA* to manage all Canada's used nuclear fuel and must be prepared for a variety of eventualities. The Council gave extensive consideration to changes in the external landscape and how energy policy decisions by electricity generators, governments and regulators might affect plans for the long-term management of used nuclear fuel.

Members noted ongoing discussions about refurbishments and possible new nuclear reactors, including types other than CANDU, being built in Canada and how the NWMO might best stay abreast of these developments and incorporate them, and their social and technical impacts, into its strategic direction.

The discussion on fuel volumes and types became particularly focused in 2010 as the Advisory Council offered advice on finalizing the process for selecting an informed and willing community to host a repository. The Council urged the NWMO to clearly communicate its commitment to continually monitor public policy developments in energy and adapt its plans in response to decisions that are made.

The Advisory Council also considered the range of management plans under development in Canada for nuclear waste other than used fuel and pointed out the importance of enhanced cooperation between the different programs.

Members of the Advisory Council



» Hon. David Crombie

The Hon. 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.



» Dr. David Cameron

Dr. David Cameron is the Chair of and a Professor in the Department of Political Science at the University of Toronto and a Fellow of the Royal Society of Canada. He has held a number of senior government positions in both the federal and Ontario civil services. He continues to advise on a wide range of governmental issues.



» Dr. Marlyn Cook

Dr. Marlyn Cook is presently Chief of Staff 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.

**» Dr. Frederick Gilbert**

Dr. Frederick Gilbert is the past President and Vice-Chancellor of Lakehead University in Thunder Bay, Ontario. He is a member of the Ontario Regional Board of the Nature Conservancy of Canada. He also serves as a member of the Board of Directors of the Thunder Bay Regional Research Institute. As well, he is a member of the Advisory Board of the Mowat Centre for Policy Innovation. Dr. Gilbert has had an extensive teaching, research and administrative career in the United States and Canada at 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.

**» Rudyard Griffiths**

Rudyard Griffiths is an author, public commentator and advisor to various not-for-profit foundations and organizations in Canada and abroad. Mr. Griffiths is the co-founder of the Dominion Institute (a national charity dedicated to the promotion of civic literacy), the co-founder of the Salon Speakers Series and a co-organizer of the Munk Debates (Canada's premiere debate series). In 2006, Mr. Griffiths was recognized by the Globe and Mail as one of Canada's Top 40 under 40. He sits on a variety of not-for-profit boards and is a columnist with the National Post. He is the author of *Who We Are: A Citizen's Manifesto* published by Douglas & McIntyre in 2009. Mr. Griffiths holds a degree from the University of Toronto and a Master of Philosophy from Emmanuel College in Cambridge, UK.

**» Eva Ligeti**

Eva Ligeti is the Executive Director of the Clean Air Partnership, a non-profit organization with a mandate to make cities more environmentally sustainable. A lawyer, she served as Ontario's first Environmental Commissioner from 1994 to 1999. Ms. Ligeti serves on the Council of the Federation of Canadian Municipalities' Green Municipal Fund, was a member of the Province of Ontario's Expert Panel on Climate Change Adaptation, and is a co-chair of the Civic Action's Greening Greater Toronto Task Force. She teaches Environmental Law in the graduate program in Environmental Science at the University of Toronto.

**» Dr. 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 the areas of chemistry and corrosion associated with nuclear systems, and he holds positions on a number of national and international committees advising government and industry.

**» Dr. Dougal McCreath**

Dr. Dougal McCreath is Professor Emeritus in the School of Engineering at Laurentian University in Sudbury, Ontario. A Fellow of the Engineering Institute of Canada, 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. From 2003 to 2007, he was President and CEO of Jonview Canada Inc., Canada's largest receptive tour operator. Prior to that, he had been Deputy Minister of seven Ontario government ministries over a 15-year period. He also held senior positions with the federal departments of Indian Affairs and Northern Development Canada, and Health and Welfare Canada. Mr. Obonsawin is Abenaki and a member of the Odanak First Nation.



» Michel Rhéaume

Michel 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 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. Mr. Rhéaume also taught nuclear physics and health physics for 20 years at the University du Québec à Trois-Rivières.



Dr. Daniel Rozon

In September 2009, the NWMO and the Advisory Council were deeply saddened by the death of Dr. Daniel Rozon, a long-time member of the Advisory Council. A specialist in reactor physics, Dr. Rozon was Professor Emeritus in the Engineering Physics Department at the École Polytechnique de Montréal. He was the Director of the Nuclear Engineering Institute (l'Institut de génie nucléaire) for more than 15 years. His active participation and significant contributions to the deliberations of the Advisory Council are greatly appreciated and will be exceedingly missed.





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Auditor's Report and Financial Statements

MANAGEMENT'S RESPONSIBILITY FOR FINANCIAL REPORTING

The accompanying financial statements of Nuclear Waste Management Organization 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 Feb. 16, 2011.

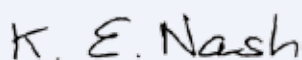
Management has a system of internal controls designed to provide reasonable assurance that the financial statements are accurate and complete in all material respects. The internal control system includes an established business conduct policy that applies to all employees. Management believes that the systems provide reasonable assurance that transactions are properly authorized and recorded, financial information is relevant, reliable and accurate and that 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 re-appointment of the external auditor.

The financial statements have been audited by Deloitte & Touche, LLP, the independent external auditor, in accordance with Canadian generally accepted auditing standards on behalf of the members.

February 16, 2011



Ken Nash
President



Steve Cavan
Chief Financial Officer

INDEPENDENT AUDITOR'S REPORT

To the Directors 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, 2010, 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 generally accepted accounting principles, 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 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, 2010, and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.



Chartered Accountants
Licensed Public Accountants
Toronto, Ontario
February 16, 2011

Statement of Financial Position

Statement Of Financial Position As at December 31, 2010	2010	2009 Restated (Note 2)
ASSETS		
CURRENT		
Cash (NOTE 4)	\$ 2,565,656	\$ 10,738,363
Accounts receivable	3,712	336,074
Member contributions receivable (NOTE 7a)	5,212,039	704,574
Prepaid expenses and deposits	428,336	322,244
	8,209,743	12,101,255
Capital Assets (NOTE 5)	2,865,405	3,185,874
Deferred Pension Asset (NOTE 9)	9,321,260	7,821,142
	\$ 20,396,408	\$ 23,108,271
LIABILITIES		
CURRENT LIABILITIES		
Accounts payable and accruals	\$ 7,808,494	\$ 11,392,300
Deferred lease inducements (NOTE 10)	182,327	225,625
Deferred Member Contributions (NOTE 7a)	273,922	509,330
	8,264,743	12,127,255
Deferred Capital Contribution (NOTE 8)	2,865,405	3,185,874
Member contributions for employee future benefits (NOTE 7b)	3,325,648	2,886,054
Other Post Employment and Pension Benefits (NOTE 9)	5,940,612	4,909,088
	12,131,665	10,981,016
Commitments (NOTE 12)		
	\$ 20,396,408	\$ 23,108,271

APPROVED BY THE BOARD OF DIRECTORS, FEBRUARY 16, 2011

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

Statement of operations and changes in net assets Year ended December 31, 2010	2010	2009 Restated (Note 2)
REVENUE (NOTE 13)		
Member cash contributions received (NOTE 6)	\$ 41,805,255	\$ 48,154,638
Non-member contributions received	389,327	305,848
Interest income	6,536	122,047
	42,201,118	48,582,533
Change in Deferred Capital Contributions (NOTE 8)	320,469	(884,810)
Change in Member Contributions for Employee Future Benefits (NOTE 7b)	(439,594)	(2,886,053)
Change in Member Contribution Receivable and Deferred Member Contributions (NOTE 7a)	4,742,873	7,081,441
	46,824,866	51,893,111
Expenses		
Adaptive Phase Management		
Staffing and administration	12,459,673	9,713,036
Siting Process	1,058,492	–
Design & Development Safety Case	8,208,124	8,318,083
Building Relationships	2,015,013	6,141,635
Governance Structure	628,881	872,499
Adapting to Change	141,353	–
Social research and support implementation	–	524,433
Funding formula/Financial Surety	23,815	1,039,622
	24,535,350	26,609,308
Deep Geologic Repository		
Regulatory review stage – contracts	10,940,838	17,277,866
Design & Construction Stage	1,827,761	–
Salaries and administration	6,887,241	5,869,911
	19,655,840	23,147,777
Life Cycle and Liability Management		
Contract	618,388	34,776
Salaries and administration	1,215,588	1,477,959
	1,833,976	1,512,735
Amortization	799,700	623,291
	\$ 46,824,866	\$ 51,893,111
Excess of revenue over expenses for the year	–	–
Net assets, beginning of year	–	–
NET ASSETS, END OF YEAR	–	–

Statement of Cash Flows

Statement of cash flows Year ended December 31, 2010	2010	2009 Restated (Note 2)
OPERATING ACTIVITIES		
Cash received from contributions	\$ 42,194,582	\$ 48,460,486
Interest received on short-term investments	6,536	122,047
	42,201,118	48,582,533
Cash paid for materials and services	(49,894,595)	(47,381,504)
Cash received from OPG in settlement of Asset Transfer Agreement	–	3,077,956
Cash paid to OPG in settlement of Pension Transfer Agreement	–	(1,867,726)
	(7,693,477)	2,411,259
INVESTING ACTIVITY		
Purchase of capital assets	(479,230)	(1,508,100)
Net increase in cash	(8,172,707)	903,159
Cash, beginning of year	10,738,363	9,835,204
CASH, END OF YEAR (NOTE 4)	\$ 2,565,656	\$ 10,738,363

Notes to the Financial Statements

1. Purpose of organization

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.

In addition to the above mandate, effective January 1, 2009, 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) and certain provision costing and accounting services relating to nuclear lifecycle liability management (LLM services).

2. Restatement of the Prior Years' Figures

On July 31, 2010, the members of the NWMO signed a revised membership agreement whereby the "Actual Cost Share Amounts" are no longer required to be adjusted to a cash basis. As a result of changes made to the Membership Agreement, NWMO reviewed its policy for recognizing contributions from its members as revenue and determined that, as all contributions are restricted in nature, that revenue should only be recorded when qualifying expenses are incurred. In previous years, as a result of additional cash requirements to fund the acquisition of capital assets as well as employee future benefits, these adjustments had resulted in an increase in contribution revenue recognized and an increase in internally restricted assets. This change in the accounting, related to the recognition of revenue from member contributions, has been made retrospectively as this provides more relevant information about the effects of the transactions on NWMO's financial position.

As a result of this change, the following amounts have been restated in the 2009 comparative amounts.

Decrease in internally restricted net assets, beginning of year	\$2,301,065
Increase in deferred revenue for employee future benefits	\$2,886,054
Increase in deferred capital contributions	\$3,185,874
Decrease in revenues	\$3,770,863
Decrease in excess revenue over expenses	\$3,770,863

3. Significant accounting policies

Basis of presentation

The financial statements of NWMO are the representations of management prepared in accordance with accounting standards for not-for-profit organizations established by the Canadian Institute of Chartered Accountants using the deferral method of reporting restricted contributions. The significant accounting policies adopted by NWMO are as follows:

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 & office equipment	7 years
Computer equipment and software	3 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 into revenue until qualifying expenses have been incurred. Any excess or shortfall of member contributions is recorded as a deferred revenue or member contribution receivable, respectively.

Contributions used for the purchase of capital assets are deferred and amortized into revenue at a rate corresponding with the amortization rate of the related capital assets.

Pension and Other Post Employment Benefits

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. NWMO has adopted the following policies with respect to accounting for these post employment benefits:

- (i) 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 12 years. (See also Note 9.)
- (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 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.

The measurement date used to determine the accrued benefit obligation for all benefit plans is December 31, 2010. The most recent actuarial valuation of all benefit plans was done as of December 31, 2010. A funding valuation was also done of the plans as of January 1, 2010, based on the transfer of the pension liability from OPG, pending approval by the Financial Services Commission of Ontario (FSCO).

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 salaries and administration expenses.

Financial instruments

NWMO has classified its financial instruments as follows:

- » Cash and cash equivalents as “held-for-trading”. Held-for-trading items are carried at fair value, with changes in their fair value recognized in the Statement of Operations in the current period.
- » Amounts receivable as “loans and receivables”. “Loans and receivables” are carried at amortized cost, using the effective interest method, net of any impairment.
- » All accounts payable and accrued liabilities as “other liabilities”. “Other liabilities” are carried at amortized cost, using the effective interest method.

NWMO has elected to follow the disclosure requirements of section 3861 “Financial Instruments – Disclosure and Presentation of the CICA Handbook As allowed under Section 3855 “Financial Instruments – Recognition and Measurement”, the Organization has elected not to account for non-financial contracts as derivatives, and not to account for embedded derivatives in non-financial contracts, leases and insurance contracts as embedded derivatives.

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 employee future benefits and certain accrued liabilities.

Future Accounting Changes

In December 2010, the CICA issued a new accounting framework applicable to Not-for-Profit Organisations. Effective for fiscal years beginning on January 1, 2012 Not-for-Profit organizations will have to choose between International Financial Reporting Standards (IFRSs) and Canadian accounting standards for Not-for-Profit Organizations. Early adoption of these standards is permitted. NWMO currently plans to adopt the new accounting standards for Not-for-Profit organizations (for its fiscal year beginning on January 1, 2012). The impact of transitioning to these new standards has not been determined at this time.

4. Cash

Included in cash is an amount of \$1,891,800 (2009 – \$840,700) which is restricted as this amount is securing a Letter of Credit issued for the Supplementary Pension Plan (Note 9).

5. Capital assets

	2010			2009
	Cost	Accumulated amortization	Net book value	Net book value
Furniture and office equipment	\$ 1,518,127	\$ 480,481	\$ 1,037,646	\$ 1,099,055
Computer equipment and software	1,396,165	661,509	734,656	851,466
Leasehold improvements	1,421,447	328,345	1,093,102	1,235,353
	\$ 4,335,740	\$ 1,470,335	\$ 2,865,405	\$ 3,185,874

6. Related party transactions, balances and other information

Transactions and balances not otherwise disclosed separately in the financial statements are as follows:

	APM	LLM/DGR	2010	2009
Transactions during the year				
Member Contributions:				
Ontario Power Generation Inc.	\$ 21,183,095	\$ 18,984,980	\$ 40,168,075	\$ 46,050,304
NB Power Nuclear	849,926	–	849,926	1,092,686
Hydro-Québec	787,254	–	787,254	1,011,648
	\$ 22,820,275	\$ 18,984,980	\$ 41,805,255	\$ 48,154,638

Transactions with Ontario Power Generation Inc.

Payments				
Managerial services (included in staffing and administration expenses)			\$ 31,335	\$ 285,927

Related party transactions are recorded at the exchange amount.

As of December 31, 2010, approximately \$28.3 million (\$25.5 million as of Dec. 31, 2009) of pension plan assets are held and managed by OPG, pending transfer to the NWMO pension plan upon approval by the Financial Services Commission of Ontario (FSCO).

Board of Directors

The following NWMO Directors are on the OPG Board:

- Gary Kugler
- Ian Ross

The following OPG Executive is on the NWMO Board:

- Donn Hanbidge – Chief Financial Officer, Ontario Power Generation

7. Member Contributions Receivable and Deferred Revenue

NWMO receives contributions from its members and is solely funded through their contributions. The contributions received by 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 NWMO are recorded as contributions receivable when the amount is determinable and the ultimate collection is likely.

a) Member contributions receivable and deferred member contributions

	2010	2009
Contributions Receivable		
Ontario Power Generation	\$ 5,212,039	\$ 704,574
Deferred Member contributions		
New Brunswick Power	55,370	230,910
Hydro-Québec	51,625	213,786
AECL	166,927	64,634
	\$ 273,922	\$ 509,330

b) Deferred Revenue relating to Employee Future Benefits

Member contributions in the amount of \$3,325,648 (2009 – \$2,886,054) received in advance to fund various employee future benefits is comprised of the following:

	2010	2009
Deferred pension asset	\$ 9,321,260	\$ 7,821,142
Other post employment benefits	(5,940,612)	(4,909,088)
Benefit liabilities in accounts payable	(55,000)	(26,000)
	\$ 3,325,648	\$ 2,886,054

8. Deferred Capital Contribution

	2010	2009
Balance, beginning of year	\$ 3,185,874	\$ 2,301,065
Additions for the purchase of capital assets	479,230	1,508,100
Less amortization into revenue	(799,699)	(623,291)
Balance, end of year	\$ 2,865,405	\$ 3,185,874

9. Pension and other Post Employment Benefit plans

Effective January 1, 2009, 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 Manulife Financial Corporation. The benefit costs and assets related to this plan are recorded in 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 benefits

These other post employment benefits are comprised of medical, dental, and group life insurance coverage for certain groups of full-time employees who have retired from NWMO and are between the ages of 55 and 65.

The significant actuarial assumptions adopted in estimating NWMO's accrued benefit obligations are as follows:

	Registered pension plan		Supplementary pension plan		Other post employment benefit	
	2010	2009	2010	2009	2010	2009
WEIGHTED AVERAGE ASSUMPTIONS FOR BENEFIT OBLIGATION AND COSTS						
Weighted-average discount rate	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
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	—	—	—	—	6.5	6.2
Expected return on plan assets	6.5	7	—	—	—	—
Average remaining service life for employees	12 years	12 years	12 years	12 years	16 years	16 years

9. Pension and other Post Employment Benefit plans (continued)

Information for NWMO's pension and post employment benefits, including long-term disability (LTD) at December 31, 2010, is as follows:

Year Ended December 31	Registered Pension Plan		Supplementary Pension		Other Post Employment Benefits/LTD	
	2010	2009	2010	2009	2010	2009
CHANGES IN ACCRUED BENEFIT OBLIGATION						
Accrued benefit obligation, January 1	\$ (26,002,000)	\$ (17,936,000)	\$ (1,332,000)	\$ (839,000)	\$ (5,796,000)	\$ (3,352,000)
Current service cost	(1,288,000)	(460,000)	(297,000)	(101,000)	(386,000)	(370,000)
Interest cost	(1,512,000)	(1,382,000)	(91,000)	(71,000)	(327,000)	(268,000)
Transfer in	–	(365,000)	–	–	–	–
Employee Contribution	(749,000)	(540,000)	–	–	–	–
Benefits paid	343,000	1,363,000	37,900	17,000	99,058	49,000
Net actuarial loss (gain)	(905,000)	(6,682,000)	(472,000)	(338,000)	202,000	(1,855,000)
Accrued benefit obligation, December 31	\$ (30,113,000)	\$ (26,002,000)	\$ (2,154,100)	\$ (1,332,000)	\$ (6,207,942)	\$ (5,796,000)
CHANGES IN PLAN ASSETS						
Fair value of plan assets, January 1	\$ 28,573,000	\$ 23,921,000	–	–	–	–
Actual return on plan assets	3,435,000	3,157,000	–	–	–	–
Reciprocal transfers	–	365,000	–	–	–	–
Benefits paid	(343,000)	(1,363,000)	–	–	\$ (99,058)	(49,000)
Employers' contribution	2,546,000	1,953,000	–	–	99,058	49,000
Employees' contribution	749,000	540,000	–	–	–	–
Fair value of plan assets, December 31	\$ 34,960,000	\$ 28,573,000	–	–	–	–
FUNDED STATUS						
(Unfunded benefit obligation) funded excess	\$ 4,847,000	\$ 2,571,000	\$ (2,154,100)	\$ (1,332,000)	\$ (6,207,942)	\$ (5,796,000)
Unamortized net actuarial losses (gains)	4,474,260	5,250,142	793,000	338,000	1,573,430	1,854,912
Accrued benefit asset (liability) at end of year	9,321,260	7,821,142	(1,361,100)	(994,000)	(4,634,512)	(3,941,088)
Short-term portion	–	–	–	–	(55,000)	(26,000)
Long-term portion	9,321,260	7,821,142	(1,361,100)	(994,000)	(4,579,512)	(3,915,088)
	\$ 9,321,260	\$ 7,821,142	\$ (1,361,100)	\$ (994,000)	\$ (4,634,512)	\$ (3,941,088)
COMPONENTS OF COST RECOGNIZED						
Current service cost, net of employee contribution	\$ 1,288,000	\$ 460,000	\$ 297,000	\$ 101,000	\$ 386,000	\$ 370,000
Interest cost on accrued benefit obligation	1,512,000	1,382,000	91,000	71,000	327,000	268,000
Amortization of net actuarial loss	199,000	–	17,000	–	80,000	–
Expected Return on Plan Asset	(1,953,000)	(1,725,000)	–	–	–	–
Cost Recognized	\$ 1,046,000	\$ 117,000	\$ 405,000	\$ 172,000	\$ 793,000	\$ 638,000

The amounts are included in the respective expense categories in the Statement of Operations.

9. Pension and other Post Employment Benefit plans (continued)

		Other post employment benefits/LTD
	2010	2009
Effect of 1% increase in health care cost trends on:		
Accrued benefit obligation	\$ 1,181,000	\$ 1,076,000
Service cost and interest cost	154,000	119,000
Effect of 1% decrease in health care cost trends on:		
Accrued benefit obligation	(917,000)	(830,000)
Service cost and interest cost	\$ (115,000)	\$ (58,000)

The supplementary pension plan is not funded, but is secured by Letters of Credit totaling \$1,891,800 (2009: \$840,700) (Note 4).

10. Deferred lease inducements

	2010	2009
Tenant inducements	\$ 263,076	\$ 263,076
Less: accumulated amortization	(80,749)	(37,451)
	\$ 182,327	\$ 225,625

11. Guarantees

In the normal course of business, NWMO enters into agreements that meet the definition of a guarantee.

(a) NWMO has provided indemnities under lease agreements for the use of its premises. Under the terms of these agreements, 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) NWMO indemnifies all directors, officers and employees acting on behalf of NWMO for various items including, but not limited to, all costs to settle suits or actions due to services provided to NWMO, subject to certain restrictions

The nature of these indemnification agreements prevents 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, NWMO has not made any payments under such or similar indemnification agreements, and therefore, no amount has been accrued with respect to these agreements.

NWMO also arranged a standby Letter of Credit to secure its supplementary pension plan (see Note 9).

12. Commitments

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 for the next 5 years are as follows:

2011	\$ 627,390
2012	617,650
2013	475,767
2014	391,035
2015	272,410
	<u>\$ 2,384,252</u>

13. Segment reporting

NWMO has two reportable segments as follows:

- » Federal mandated program (Adaptive Phased Management of long-term used nuclear fuel – “APM”)
- » Other direct services outside mandate, which include the Deep Geologic Repository (DGR) and Life Cycle and Liability Management (LLM) for Ontario Power Generation Inc. with service contracts which became effective January 1, 2009.

The accounting policies followed by the segments are the same as those described in the summary of significant accounting policies (see Note 2). Segment information on the above basis is as follows:

Year ended December	APM		DGR/LLM		Total	
	2010	2009	2010	2009	2010	2009
Revenue	\$ 25,251,176	\$ 27,072,611	\$ 21,567,154	\$ 24,698,453	\$ 46,818,330	\$ 51,771,064
Interest revenue/other income	3,856	116,384	2,680	5,663	6,536	122,047
Total income	25,255,032	27,188,995	21,569,834	24,704,116	46,824,866	51,893,111
Amortization of capital assets	719,682	579,687	80,017	43,604	799,699	623,291
Operating cost	24,535,350	26,609,308	21,489,816	24,660,512	46,025,166	51,269,820
Total assets	12,742,470	12,469,904	7,653,938	10,638,367	20,396,408	23,108,271
Expenditure for segment capital assets	\$ 316,771	\$ 904,860	\$ 162,459	\$ 603,240	\$ 479,230	\$ 1,508,100

Certain common service costs are allocated to each function of the above segments based on the number of direct staff in each function.

14. Capital management

In managing capital, NWMO focuses on liquid resources available for operations and project implementation. The need for sufficient resources is considered in the preparation of a long-range business plan and annual budget and in monitoring cash flows and actual expenditures compared to the business plan and budget. NWMO has sufficient liquid resources to meet its current obligations.

15. Comparative figures

Certain of the prior year's comparative figures have been reclassified to conform to the current year's presentation.





14

Advisory Council Comments

Advisory Council
to the NWMO

Dr. Gary Kugler
Chairman of the Board of Directors
Nuclear Waste Management Organization
22 St. Clair Ave. East
Toronto, Ontario
M4T 2S3

January 2011

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 the NWMO's 2011 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 Cameron
Dr. Marlyn Cook
Dr. Frederick Gilbert
Mr. Rudyard Griffiths
Ms. Eva Ligeti
Dr. Derek Lister
Dr. Dougal McCreath
Mr. Donald Obonsawin
Mr. Michel Rhéaume

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1 Introduction

This report reflects our mandate under the *Nuclear Fuel Waste Act* to comment on the process and findings of the Nuclear Waste Management Organization (NWMO).

Section 1 provides an overview of the mandate, process and approach of the Advisory Council. Section 2 provides our evaluation of the work the NWMO has undertaken over the past three years towards its seven strategic objectives for Adaptive Phased Management. Section 3 includes comments on the NWMO's plans for future work, based on its 2011–2015 Strategic Plan and Budget Forecast. 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* (NFWA), the NWMO Board of Directors established an Advisory Council in 2002. The NFWA 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 traditional Aboriginal knowledge. In 2008, two of the original nine members left the Council, and three new appointments were made (Marlyn Cook, Rudyard Griffiths and Dougal McCreath). In September 2009, we were deeply saddened by the death of Dr. Daniel Rozon, and greatly miss his active participation and significant contributions to our work. In September 2010, Michel Rhéaume was appointed to the Council. The Honourable David Crombie continues to serve as Chair, and the Advisory Council members are profiled on pages 224–227.

The Advisory Council is required by the NFWA to comment every three years on the previous three years of NWMO activity. These independent statements, which include observations on the result of NWMO public consultations and analysis 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. Advisory Council comments are submitted to the Minister of Natural Resources Canada and made public at the same time.

1.2 Relationship with the NWMO

The Advisory Council meets regularly with staff and the NWMO President. We follow the development of the Organization's plans and activities closely, and provide ongoing counsel and advice. 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 Council apprised of Board matters, and vice versa. Council members and the Board of Directors meet annually for an informal exchange of views.

In 2005, the Council provided independent comments on the NWMO's report, *Choosing a Way Forward – The Future Management of Canada's Used Nuclear Fuel (Final Study)*, which recommended Adaptive Phased Management (APM). We concluded that APM 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 specific comments focused on the future governance of the NWMO, development of APM, public engagement, Aboriginal engagement, Advisory Council membership and energy policy. The NWMO has responded to our comments in all these areas:

- » Following the 2007 government decision to proceed with APM, the NWMO has begun its transition into an organization with appropriate board representation and staff expertise to address the challenges of implementing APM.
- » Engagement activities have been enhanced by the establishment of the Elders Forum, Niigani and the Municipal Forum, as well as the activities of the Youth Roundtable (which has now completed its work; see also Section 2).
- » Work is underway to understand how to incorporate Aboriginal Traditional Knowledge (ATK) into the NWMO's work (see also Section 2).
- » The assurance that the NWMO's technical work meets international standards has been increased by the establishment of the Independent Technical Review Group (ITRG), which provides a rigorous peer review process.
- » The four new members of the Advisory Council add to the breadth of expertise in our group. See pages 224–227 for biographies of all our members.
- » Energy policy is outside the mandate of the NWMO, but the Organization continues to keep abreast of the changing landscape both in Canada and abroad (see also Section 2.5). Current areas of interest in Canada include potential new nuclear build, nuclear plant refurbishments, and projects to manage low and intermediate level radioactive wastes (e.g., by Ontario Power Generation and Atomic Energy of Canada Limited).

In addition to fulfilling our legislated reporting requirements, we summarize our activities on a yearly basis for inclusion in the NWMO Annual Report. The NWMO also produces a detailed annual tracking matrix documenting the actions taken by the Organization in response to our advice. The tracking matrices are posted on the NWMO's website at www.nwmo.ca/actrackingmatrices. We have been generally pleased with the NWMO's receptiveness and efficiency in taking up our suggestions.

1.3 Advisory Council Process & Activities: 2008–2010

During 2008–2010, the Advisory Council held at least four formal meetings and one conference call per year. The formal meetings included progress reports from the NWMO and discussions about ongoing planning activities, technical and social research, and the findings of public engagement activities. We met with the NWMO Aboriginal working group Niigani each year. An *in camera* session was held at the end of most of our formal meetings when we deliberated without the presence of NWMO management or staff. Three additional, separate *in camera* meetings were held in fall 2010 to discuss the contents of this Triennial Report.

During this three-year period, the Council provided guidance and advice to the NWMO on the design of its processes and development of its documents. For example, in 2008, we conferred with the NWMO on the design of a process to select a site for the deep geological repository, provided input on the siting process discussion document, and reviewed readiness criteria for

public dialogues. In 2009, we continued to provide advice on siting documents, and emphasized the importance of complementary information to elaborate on the anticipated economic benefits of the project and its community impacts, both positive and negative, during the various stages of implementation. In 2010, we discussed preparations to initiate the site selection process and provided specific comments on the siting document as well as the preliminary interactions with interested communities. We also advised the NWMO on engagement programs and communication materials on an ongoing basis.

Members of the Council brought areas of relevant expertise to our work, and some Council members made presentations to the group during our regular meetings. For example, in 2008, Derek Lister and Daniel Rozon drew on their knowledge of nuclear engineering to present a paper that, among other things, addressed possible utilization of the fluoride volatility method for reprocessing used fuel. The Council referred this work to the NWMO for further consideration. In 2009, Marlyn Cook provided the Council with a session on traditional healing that examined some of the challenges facing Aboriginal communities. In the same year, David Cameron presented a paper on the challenges of interweaving ATK into the NWMO's work.

Guest speakers also attended some of our meetings. In 2008, we received a presentation on Finland's program for long-term used nuclear fuel management by Eero Patrakka, President of Posiva, Finland's nuclear waste management organization. In 2008 and 2009, Allan Hooper, the chairperson of the Independent Technical Review Group (ITRG), joined us for an update and discussion of the Group's work. Also in 2009, members and staff from the Youth Roundtable presented a DVD featuring their work, including recommendations regarding targeted communications, clear messaging and ideas for engaging youth inside and outside the formal education system.

Council members also participated in other NWMO activities as a means of observing engagement activities directly and increasing our understanding of issues raised by dialogue participants. A number of Council members participated in the annual Elders Forums and observed sessions of the Citizen Panels. The Aboriginal working group Niigani attended at least one of our meetings each year. Council members attended an Aboriginal Cultural Training session presented by Niigani members in 2009. In 2008, Marlyn Cook made a presentation at a Traditional Knowledge Workshop held with NWMO staff. Eva Ligeti, who has extensive experience working with municipalities on environmental issues, attends the meetings of the Municipal Forum regularly and briefs the Council on its activities. In 2008, Council members visited the Darlington nuclear plant to observe the handling and storage of used fuel.

Advisory Council members also made presentations about their work at international conferences. Derek Lister presented a paper prepared by David Crombie, Daniel Rozon and himself at the 16th Pacific Basin Nuclear Conference in Aomori, Japan, 2008. The paper addressed challenges ahead in the management of Canada's used nuclear fuel. In 2009, David Cameron spoke about the Council's role at the Nuclear Power in Society Conference held in Ottawa.

In January 2009, Ontario Power Generation (OPG) contracted the NWMO to manage the regulatory approvals process for its Deep Geologic Repository (DGR) Project for the long-term management of low and intermediate level radioactive waste (L&ILW) in Kincardine, Ontario (see section "Other Activities: OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste" of Chapter 6 in the NWMO's Triennial Report). A second contract is under development for the NWMO to manage the Design and Construction Phase of this project. In 2009, Advisory Council was advised that, based on

the *Nuclear Fuel Waste Act* which established the Council, there is no legal requirement for us to provide comments on the L&ILW projects. However, this work is highly relevant to the NWMO's core mandate to provide a solution for Canada's used fuel waste through APM. We have therefore requested briefings on the L&ILW project and provide some comments in Sections 2, 3 and 4 below.

At our request, formal records of our meetings and copies of papers by Council members are posted on the NWMO website at www.nwmo.ca/advisorycouncilminutes.

1.4 Criteria to Assess the NWMO's Work

In 2002, in order to fulfil our obligations to provide an independent review of the work of the NWMO, we developed four primary criteria for evaluation. In developing these criteria, we considered the mandate of the NWMO, the requirements of the legislation, and the experience of the Seaborn Panel. The four criteria were: comprehensiveness, fairness and balance, integrity, and transparency.

In considering the work of the NWMO since the adoption of APM, in particular the design of the siting process, we believe that these four criteria are still appropriate. However, we have adapted them to be consistent with the phases of the Organization's work since 2005. We have also added three criteria to reflect the evolution of NWMO's work: technical strength, financial capacity and culture of learning. As we show in this report, the NWMO's work to date has been characterized by its efforts to follow these principles, and we encourage the Organization to continue to apply them.

Comprehensiveness. The NWMO's work should continue to properly consider all the available reasonable alternative approaches. The experiences from other jurisdictions should be taken into account. Advice from the ITRG, Elders Forum, Niigani, Youth Roundtable and Advisory Council should be carefully considered, evaluated and incorporated as appropriate.

Fairness and balance. The siting process should be conducted impartially. Adequate consideration must be given to diverse points of view, including minority perspectives.

Integrity. The NWMO should undertake APM and all its other activities with openness, honesty and consistency. The Organization should provide meaningful and sufficient opportunities for public and stakeholder engagement, clearly demonstrate how the Organization is responding to input, and show respect for participating individuals, communities and organizations.

Transparency. The NWMO should make its plans, timetable and activities clear to the interested public. Information should be shared with citizens in a timely fashion so that they can participate effectively.

Technical strength. The NWMO should have adequate human resources encompassing the engineering and scientific disciplines associated with site characterization as well as knowledge relating to the societal aspects of the community, region and transportation corridor. The long-term needs of interested communities should be met by ensuring there are skilled personnel at the local level to fulfil the requirements associated with implementation.

Financial capacity. The funding formula for APM must be adequate to finance all aspects of the project. The NWMO should identify and accommodate all key factors associated with the cost estimates such as the amount and type of used fuel to be managed, the geology of the site and rate of return on contributed funds. Cost estimates should be kept up-to-date, and contributions should be adjusted to reflect updated overall costs.

Culture of learning. The NWMO should continue to show openness to new ideas and perspectives and apply its learning – regarding science, technology, Aboriginal Traditional Knowledge, history, ethics, sociology and culture – in a responsive way. The NWMO should ensure that the knowledge gained is absorbed by its own staff, shared with its partner organizations and reflected in their actions.

2 Comments on NWMO Activities: 2008–2010

Over the past three years, the NWMO has consulted interested organizations and individuals to design a fair and appropriate process for finding an informed and willing community to host the deep geological repository for Canada's used fuel. In 2010, the Organization began to implement this process. The Advisory Council's comments on the NWMO's work during the current three-year time period are provided below for five of the Organization's seven strategic objectives: building relationships, designing and implementing the site selection process, refining designs and safety cases, adapting plans, and building a high-performing organization (our comments on Providing Financial Surety and Ensuring Accountability are included in Section 3). As documented in the tracking matrices (see the NWMO website at www.nwmo.ca/actrackingmatrices), our advice generally has been well-received and acted upon by the NWMO in a timely way.

2.1 Building Relationships

The NWMO is continuing its careful and thorough approach to dialogue and engagement. This began with engagement regarding the strategic objectives, continued with discussions about the design of the siting process and is now progressing to the siting process itself. We recognize the effort required to establish and sustain the relationships that will be central to moving forward with implementation, and note that this remained a cornerstone of the NWMO's work during 2008–2010.

Municipal, Provincial and Federal Governments

During 2008–2010, the Council underscored the importance of actively engaging federal, provincial and municipal governments, emphasizing that the NWMO must continue to ensure that elected politicians and public officials are well-informed about the siting process. The NWMO has held numerous briefings for representatives of all levels of government.

The Council provided extensive input into the NWMO's evolving municipal

engagement plans. The Municipal Forum was established in 2009 with representation from the Federation of Canadian Municipalities and municipal associations in the nuclear provinces. The Forum provides a valuable two-way communication link between the NWMO and urban and rural communities.

We also discussed the development of the NWMO's new participant funding program, suggesting that the financial envelope available should be made explicit and that criteria or guidelines should be developed for the selection of consultants by communities to ensure minimum standards are met. The NWMO incorporated our advice in the design of the Learn More program (www.nwmo.ca/invitation_to_learn_more).

Aboriginal Engagement

The Elders Forum and its working group Niigani have helped to engage Aboriginal peoples in the NWMO's work. We believe that the NWMO process to date has provided a model of good practice for involving Aboriginal traditional cultures in policy development in Canada.

During 2008–2010, the NWMO made efforts to incorporate elements of the Aboriginal manner of making decisions into its own practices – these include using a process of community discussion and reflection that listens to the voice and experience of the older members of the community while giving space to the aspirations of the young. Key elements of the NWMO's process that reflect Aboriginal concepts are demonstrated in its use of the “seven generations” perspective, long-time horizon, pacing of its work, involvement of youth as well as elders, consideration of ATK, and the varied opportunities to include many voices.

Our input on a number of specific areas of the NWMO's Aboriginal Policy has been reflected in the NWMO's activities. We emphasized the need to transfer knowledge from the Elders to Aboriginal youth to facilitate youth participation, recognizing the long time frame of the APM project, and to provide opportunities to engage Aboriginal peoples at the community level. The Council encouraged the NWMO to continue involving Niigani in as many discussions as possible with Aboriginal groups in Canada. The NWMO generally arranges for a Niigani elder to accompany the NWMO in meetings with Aboriginal organizations.

The Elders Forum and Niigani have provided invaluable advice to the NWMO in many areas, such as the Aboriginal policy, ATK, culturally appropriate communication materials, cross-cultural training for NWMO staff, and the site selection process. In 2007–2008, Niigani participated in a project to advise the NWMO on community engagement that resulted in advice for the following themes: education, incorporation of culture and traditional knowledge, economic development and community sustainability. However, it is not always obvious how the NWMO is incorporating this advice. We encouraged the NWMO to publish more explicit information about the ways that it is applying ATK in its work. The section *Review, Adjust and Adapt Plans* of Chapter 6 of the NWMO's Triennial Report describes how the Organization is interweaving ATK with APM.

The NWMO's site selection process lists a number of factors that must be considered in order to integrate ATK into the process. We have emphasized that the involvement of interested and potentially affected Aboriginal peoples early in the siting process is of particular importance to ensure that good relationships are developed from the outset. We made a number of recommendations to support this. We requested that the NWMO show explicitly how ATK is part of the siting process, for example by recognizing Aboriginal land uses,

conducting a spiritual survey of any land chosen as a potential site, and incorporating knowledge gained from traditional ceremonies. We also suggested that the NWMO consider holding spiritual ceremonies to begin meetings when appropriate, and we understand that the NWMO has instituted this practice.

Further comments on the NWMO's Aboriginal engagement work are included in Section 3 of this report.

Youth

Recognizing that long-term used nuclear fuel management is an inter-generational issue, we have strongly supported the NWMO's efforts to involve youth and provided advice on the design of a Youth Roundtable to guide development of the NWMO's youth engagement strategy. We emphasized the ethical dimension of incorporating opinions of youth into decision-making that will have impacts far into the future. The Council also encouraged the NWMO to engage young people with a range of perspectives, not only those who have an interest in nuclear energy issues.

We met with the Youth Roundtable in 2009 and received a video presentation that included recommendations on methods for targeted communications and clear messaging, as well as ideas for engaging youth in and out of the educational system. We were impressed with the quality of the content and the relevance of the group's recommendations. We encouraged the NWMO to listen to this diverse group of young people and incorporate their proposals to encourage informed and open dialogue with youth on long-term nuclear fuel waste management.

The NWMO is acting on the recommendations of the Youth Roundtable by updating existing communication materials and producing new ones that include features and use techniques that appeal to youth. A range of communications media is being employed, from print to web-based, social media and videos. An outreach and education strategy for young Canadians is now being developed.

The Council also encouraged the NWMO to seek opportunities to support youth engagement and capacity building within the context of its community investment program.

Broad Outreach

The Council continues to support the NWMO's initiatives to engage the broader Canadian public in its work. In 2008 and 2009, the engagement program sought input through a range of public sessions, dialogues and citizen panels. However, in 2008, we flagged the potential for engagement fatigue and recommended that the NWMO carefully consider how much it asks of the public. We also discussed ways to avoid engagement fatigue, such as seeking opportunities to speak about the NWMO's work at existing gatherings rather than organizing its own meetings.

We recognized the importance of using a full range of online tools for engagement, but cautioned the NWMO against over-reliance on web-based outreach because it does not necessarily reach and engage a full representation of the population.

Noting the value of third parties in building confidence in the process, the Council suggested that the NWMO consider involving independent organizations, especially professional ones, in the site selection process. The NWMO has recognized the importance of independent reviews in the site selection process by requiring that third parties review and confirm site evaluations.

Communities engaged in the site selection process will also have access to funds so that they may engage independent expert advice throughout the process. The organization has a Memorandum of Understanding with Natural Resources Canada for collaboration on technical research.

We further advised that the NWMO should provide tailored briefings on the site selection process to relevant professional societies, editorial boards and journalists, who specialize in science, environment and social and ethical matters. The NWMO has undertaken to do this. Articles have recently been published in municipal and nuclear industry publications, and the Organization will continue to seek further opportunities to communicate the NWMO's work and site selection process. Outreach and briefings on the NWMO's work continue through a broad program of speaking opportunities at a wide range of professional meetings. For example, the NWMO delivered numerous presentations at the 2010 GeoCanada conference, organized by the Geological Association of Canada, the International Association of Hydrogeologists and the Canadian Association of Petroleum Geologists, and continues to address a diversity of audiences through a wide range of municipal and Aboriginal association meetings across Canada. The NWMO also involved more than 100 representatives of independent organizations in the design of the site selection process through many multi-party dialogues and a variety of topical workshops.

The NWMO publishes the results of its public consultations on its website (see www.nwmo.ca/what_we_heard) and continues to provide responses to the comments it receives. In 2008, the NWMO wrote letters, and in some cases, met with individuals who had provided comments. The 2009 and 2010 documents on the website include detailed responses to public and stakeholder comments.

Community Investment

The Council provided advice to the NWMO on developing its approach to corporate citizenship, which resulted in the community investment program. We suggested that the program should be focused on some specific areas linked to the NWMO's key objectives. The NWMO established youth and science as the primary foci for the current time frame.

Communication

We recommended that the NWMO include more information about transportation in its communication materials. The NWMO responded by developing a video on the safe transportation of used fuel. The NWMO also developed a mobile exhibit to provide information about Canada's plan for used nuclear fuel management.

From its inception in 2002, the NWMO has made specific efforts to involve Aboriginal peoples in its work and has sought to provide resources to enable their participation to learn about the NWMO's work and contribute to each phase of the implementation of APM. In early 2010, dialogue with Aboriginal organizations determined that establishing an ongoing liaison relationship is the preferred means to provide each organization with the capacity to participate in the APM project on an ongoing basis. The agreements are intended to ensure that all the Provincial organizations are able to establish a liaison position, build and maintain internal capacity and support and update members as communities participate in the site selection process. A number of Aboriginal organizations, including the Assembly of First Nations, Chiefs of Ontario, Federation of Saskatchewan Indian Nations (FSIN), Mawiw Council of First Nations and Union

of New Brunswick Indians, have now signed agreements with the NWMO and several others are in the process of negotiation. The Council recognized that following the initiation of the site selection process, it took some time to coordinate these agreements among the various parties. We recommended that as these agreements are developed, the NWMO provide more visible, public information about them to encourage a more accurate and comprehensive understanding among the media, public and stakeholders. The NWMO has included information about the Aboriginal liaison relationships in the Triennial Report.

During 2010, there was considerable media coverage of a range of nuclear waste issues in Canada: from radioactivity in Port Hope, to the transportation of steam generators on the Great Lakes, OPG's plans for a L&ILW DGR, and the early engagement of communities interested in learning more about APM. The NWMO worked with local media to ensure that accurate and timely information was available in the potential host communities. However, the NWMO has been less active recently with respect to the provincial and national media. We recommend that the NWMO maintain active communications and media activities at all levels – local, regional, provincial and national.

2.2 Designing and Implementing the Site Selection Process

A key NWMO endeavour in the past three years has been the design of a process to select a site for the deep geological repository. The NWMO has developed the site selection process through technical studies and public engagement, and the process is founded on principles that are based on the expectations of Canadians. The Council conferred with the Organization throughout this process, reviewing findings from meetings and engagement activities, and offering advice in a number of areas.

As the proposed process was being drafted, we encouraged the NWMO to expand its description of APM and make a stronger public case for the approach, with particular focus on its adaptability. We also emphasized the importance of complementary information materials to support site selection, in particular to elaborate on the anticipated community impacts of the project, both positive and negative, over the different stages of its implementation. The NWMO incorporated our suggestions in the design of the site selection process.

We made specific suggestions regarding the involvement of regulatory authorities, the volume of used fuel to be managed, the timing of the underground demonstration facility, the definition of the term “community”, and the involvement of Aboriginal communities. We noted the importance of social, economic and cultural factors in selecting a host community. We also raised the concern that some interested communities may be experiencing acute social and economic difficulties and may not have the capacity to fully assess the project and implications it may have for them. The NWMO has made a commitment that participation in the project must be based on sound information and must foster the long-term well-being of any host community and region.

We discussed various means of ensuring that interested communities are able to take full advantage of the opportunities associated with the project. We supported the idea that funds will be available to allow a community to participate in the site selection and subsequent processes, regardless of whether they are selected as the host community. The NWMO has included funding as part of the siting process and is already providing funds for a number of initiatives in various communities (see Learn More Program on the NWMO website).

The Council discussed the NWMO's proposed Principles for Community Benefits. We supported the overall intent and approach, but expressed some concern that the NWMO's requirement that funding for communities must be visibly connected to the APM project might be overly restrictive. We noted that other countries, such as Sweden and Finland, allow more flexibility in the kinds of benefits available to host communities. We recommended that community engagement should help to determine what investments would be appropriate. We also cautioned that it is important to emphasize that safety is a fundamental characteristic of the entire APM project. Community benefits should therefore be viewed as compensation for disruption and other impacts associated with a major development project.

We discussed the Learn More Program, focusing on how communities approach the NWMO for information, what funding is available to build local capacity, and the importance of encouraging communities who enter the siting process to inform and involve Aboriginal groups in their areas from the outset. Aboriginal communities that enter the siting process are also encouraged to engage non-aboriginal communities from the outset. The NWMO's siting process specifies early involvement of Aboriginal groups and recognizes that the initiating party could be either non-Aboriginal or Aboriginal, or both. We understand that the NWMO has begun the process of information sharing with Aboriginal peoples near communities in the Learn More Program.

With respect to socio-economic impacts (both positive and negative), the Council recommended that the NWMO emphasize the very long time frames of APM. APM provides an opportunity for community members to become technically skilled and stay in the community, building social capacity and providing economic opportunities over the long term. The NWMO agreed that these are important points, and they are included in the Learn More Program.

In 2010, when the NWMO began to implement the site selection process, we discussed the importance of ensuring the competence and credentials of third-party expertise engaged by communities. The NWMO indicated that they would consider this advice as they proceed with the process.

We emphasized that community well-being means protection from harm as well as provision of benefits and recommended that the NWMO provide information about long-term safety. We encouraged the Organization to elaborate on anticipated community impacts over the different phases of project implementation. We suggested that a distillation of international best practices might assist the NWMO with this discussion with communities. The NWMO continues to track international work and has included some examples on its website.

We provided advice on transportation-related aspects of siting, recognizing that achieving community acceptance is a key communications challenge, particularly with respect to public perceptions of safety. We recommended that the NWMO assign greater focus on transportation in its plans, elaborate on transportation in its communication materials with an emphasis on safety, and conduct an illustrative transportation route study, with involvement from the Municipal Forum. The NWMO has now developed more communication materials on transportation, including a video. It is also in dialogue with federal and provincial authorities and the Canadian Nuclear Safety Commission (CNSC) regarding the siting process, including the transportation component.

The Council suggested that the NWMO might brief professional societies, journalists and editorial boards about its work to foster dialogue with experts as well as the general public. The NWMO has included professional societies and the media in its outreach plan so that they can provide informed insights into the siting process.

In 2009, the Council reviewed and commented on plans for initiating the

Site Selection Process in 2010. We generally agreed that a measured and gradual approach would be appropriate, but encouraged the NWMO to ensure that a clear distinction is made between the development of the process and the process itself. The NWMO incorporated our advice in its launch plan for the site selection process.

2.3 Refining Designs and Safety Cases

Technical R&D Program

The Council has received regular updates on the NWMO's research and development program. We were consulted on, and supported formation of the Independent Technical Review Group (ITRG). This distinguished group continues to provide meaningful oversight of the technical program. Their annual peer review strengthens the NWMO technical research program and helps build confidence in Canada's plan for long-term used nuclear fuel management. We commend the NWMO on the breadth of international experience within the group.

We were initially concerned about the limited information base in Canada regarding the potential to use sedimentary rock for a deep geological repository. We therefore welcomed ITRG recommendations for more Canadian research on sedimentary rock, including monitoring and retrievability issues, and are pleased to see that this work is now proceeding.

International Collaboration

The NWMO is actively involved with the international nuclear waste management community. The Organization has formal relationships for collaboration in technical research programs and sharing of results and is well-informed about practices and projects in other countries such as Finland, Sweden, France and Switzerland.

2.4 Adapting Plans

Energy Policy

The Council has continued to consider the changing external landscape, with particular focus on reactor refurbishment and proposed new nuclear generating units in Canada, and their potential impacts on the NWMO's work.

During 2008–2010, 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 has stated that 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. The Organization 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 APM should be adapted in response to current and projected inventories of used nuclear fuel. We emphasized the importance of communicating not only how the Organization is keeping abreast of changes in the nuclear power industry, but also how and why any new developments may or may not result in modifications to APM.

Recognizing the critical connection between the generation of nuclear power and the production of nuclear fuel waste, our 2005 comments on the NWMO's report recommending APM included the following:

"The Advisory Council would be critical of an NWMO recommendation of any management approach that makes provision for more nuclear fuel waste than the present generating plants are expected to create, unless it were linked to a clear statement about the need for broad public discussion of Canadian energy policy prior to a decision about future nuclear energy development. The potential role of nuclear energy in addressing Canada's future electricity requirements needs to be placed within a much larger policy framework that examines the costs, benefits and hazards of all available forms of electrical energy supply, and that framework needs to make provision for comprehensive, informed public participation...Any significant change in the amount or type of used fuel to be managed should trigger a review of the work undertaken by NWMO to date...Recognizing that responsibility for energy in Canada is shared among the federal, provincial and territorial governments, we recommend that:

- » The federal government should work with the provincial and territorial governments to facilitate a national public policy discussion about future energy supplies in Canada.
- » There should be no expansion or reduction of nuclear power generation at the provincial or territorial levels without public policy discussion about future energy supplies within those jurisdictions."

Since 2005, several provinces have made decisions to proceed with refurbishments of existing nuclear generating stations and new nuclear energy projects. However, there has been no substantive discussion regarding electricity generation in general and specifically regarding the role of nuclear energy in meeting Canada's electrical energy needs. We remain concerned that the absence of a broad context for energy production hampers the NWMO's ability to effectively plan for the long-term management of Canada's nuclear fuel wastes.

We therefore reiterate our recommendation that the federal government work with the provincial and territorial governments to facilitate a public policy discussion about future energy supplies in Canada.

Technological Developments

The Council discussed the possibility of retrieving used nuclear fuel from the DGR in future so that it could be neutralized or used as a resource. The NWMO provided Council with a report assessing the potential for reprocessing used nuclear fuel in Canada. We noted that although retrievability to provide options for future generations is an important element of APM, this aspect of the process continues to be raised by media and the public as an outstanding issue. We advised the NWMO to place greater emphasis in its communications on the retrievability opportunities associated with APM.

Societal Context

In 2009, the Council urged the NWMO to consider long-term scenarios in its planning, such as societal changes that could impact the ability to implement APM.

2.5 Building a High-Performing Organization

In our independent report on the NWMO's 2005 study, the Advisory Council suggested it would be advantageous for the Organization to increase its technical and scientific capacity to address the complex challenges of used nuclear fuel management. In 2008, the NWMO completed its transition to become a stand-alone employer with significantly expanded in-house expertise, not only in technical and scientific fields, but also in social research, ethics, public engagement, finance and governance. We commended this advance and have continued to support the hiring of needed personnel.

As noted earlier, in 2009, the NWMO began working on contracts related to OPG's L&ILW project at Kincardine, Ontario. The Organization also has a contract for Lifecycle Liability Management (LLM) for the L&ILW project. To respond to the workload associated with these contracts, the NWMO has diversified its operations and made substantial increases in staffing levels. Although we recognize that the OPG projects are providing the NWMO with valuable experience in a number of areas that are highly relevant to APM, we expressed concerns that there is a risk that attention and resources will be diverted away from the NWMO's core business – to manage Canada's used nuclear fuel. (See section 3 for more comments on this aspect of NWMO's work).

We asked the NWMO about the hiring of Aboriginal personnel and were advised that the Organization advertises job opportunities with organizations that focus on Aboriginal employment and training, and currently has three staff people with Aboriginal backgrounds. There are various constraints that appear to deter some people from applying, such as a desire to stay in their own community rather than move to Toronto. We recommend that the NWMO increase its efforts to hire Aboriginal personnel, for example by providing opportunities to accommodate flexible working schedules and locations to make it easier for people to work in their own communities.

The Elders Forum has requested, and the NWMO is providing, a matrix of job skills and professional expertise that will be required as the project proceeds. Regarding employment training, the NWMO contributes support for a Chair in Indigenous Governance at Ryerson University. We recommend that additional tools, such as scholarships and internships, be developed to increase the opportunities for Aboriginal education and employment, now and in the future.

3 NWMO's 2011–2015 Strategic Plan for APM

3.1 Introduction

In this section of our report, we review the NWMO's Strategic Plan "Implementing APM 2011–2015" and provide specific recommendations for each of the Organization's seven strategic objectives for APM. In addition, we highlight two broad challenges that we think will be particularly important over the next five years: the need for a comprehensive plan for all the Organization's work, and the need to ensure that all NWMO's work is based on a consistent value system. We discuss these challenges below in Section 3.2.

3.2 NWMO Organization

The first section of the NWMO's Strategic Plan explains that the Organization was created through the *NFWA* to develop and implement a management approach for the long-term care of Canada's used nuclear fuel.

Strategic Planning

The NWMO's 2011–2015 Plan for APM has been prepared in response to the *NFWA* requirement for a strategic plan. The Council notes that although the implementation plan clearly identifies how the NWMO intends to implement its objectives for APM, it does not fully address a number of key strategic initiatives that will be crucial to its work over the next five years. Examples include the use of OPG's L&ILW project to provide experience to the NWMO on DGRs, the transition of the siting process to the local level, the selection of key partners for future work, and the development of communication strategies.

With respect to the NWMO's work to provide services for OPG's Project for long-term management of L&ILW in Kincardine, we note that this represents a major expansion of the scope and volume of the Organization's activities. We recognize that the L&ILW project provides valuable opportunities to gain experience on DGRs in general, and to share knowledge, expertise and research between the two projects. However, we are concerned that there may be negative repercussions for the NWMO's mandated work on APM for Canada's used nuclear fuel.

Although the L&ILW and LLM contracts are being managed as a separate project by the NWMO, they represent a substantial portion of the NWMO's overall work plan and budget. This presents a risk that the primary responsibility of the NWMO (APM) may become overshadowed or jeopardized by large contracts for other work. To ensure that the Organization addresses this issue explicitly, we recommend that the NWMO incorporate all its projects and processes, as noted above, into one strategic plan.

Partners

We observe that the NWMO is in a period of transition and expansion that necessarily involves more partners in its work. For example, the site selection process involves an increasing emphasis on interested potential host communities and the concomitant involvement of local organizations. Another example is the work for OPG on the L&ILW project. It is not unlikely, given the NWMO's valuable expertise in the nuclear waste field, that other organizations (such as AECL, Hydro-Québec and New Brunswick Power) may be interested in working with the Organization in the future. These expanding relationships provide opportunities for the NWMO, but they may also affect the Organization's reputation if the work is not based on a shared value system. Stakeholders and the public may not be aware of the specific responsibilities and mandates of the various organizations involved in each project, so if there are any concerns about the activities of any of the players, the integrity of others may also be questioned.

In addition, other organizations are also engaged in activities to manage nuclear wastes. Recent examples include Bruce Power's proposals to ship steam generators on the Great Lakes, and AECL's project to manage wastes from its Chalk River Laboratories. We raised concerns that the NWMO's ability to implement APM may be affected by the actions of other participants in the industry. We also suggested that although AECL is not dealing with

fuel wastes, it would be inadvisable for AECL to proceed in isolation of the NWMO's work. The NWMO is now in discussion with AECL and other waste owners regarding ways to enhance cooperation.

One of the primary reasons for the NWMO's success to date has been its adherence to a sound value system that emphasizes integrity, excellence, engagement, accountability and transparency. It will be important for the Organization to find ways to maintain its own standards of practice and to ensure that all its partners do the same. We recommend that the NWMO's five fundamental values (integrity, excellence, engagement, accountability and transparency) as well as the seven criteria in Section 1.4 of this report (comprehensiveness, fairness and balance, integrity, transparency, technical strength, financial capacity and culture of learning) be applied to all NWMO's agreements and contracts with its partners for all its projects, including APM.

3.3 Canada's Plan for Used Nuclear Fuel

This section of NWMO's Strategic Plan outlines the NWMO's process to develop and implement APM. The Council continues to support this approach to managing Canada's used nuclear fuel, and we are generally satisfied that the NWMO is proceeding to implement it according to sound principles and objectives.

However, as discussed in Section 2.4 above, we remain concerned that although Canada has a plan for managing used nuclear fuel, it still does not have a strategy that addresses the utilization of energy in general, nor nuclear energy specifically.

3.4 Priorities for 2011 to 2015

The NWMO states that it has two primary priorities for the APM project during 2011 to 2015. One priority is to implement the site selection process, and the other is to build the Organization to strengthen internal resources and capacities to implement APM. We comment on organizational development in Section 3.5.7. below. Regarding the time frame for the site selection process, we note that there are many uncertainties ahead, and it may not be possible to complete the site selection process by 2015. We recommend that the NWMO clearly communicate that the time frame is flexible and the process will be adjusted if necessary.

3.5 Strategic Objectives

This section of the NWMO's Strategic Plan provides details on the Organization's plans to implement its seven strategic objectives for APM:

1. Build sustainable relationships
2. Collaboratively implement the site selection process
3. Refine and further develop generic designs and safety cases
4. Provide financial surety
5. Adapt plans
6. Ensure governance and accountability
7. Build and sustain a high-performing organization

3.5.1 Build Sustainable Relationships

Over the past three years, the NWMO has sought to engage Aboriginal peoples in a variety of ways (see also section 2.1). These include the establishment of the Elders Forum and its working group Niigani, the development of an Aboriginal Policy, a workshop on ATK, interactions with Aboriginal organizations, and regional dialogues in Aboriginal engagement. These activities provide a strong foundation for ongoing Aboriginal participation and for the integration of ATK in the APM project.

The Strategic Plan notes that the Elders Forum, Niigani, Youth Roundtable and Municipal Forum have all played an important role in the NWMO's work to date. The work of the Youth Roundtable is now concluded, and the NWMO is implementing a strategy for ongoing youth engagement. As the NWMO's work transitions to site selection and later to implementation, it is appropriate to review the best ways to engage with different groups of stakeholders to ensure strong and effective involvement. The Council emphasizes that APM is a long-term project, so the foundations that the NWMO builds today in its relationships with key stakeholders are essential for sustaining collaborative relationships over the entire lifespan of the program. We recommend that the NWMO review its stakeholder engagement programs in 2011 with a view to ensuring that Aboriginal peoples, youth and municipalities continue to play a constructive role in the APM process over the long term.

We note that as the site selection process unfolds, the NWMO is focusing its engagement activities with the local communities that are expressing an interest in the APM project. This is appropriate and necessary, but it is also essential to continue to engage with the broader Canadian public, and maintain established Aboriginal and non-Aboriginal linkages, to provide information, foster dialogue and avoid potential communications or media issues that may arise in the absence of knowledge and understanding.

3.5.2 Collaboratively Implement the Site Selection Process

Since its inception, the NWMO has been guided by five fundamental values: integrity, excellence, engagement, accountability and transparency. During the site selection process, the NWMO will need to ensure that candidate "willing host" communities are also committed to these values and are seen to actively practise them. It is important that the local communities accept these values and apply them from the outset. A candidate "willing host" community must demonstrate its commitment to engage the surrounding communities early in its process as well as ensure that it is totally transparent with all potential partners in the area, so that trust is developed quickly at the local level. This commitment reflects two key NWMO strategic objectives:

- » "build sustainable, long-term relationships with interested Canadians and Aboriginal peoples of Canada and involving them;"
- » "build an accountable governance structure."

The NWMO has invested heavily in building trust with the non-Aboriginal and Aboriginal peoples of this country. It has also accumulated knowledge and best practices that should be shared from the outset with local "willing host" candidates. In many ways, for the project to be successful at the local level, the "willing host" community must be seen as sharing and expressing the values and behaviour of the NWMO as it proceeds with its own local due diligence, planning and implementation. The Council therefore recommends that "willing

host” candidates start to actively demonstrate their engagement and transparency initiatives as early as possible in the site selection process.

A good way to approach this challenge is for the NWMO to engage quickly in local capacity building. The “willing host” candidates must not only be supported in the “scientific” elements of the due diligence work, but also in the “social” elements of the work. This may include having skilled personnel at the local level able to fulfill the requirements associated with implementation. We note that the NWMO’s Learn More Program for interested communities includes resources to hire independent expert advice, develop/refine a long-term vision for community sustainability, build awareness and understanding in the community, undertake research on topics related to the siting process, and establish a community office for the project. We recommend that the NWMO further increase local technical and social capacity by providing internships and scholarships to young people to allow them to obtain the necessary skills to assist their communities to participate in the APM process.

The Strategic Plan includes activities to refine the tools and methods for the siting process, including factors identified by ATK. Council emphasizes that it will be important to clearly identify all the factors that will be applied in the assessment process. Examples may include sites of cultural and spiritual significance, such as burial grounds, ceremonial places, trap lines and lands with sources of food and medicine, as well as traditional approaches to land use mapping and planning.

Step 4 of the siting process includes engagement with communities in the broader region of potential host communities, if they haven’t been involved already. We are concerned that this may be too late, and that lack of information and understanding in the region might jeopardize early dialogue with interested local communities. We recommend that deliberate efforts be made to involve surrounding regions as early as possible in the siting process.

The NWMO’s nine-step site selection process includes a number of decision points that will affect how interested communities proceed. As the Scientific Review Group of the Seaborn Panel emphasized, it will be important to ensure that all interested communities and regions are fully informed about the reasons why certain sites are (or are not) selected for further investigation. We recommend that the NWMO communicate the reasons for its decisions in a consistent and transparent manner, using clear and defensible qualitative and quantitative criteria for ranking and selecting potential sites.

Step 6 of the site selection process includes a formal agreement between the NWMO and the host community to define the conditions under which the project will proceed. While we understand that it is premature to specify exactly how the host community should be represented, we recommend that the NWMO be willing to consider formal institutions for power sharing. For example, these might include jointly developed ethical principles and revenue sharing through co-management agreements to formalize the consent, participation and full involvement rights of Aboriginal and other communities.

From 2003 to 2005, the NWMO convened a Round Table on Ethics that met two or three times a year and helped the NWMO to develop an ethical and social framework for its activities. The draft 2011–2015 Strategic Plan for APM notes that “the site selection process has been designed to ensure, above all, that the site which is selected is safe and secure, and meets the highest scientific, professional and ethical standards.” We appreciate that ethical conduct is incorporated throughout the NWMO’s work, but would like to see more explicit explanations of how that will be accomplished during the site selection process. This will become especially important when the NWMO is developing community benefit approaches and packages. In order to help ensure that

the NWMO's work continues to be undertaken with high ethical standards, we recommend that the NWMO establish an ongoing process to identify and discuss specific ethical and social considerations that should be applied in the site selection process.

Another aspect of the site selection process is transportation. During the period 2011–2015, the NWMO will prepare generic options for transport of used nuclear fuel from interim storage sites to a long-term management facility. In 2011, the NWMO's transportation work plan includes mapping of opinion leaders, development of a transportation presentation, tracking public interests, engaging regions in Step 3 of the siting process, engaging reactor site communities, and liaison with federal and provincial authorities. The Council considers this to be a sound approach. We note that although the municipal sector is included among the opinion leaders, the Municipal Forum, which could make a significant contribution to this dialogue, is not mentioned. We recommend that the Municipal Forum be engaged early to provide advice regarding ways to communicate transportation plans and engage with communities that may become part of a transportation corridor for used nuclear fuel.

We anticipate that questions or concerns about transportation may arise at any time, whether they are generic or specific to particular locations. As we have seen recently in the response to Bruce Power's proposal to ship radioactive steam generators via the Great Lakes, St. Lawrence River and Atlantic Ocean to Sweden, public and media concerns about transportation risks should be addressed early and comprehensively. Transportation is mentioned in Step 4 of the APM siting process. We recommend that communication and dialogue regarding transportation options and related safety cases receive earlier priority in the siting process. We also recommend that the NWMO review experience with transportation of nuclear wastes in Canada and internationally to identify lessons that could be applied to APM.

3.5.3 Refine and Further Develop Generic Designs and Safety Cases

During 2011–2015, the NWMO will continue its work on reference designs and safety cases, prepare for a CNSC pre-licensing review, and identify design optimization opportunities. The actual parameters and assumptions that are selected to underlie the generic safety cases are critically important to their credibility, and to the subsequent process of choosing a site with appropriate characteristics. The Scientific Review Group (SRG) of the Seaborn Panel criticized this aspect of AECL's work and provided a number of technical recommendations to address it. We recommend that the NWMO place strong emphasis on developing and communicating the parameters and assumptions being used in its work on safety cases.

The Seaborn Panel also noted that there is an important relationship between the generic designs and safety cases and the site selection process that should not be overlooked. We recommend that the NWMO ensure that its work on generic designs and safety cases includes sufficient flexibility to be effectively adapted to the specific characteristics of the selected DGR site.

3.5.4 Provide Financial Surety

The NWMO's Strategic Plan states that the estimated cost of the APM project is \$7 billion to \$8.5 billion present value as of January 1, 2011. This cost is reviewed every five years and work is currently underway to update the cost

estimate by 2012. The Triennial Report outlines the process to develop the current estimate, including the development of assumptions, review by an External Expert Panel and by Natural Resources Canada, and an independent appraisal by the Secretariat of the OECD Nuclear Energy Agency. Recognizing the critical importance of this work to the success of APM, we suggested that the NWMO publish specific information about the assumptions and other considerations used to develop the current cost estimate as well as the process for revising it.

The NWMO's Triennial Report also refers to the Funding Formula that was developed to ensure that the full cost of waste management is borne by the producers, and lays out the five key principles upon which the required annual trust fund contributions from the producers are based. The Formula was approved by the Minister of Natural Resources in 2009. Chapter 10, *Financial Reporting Requirements*, provides information on the amount of the annual trust fund contributions and the balance of the trust fund. The *NFWA* includes the requirement that all annual reports must include "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". We suggested that the Triennial Report include an explanation of the Funding Formula and show how it meets the anticipated fiscal requirements of APM. We also suggested that the NWMO provide a description of how the current formula for annual Trust Fund deposits from the producers will meet the currently estimated full costs of the project, emphasizing that this Formula will be periodically updated to ensure that if the costs escalate, so do the annual contributions. The NWMO has included this information in the Triennial Report. The Council recommends that the NWMO continue to provide and publish detailed information about the assumptions and other considerations used to develop the current cost estimate as well as the process for revising it.

3.5.5 Adapt Plans

Our specific comments regarding the NWMO's approach to adapting its plans are in Section 2.4 above.

3.5.6 Ensure Governance and Accountability

As the NWMO's work transitions to a greater focus on local and regional potential host communities, it is required by the *NFWA* to include representatives from these communities on its Advisory Council. Recognizing that this is essential, we note that it will also be important for the Advisory Council to continue to include expertise with a broader Canadian perspective.

3.5.7 Build and Sustain a High-Performing Organization

In Section 2.5, we commented on the need to include more Aboriginal peoples in the Organization, at the local level as well as the head office, and in Section 3.2, we commented on the risks to the Organization's work on APM that may result from its large contracts for the OPG DGR.

Another aspect of the NWMO's Organization that we wish to emphasize is the need to increase its efforts to start building capacity at the local and

regional level to participate in implementing and managing the DGR for used fuel waste. This will be a large scale and long-term development project that will transform local communities and will require a workforce with a wide range of skills. We recommend that the NWMO research best practices for local capacity building in Canada and internationally, not only in the nuclear industry but also in other industries that typically transform small rural communities such as mining, hydroelectric power and forestry.

4 Conclusions and Recommendations

4.1 Conclusions

The NWMO is in a period of significant transitions arising from the changing nature of its work on APM, as well as its involvement in contract work for OPG's L&ILW and Lifecycle Liability Management (LLM) projects. These changes affect the external context of the NWMO's work, its relationships with stakeholders, partners, media and the public, and the internal dynamics of staffing and work plans both at head office and in potential host communities.

With respect to APM, the NWMO is evolving from a small, nimble organization focused on studies and process design, to a much larger organization with responsibilities for selecting a site and implementing a major development project. The design of the site selection process was undertaken with thorough and comprehensive public engagement, and we believe that the resulting process is sound and meets the expectations of Canadians. One of the NWMO's challenges during the implementation of the site selection process will be to maintain the same high standards of engagement and transparency. Another is to ensure that local capacity is developed as quickly as possible in the interested willing host communities. This capacity is needed now, to assist in the site selection process, and over the longer term, to facilitate participation in the development of the DGR and the community transformation that will accompany it. Related to this challenge is the need to increase participation by Aboriginal peoples, both locally and in the Organization as a whole.

The NWMO has invested considerable effort into building relationships and fostering dialogue – with the Canadian public as a whole and with specific stakeholders including Aboriginal peoples, youth and municipalities. The Council emphasizes that it will be important to maintain existing relationships and to review how they may need to evolve to meet the changing requirements of the NWMO's work. For example, the increasing focus on local communities is essential as the NWMO proceeds through the site selection process, but it will be equally important to maintain communications and good relationships with the broader constituencies that are interested in the NWMO's work.

With respect to the contract work for OPG's L&ILW and LLM projects, the Council recognizes that it provides many opportunities for synergies with the NWMO's work on APM. However, we are concerned that the scale of the OPG work also brings with it a risk that the NWMO's core mandate – to manage Canada's used nuclear fuel – may be undermined because of the inevitable strain on staff resources and focus and the potential for confusing the two projects in the public's mind. A comprehensive strategic plan that encompasses all NWMO's work would be a valuable tool to assist the Organization in addressing this risk and ensuring that it takes full advantage of the synergies among its projects.

The NWMO has worked hard to conduct its activities for APM with a strong value system encompassing integrity, excellence, engagement, accountability and transparency. Its reputation is based on this approach. As the Organization develops working relationships with new partners, whether they are potential host communities or large organizations like OPG, the Council highlights the importance of the NWMO's values being shared by its partners and the incorporation of the NWMO's operating practices into its contracts and agreements.

4.2 Summary of Recommendations

In this section, we summarize our recommendations from the previous sections, grouped according to the NWMO's strategic objectives. We conclude that the NWMO is generally meeting the Council's criteria: comprehensiveness, fairness and balance, integrity, transparency, technical strength, and financial capacity. Our recommendations are designed to highlight some areas that we think will be particularly important for the NWMO's next phases of work.

For explanatory text about the recommendations, please refer to the section noted in parentheses after each one.

4.2.1 Build Sustainable Relationships

1. The Council recommends that the NWMO maintain active communications and media activities at all levels – local, regional, provincial and national (Section 2.1).
2. The Council recommends that the NWMO review its stakeholder engagement programs in 2011 with a view to ensuring that Aboriginal peoples, youth and municipalities continue to play a constructive role in the APM process over the long term (Section 3.5.1).
3. Council recommends that the NWMO continue to engage with the broader Canadian public, and maintain established Aboriginal and non-Aboriginal linkages, to provide information, foster dialogue and avoid potential communications or media issues that may arise in the absence of knowledge and understanding (Section 3.5.1).

4.2.2 Collaboratively Implement the Site Selection Process

4. The Council recommends that the NWMO clearly communicate that the time frame is flexible and the process will be adjusted if necessary (Section 3.4).
5. The Council recommends that “willing host” candidates start to actively demonstrate their engagement and transparency initiatives as early as possible in the site selection process (Section 3.5.2).
6. The Council recommends that the NWMO further increase local technical and social capacity by providing internships and scholarships to young people to allow them to obtain the necessary skills to assist their communities to participate in the APM process (Section 3.5.2).

7. The Council recommends that deliberate efforts be made to involve surrounding regions as early as possible in the siting process (Section 3.5.2).
8. The Council recommends that the NWMO communicate the reasons for its decisions in a consistent and transparent manner, using clear and defensible qualitative and quantitative criteria for ranking and selecting potential sites (Section 3.5.2).
9. The Council recommends that the NWMO be willing to consider formal institutions for power sharing. For example, these might include jointly developed ethical principles and revenue sharing through co-management agreements to formalize the consent, participation and full involvement rights of Aboriginal peoples and other communities (Section 3.5.2).
10. The Council recommends that the NWMO establish an ongoing process to identify, discuss and communicate specific ethical and social considerations that should be applied in the site selection process (Section 3.5.2).
11. The Council recommends that the Municipal Forum be engaged early to provide advice regarding ways to communicate transportation plans and engage with communities that may become part of a transportation corridor for used nuclear fuel (Section 3.5.2).
12. The Council recommends that communication and dialogue regarding transportation options and related safety cases receive earlier priority in the siting process. We also recommend that the NWMO review experience with transportation of nuclear wastes in Canada and internationally to identify lessons that could be applied to APM (Section 3.5.2).

4.2.3 Refine and Further Develop Generic Designs and Safety Cases

13. The Council recommends that the NWMO place strong emphasis on developing and communicating the parameters and assumptions being used in its work on safety cases (Section 3.5.3).
14. The Council recommends that the NWMO ensure that its work on generic designs and safety cases includes sufficient flexibility to be effectively adapted to the specific characteristics of the selected DGR site (Section 3.5.3).

4.2.4 Provide Financial Surety

15. The Council recommends that the NWMO continue to provide and publish detailed information about the assumptions and other considerations used to develop the current cost estimate as well as the process for revising it (Section 3.5.4).

4.2.5 Adapt Plans

- 16.** The Council recommends that the NWMO communicate not only how the Organization is keeping abreast of developments, but also how and why any new developments may or may not result in modifications to APM (Section 2.4).
- 17.** The Council recommends that the federal government work with the provincial and territorial governments to facilitate a public policy discussion about future energy supplies in Canada (Section 2.4).

4.2.6 Build and Sustain a High-Performing Organization

- 18.** The Council recommends that the NWMO increase its efforts to hire Aboriginal personnel, for example by providing opportunities to accommodate flexible working schedules and locations to make it easier for people to work in their own communities (Section 2.5).
- 19.** The Council recommends that additional tools, such as scholarships and internships, be developed to increase the opportunities for Aboriginal education and employment, now and in the future (Section 2.5).
- 20.** The Council recommends that the NWMO's five fundamental values (integrity, excellence, engagement, accountability and transparency) as well as the seven criteria in Section 1.4 of this report (comprehensiveness, fairness and balance, integrity, transparency, technical strength, financial capacity and culture of learning) be applied to all NWMO's agreements and contracts with its partners for all its projects, including APM (Section 3.2).
- 21.** The Council recommends that the NWMO research best practices for local capacity building in Canada and internationally, not only in the nuclear industry, but also in other industries that typically transform small rural communities such as mining, hydroelectric power and forestry (Section 3.5.7).

Glossary of Acronyms:

AECL	Atomic Energy of Canada Limited
APM	Adaptive Phased Management
ATK	Aboriginal Traditional Knowledge
CNSC	Canadian Nuclear Safety Commission
DGR	Deep Geological Repository
FSIN	Federation of Saskatchewan Indian Nations
ITRG	Independent Technical Review Group
L&ILW	Low and Intermediate Level Waste
LLM	Lifecycle Liability Management
NFWA	<i>Nuclear Fuel Waste Act</i>
NWMO	Nuclear Waste Management Organization
OPG	Ontario Power Generation
OECD	Organisation for Economic Co-operation and Development

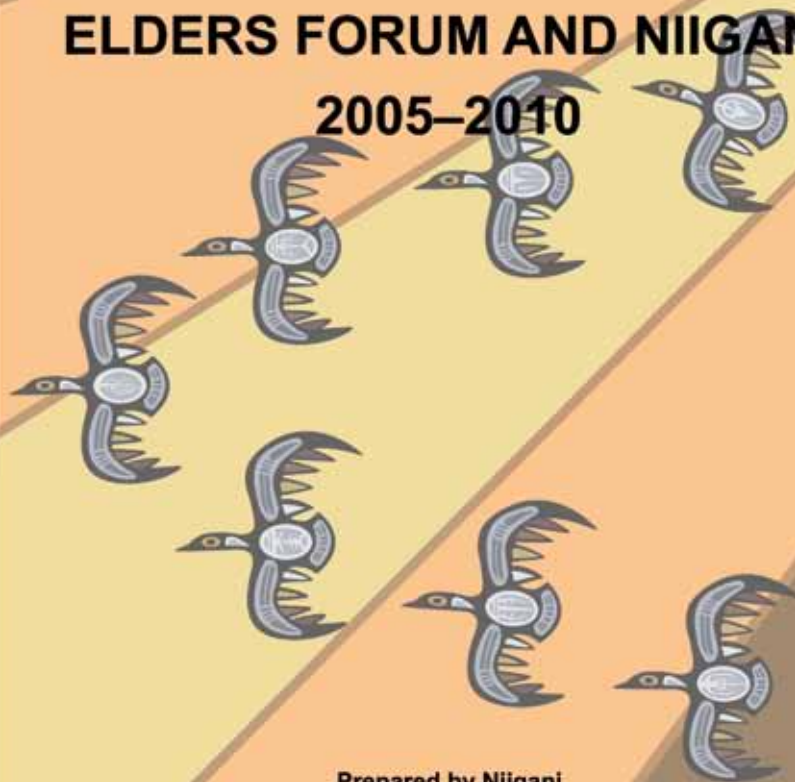




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Report of the Elders Forum and Niigani

**REPORT OF THE
ELDERS FORUM AND NIIGANI
2005–2010**



**Prepared by Niigani
The Aboriginal Working Group of the NWMO Elders Forum
October 2010**

NIIGANI

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THE ELDERS FORUM REPORT ADDENDUM FOR THE NWMO TRI-ANNUAL REPORT TO THE MINISTER 2005-2010

“...Elders want to give the best advice they can to the NWMO so they requested a written report be completed to record the highlights of their advice... It is our view that a written text will document our legacy and will enhance and protect the credibility of the relationship between the Elders Forum and the NWMO.”

Gordon Williams, 2009

Introduction

Elders are very concerned that all their work with the NWMO be consistent with the Elders Forum Mission Statement:

...To protect and preserve all creation air, land, water, fire, plants, medicines, animals and humankind – guided by the seven universal teachings of love, trust, sharing, honesty, humility, respect and wisdom.

The Elders agree with the NWMO in its emphasis on safety for people and the environment. The relationship between the NWMO and the Elders Forum has developed over time in an atmosphere of trust. During this time, the members of the Elders Forum have stressed the importance of the protection of Treaty, Constitutional and Inherent rights, and free, prior and informed consent in the implementation of Adaptive Phased Management.

Elders recognize that radioactive waste is a dangerous substance and all countries with used nuclear fuel are taking measures to safely contain it, and some feel that burying nuclear waste is not desirable while others do not feel the same; however, after engaging Canadians, the Federal Government selected Adaptive Phase Management as the approach that will be used in Canada. Elders provide independent advice, and they are vigilant in their encouragement of the NWMO to create impact and benefit agreements which will provide Aboriginal peoples a clear understanding of potential impacts and benefits – careers and long-term jobs; preparatory education and training for Aboriginal peoples; entrepreneurship and a partnership in the project. Elders appreciate the model being developed by the NWMO and encourage other corporate citizens to consider this model as a way to assist Aboriginal communities in meeting the challenges of working in partnerships.

Elders in the Aboriginal community make significant contributions in the

teaching and the guiding of the people in their communities. The Elders are the wisdom holders, and their influence permeates all aspects of physical, emotional, mental and spiritual activities. When the Elders speak of the impacts, they do in the context of what will happen to the children of the next seven generations as described in the mission statement. Since Elders are the guardians of Mother Earth, they wish to speak freely, and in time as NWMO goes forward with the site selection process, they may feel that it is necessary to speak with the Crown, to Aboriginal organizations and to potential host communities.

Historical Context

The Nuclear Waste Management Organization (NWMO) was established in 2002 by the Ontario Power Generation Inc., Hydro-Québec, and New Brunswick Power Corporation in accordance with the *Nuclear Fuel Waste Act* (NFWA) to assume responsibility for the long-term management of Canada's used nuclear fuel. This report describes the relationship between the Elders Forum and the NWMO and identifies the advice provided by the Elders since it came into existence in 2005.

This independent report is prepared for the Elders Forum and is submitted to the NWMO Board of Directors for inclusion in the NWMO's Tri-Annual Report to the Minister of Natural Resources. The Elders Forum welcomed the opportunity to contribute their perspective on this most important subject – a plan for long-term storage of Canada's used nuclear fuel. We understand that the Federal legislation requires consultation with Canada's Aboriginal peoples, but the discharging of this obligation is being done in a unique manner and the NWMO needs to be acknowledged for their work in this area.

One of the first tasks of the NWMO was to explore the thoughts of Canadians from across Canada regarding their views on the plan for the long-term storage of used nuclear fuel. Dialogues were held with Canadians and Aboriginal peoples from coast to coast. The NWMO wanted to receive input from Aboriginal peoples and the Aboriginal point of view. In order to get a better appreciation of the Aboriginal point of view, the NWMO consulted with National, Provincial and Regional Aboriginal Organizations between 2003 and 2005 and worked with them as they conducted dialogues with their members on the options for the storage of nuclear waste. The NWMO contracted with 15 Aboriginal Organizations to conduct discussions and report on the input they received on the subject. In addition, in 2005, the NWMO solicited the advice of the Aboriginal Organizations to recommend a number of Elders to advise the NWMO. This group of Elders formed what became the Elders Forum. This report highlights the past few years work, and advice of the Elders Forum and Niigani to the NWMO.

The NWMO is utilizing a unique process, which is very innovative when compared to other industries by involving Aboriginal peoples from the very beginning of the project, years before the construction phase of the project begins. The Elders Forum provides ongoing advice to the NWMO. Their goal was to find Elders with specific knowledge that would assist and help the NWMO in their work to understand the Aboriginal world view. Each Elder was invited to select a youth to assist him/her as required. Over the years since the formation of the Elders Forum, the youth have become an integral part of the Elders Forum. As the youth gain confidence, they became more active in the proceedings of the Elders Forum. In the past two years, the youth have

requested and received opportunities to meet by themselves so that they had time to hold discussions and articulate their own priorities. The Elders are very supportive of the involvement of youth and encourage them to develop their goals in order to learn since it will be their generation and future generations that will be responsible for future work.

The expressed mission 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." The primary focus of the work of the Elders Forum is to review and give advice on the work of the NWMO. The Elders Forum has made a significant contribution on how they should not only engage Aboriginal communities and organizations to accomplish their mission, but should also acknowledge and be mindful of the historical, legal and the contemporary contributions of Aboriginal peoples. Central to all the dialogue, discussion and the advice given to the NWMO is the respect for Inherent, Treaty and Aboriginal Rights as expressed in the *Constitution Act* of 1982. The Elders Forum is a tireless advocate for decision-making based on "...free, prior, informed, consent."

The relationship between the Elders and the NWMO is based on trust, which comes from: mutual respect; independence of the Elders; respect of cultures and world views, Aboriginal Rights and Treaties; respect for land claim areas, sacred sites and burial sites; traditional and intellectual knowledge; and the associated traditional processes.

The Elders were skeptical at first of the motivation of the NWMO even though some of them had participated in the dialogues that the NWMO held across the country, but over time, most of the Elders now understand the challenge all Canadians face when dealing with used nuclear fuel for the long term and see the importance of Aboriginal involvement in the process to protect Mother Earth.

In order to keep a focus on their role as guardians of Mother Earth and their role and responsibility to Mother Earth, their communities and their families, their respective First Nations, Métis and Inuit communities, and overall cultures, the Elders developed a Mission Statement that would guide their relationship and advice to the NWMO. Elders wanted to keep a strong cultural element in the Mission Statement and to acknowledge the responsibility all Aboriginal peoples have to each other, the land and the environment. Elders also wanted a clear statement to guide their ongoing involvement.

The Elders Forum Mission Statement is as follows:

"...To protect and preserve all creation air, land, water, fire, plants, medicines, animals and humankind – guided by the seven universal teachings of love, trust, sharing, honesty, humility, respect and wisdom."

This Mission Statement and the teachings of the Elders guide the work of the Elders Forum and is the contextual framework of the advice given to the NWMO. The Elders recognize that there are Aboriginal communities that are against nuclear development and the associated waste; the Elders also recognize that there are Aboriginal communities that support the plan for a deep geological repository. Recognition that these two views exist means community people will have to make their own decisions regarding a repository and Elders can make a contribution by making sure community people are well-informed about their responsibility to the land and the potential impacts of long-term storage of nuclear fuel in their territory.

Sequence of Meetings with the Elders Forum

Seven Elders Forums were held at different locations in three of the four nuclear provinces since 2005. The nuclear provinces are New Brunswick, Quebec, Ontario and Saskatchewan. At the request of the Elders, three of the Forums meetings were held on First Nation Communities. Reports of these Forums are publicly available through the NWMO website. Some of the main topics that were discussed at those meetings included a Mission Statement, an Aboriginal Policy, a Site Selection Process, Site Selection, Aboriginal Protocols and Traditional Ceremonies, Treaty Rights and Treaty Principles, Communication Strategy, Communication materials, Visits to nuclear facilities, Youth Programs, Outreach to Communities, Protocols (MOU) with Provincial Aboriginal Organizations and National Aboriginal Organizations.

Elders have been consistent about their relationship to the land, and their responsibility and need to protect Mother Earth. Health and safety of our people, the animals and the environment are their paramount concerns. Elders want every option considered by the NWMO when they deal with the storage of used nuclear fuel.

Meetings One & Two of the Elders Forum

The first two meetings of the Elders Forum took place in August 25–27, 2005, at the Odawa Native Friendship Centre in Ottawa and October 11–13, 2006, at the Delta Toronto Airport West Hotel in Mississauga, Ontario. Those two meetings generated some common themes (see recommendation sections of this document), as well as a sense of trying to figure out the role of the Elders Forum. There was some apprehension expressed by a few Elders as they tried to understand what their roles were in this new approach to doing business. The Elders Forum is leading the way in a new and unique process that usually does not happen with large corporations. They are working to establish a new standard and process that can be a model for involving Aboriginal peoples in development.

During the second meeting of the Elders Forum, part of one day was set aside by the NWMO to organize a trip to the Pickering Waste Management Facility at the Pickering Nuclear Generating Station in Pickering, Ontario. The Elders had a chance to experience for themselves the operation of a nuclear facility and the measures taken to secure the site. They also received an introduction to the present processes used to store the used nuclear fuel on site, from the cooling of the used fuel to the temporary storage of the used fuel bundles. This was a very valuable experience for the Elders as it helped their understanding of how the used fuel was currently being stored.

During the same meeting, the Elders discussed the development of a set of protocols for the NWMO when dealing with Elders and Aboriginal peoples in their respective areas. The Elders also discussed the importance of community development principles as the basis for capacity building at the community level so that the members of those communities would be able to benefit from any development in their area. People in our communities need information so decisions can be made with “...free, prior, informed consent.” Members of the Elders Forum spoke about the educational needs of Aboriginal peoples and encouraged the NWMO to sponsor aspiring Aboriginal students to seek careers in the scientific fields so that they would be candidates for employment and business opportunities with the NWMO in the future. Scholarships, training

programs and entrepreneurial development need to begin now so Aboriginal peoples across Canada can prepare for the significant number of construction jobs, entrepreneurship and business opportunities that will be available. The Elders know that the future is now.

The Elders Forum stressed that traditional knowledge and Western scientific knowledge should be seen as equal as the project moves forward. It became obvious that Aboriginal spirituality would also be an important component as the discussions progressed. In the Aboriginal world view, there is a spiritual bond with the land which is often not acknowledged. This is echoed in a book entitled the *Wisdom of the Elders* that reads as follows:

“...By openly acknowledging the inherent intelligence, coherence, and relevance of traditional Native knowledge about the natural world, the West can, if not to its satisfaction finally “prove” or “disprove” them, affirm their right to flourish by honoring the dignity of all First Peoples and by honorably settling their legitimate claims to the sacred lands that are so vital to their world view and survival.”

Understanding the important contribution of traditional knowledge and inter-weaving into all that is done can provide a valuable contextual perspective for decision-making for those that are trained to only focus on Western scientific knowledge and processes.

Meetings Three & Four of the Elders Forum

The third meeting of the Elders Forum was held at the Garden River First Nation in Ontario on August 20–22, 2007. This was done in response to a request by members of the Elders Forum that some meetings should take place in Aboriginal communities when and where possible. This also was a time when a mission statement for the Forum was discussed in detail. The need for a mission statement was raised at the second meeting of the Elders Forum, and a draft mission statement was presented to the Elders in Garden River. After a great deal of discussion, the mission statement was refined and adopted. The Mission Statement read as follows:

“To protect and preserve all creation: land, water, plants, medicines, animals, and humankind, and guided by the seven universal teachings of love, trust, sharing, honesty, humility, respect and wisdom.”

During the April 2009 Elders Forum, the Mission Statement was amended to add “fire” and now reads as follows:

“To preserve and protect all creation: air, land, water, fire, plants, medicines, animals and humankind, and guided by the seven universal teachings of love, trust, sharing, honesty, humility, respect and wisdom.

The Elders spoke freely about their views on the manner in which the NWMO was moving forward, and they wanted more information to keep pace with the changes that were occurring so Elders could monitor their impact. The NWMO informed the Elders Forum that it was now going ahead with Adaptive Phased Management, which was approved as the preferred option by the Federal Government in June of 2007.

Also, the NWMO had sponsored a youth program over the summer, and the youth who were involved in the project reported to the Elders Forum and were thanked for their work. In addition to the report by the Youth, the Elders requested that the NWMO develop a means of communication that would keep the Elders informed. It was agreed that a newsletter would be developed.

The fourth Elders Forum was held in Waskesiu, Saskatchewan, on

June 4–6, 2008. The Elders had an opportunity to meet with the Chair of the Board of Directors, Dr. Gary Kugler. Members of the Board, the Advisory Council and the NWMO staff participated in the meeting and the traditional ceremonies that were held daily. The participation of the NWMO was well-received by all the Elders. They viewed these actions as positive steps in building understanding and a trusting relationship with the NWMO. It became clear to those members who attended the Elders Forum that the NWMO was making concrete efforts to add Aboriginal members to the Board of Directors and the Advisory Council. These were measures the Elders Forum requested, and the NWMO responded positively to them. Another important activity of the meeting was information on the nuclear cycle. The members of the Elders Forum were given presentations by the NWMO's scientific staff so the Elders could understand the nuclear cycle and other activities that the NWMO was engaged in Canada and abroad.

A key area of discussion at this Elders Forum was advice to the NWMO on the guiding principles for an NWMO Aboriginal Policy. Following this meeting, the NWMO committed to develop the Aboriginal Policy and return to seek input from the Elders Forum on the draft Aboriginal Policy at the next Elders Forum.

Meetings Five, Six and Seven of the Elders Forum

The fifth Elders Forum was held in Toronto, Ontario, at the offices of the Ontario Federation of Indian Friendship Centres on March 31 and April 1, 2009. The agenda for the meeting had set aside some time to discuss the draft NWMO Aboriginal Policy. The NWMO also presented the Adaptive Phased Management process by which the proposed site selection process was being prepared for public release for discussion in 2009. It was clear that although the draft Aboriginal Policy reflected the principles and points made by the Elders Forum in 2008, Elders wanted to discuss the site selection process in detail. The NWMO described the process outlining that a series of dialogues would be held in the four nuclear provinces, and the members of the Working Group Niigani and members of the Elders Forum as appropriate in dealing with Aboriginal Organizations would be involved in the dialogues in their respective jurisdictions. Reports of all dialogues were written and subsequently analyzed by the NWMO to revise the site selection process and determine the next steps the NWMO would take in going forward. The NWMO released the proposed site selection process in 2010.

The sixth Elders Forum was held in Oromocto, New Brunswick, on July 28–29, 2009. The main issues that were to be discussed included the future of the Elders Forum and their long-term role in the project, discussion on the site selection process, final discussion on the NWMO's Aboriginal Policy and empowering the youth. The issue of dealing with the details of the site selection process focused on how it would impact Aboriginal communities and requested more time and information. The result was a discussion on the frequency of meetings of the Elders Forum. The members of the Elders Forum felt that meeting once a year was not sufficient for them to keep up with what was going on with the NWMO. The Elders had other ideas and requested that Niigani do an account or record of the advice given to the NWMO over the last five years.

In early 2010, the NWMO put forward to Niigani the idea of having the Elders Forum prepare three different projects based on the Elders Forum advice to date and begin to implement them and make presentations at the

next Elders Forum. This was proposed to give the Elders Forum an opportunity to explore three areas of activity that would concentrate on the interweaving of Traditional Knowledge and Western scientific knowledge, a Youth project to understand the long-term management of used nuclear fuel and other areas regarding the Deep Geological Repository and a project on Community Involvement from the Elders Forum perspective. The three projects were given to those Niigani Elders and youth who volunteered to work on those projects. The Elders and youth present were asked to give examples of initiatives that would qualify for further research with respect to ongoing and future project development. These initiatives captured the interest of the Elders and youth and teams were selected to carry out the three projects areas and report back to the Elders Forum at the next meeting in July 2010.

The seventh Elders Forum was held in Winnipeg on July 13–15, 2010. The meeting was held at the Thunderbird House. Consistent with other meetings, cultural ceremonies were available for those who wanted to attend a sunrise ceremony or participate in a sweat. Most of the two-day meeting was taken up with presentations by the Youth, the Traditional Knowledge Project and the Community Involvement Project.

The Draft Report on the Elders Forum activities from 2005 to 2009 was presented and discussed. After some discussion, it was clear that the Elders wished that they would capture more of the flow of their activities and advice over the years and a redraft of the report based on the concerns expressed by the Elders in Winnipeg was requested. The Elders raised a need for an *in camera* Elders Forum before the end of the calendar year to revise the report and prepare this Addendum to the NWMO Tri-annual Report to the Minister of Natural Resources. They felt that they needed to discuss issues that were important to them without the participation of NWMO staff. Ken Nash, President of the NWMO agreed with the request, and a meeting was scheduled for October 21, 22, 2010. This document highlights the work of the Elders Forum from 2005 to 2010.

The Formation of Niigani

The Elders Forum has met at least once a year since 2005. During the second meeting in the fall of 2006, the Elders formed a smaller group of eight Elders and youth, a Chairperson and Secretary. The primary function of the smaller group was to meet more often with the NWMO to follow up on the decisions made and the advice given at the Elders Forum. The smaller group met between three and four times annually with the NWMO which allowed for the necessary work that needed to be done between the Elders Forum meetings. The working group decided that it needed a name, and one of the Elders was offered tobacco to conduct a ceremony to ask for a name. The name “Niigani,” which means “leading the way,” was provided during the ceremony with the Niigani logo of seven geese flying in formation. The Niigani logo is symbolic of people working together. This was the genesis of how the smaller group became known as Niigani.

Niigani works on specific activities and reports to the Elders Forum guided by the Mission Statement. Niigani members actively participated in the dialogues that the NWMO held in the four nuclear provinces. Other members of Niigani travelled in their provinces in providing information to community groups and Aboriginal organizations. These activities are ongoing as the NWMO moves into the site selection phase, and it is anticipated that some members will

continue to be involved depending upon the needs of interested communities and the need to liaise with Aboriginal organizations.

The Elders Forum is now working on a review that will identify their recommendations regarding the long-term engagement of the Aboriginal communities in Canada as the site selection proceeds. The evolving role will be dependent on the need of Aboriginal organizations and Aboriginal communities in the region of the site selected. Elders anticipate that they will be directly involved and will continue to be active participants in the NWMO's work for many years to come.

Summary Notes on Recurring Themes

The expressed purpose from the inception of the Elders Forum was to give advice to the NWMO on a number of topics after meeting with Aboriginal communities. As the Elders Forum matures, it is spending more and more time, not only with the NWMO, but also with Aboriginal organizations and Aboriginal communities. One of the goals of the Elders of the Elders Forum is to learn about nuclear and particularly nuclear waste so they can ensure that the processes of engagement and consultation used by the NWMO will provide community people with information to make informed choices. The Elders on the Elders Forum do not see themselves as advocates, or adversaries regarding nuclear waste. But, they are advocates and adversaries when they discuss processes to engage the Aboriginal community, the use of Traditional Knowledge, Constitutional, Treaty Rights and inherent rights of Aboriginal peoples and making sure that Aboriginal peoples have "...free, prior, informed consent."

It was noted that some views expressed by the Elders came up regularly at the Forum and Niigani Meetings. One of the unique aspects of the relationship between the NWMO and Elders is the ability of the Elders to provide the NWMO with advice based on their Traditional Knowledge and experience. One of the strengths of the relationship is the NWMO encourages open and candid discussions. The following list is not exhaustive, but it provides an introduction to the variety of topics discussed and position of the Elders and youth:

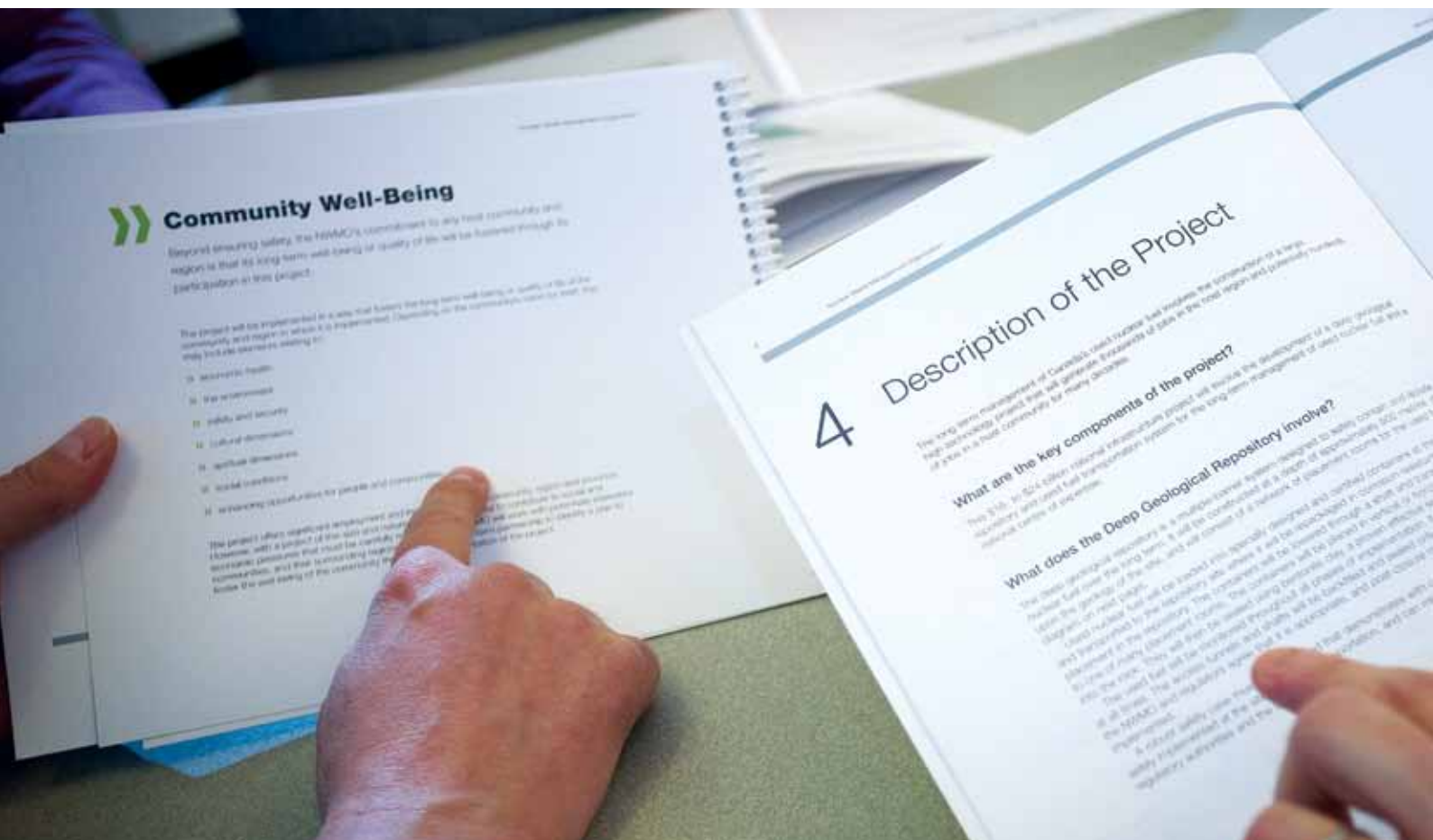
1. Mother Earth must be respected as Aboriginal peoples are the guardians of Mother Earth. The protection of the land, water and all living things including humankind was often raised and reflected in the Mission Statement. The building of a deep geological repository must be built to be safe and protect the health and safety of all creatures.
2. The Duty to Consult based on the *Constitution Act* of 1982 was often brought up in order to protect Inherent Rights, Treaty Rights and the Constitutional Rights of Aboriginal peoples. Elders are adamant that the Treaties be honoured and suggest that outstanding land claims of an identified host Aboriginal community be settled in a fair manner before the facility is constructed.
3. Capacity of the community people was deemed a priority in terms of information and research needed in short- and long-term decision-making processes.
4. Elders in the Elders Forum asked that a specific allotment of funds be earmarked for their use to accommodate requests for information made by communities and Aboriginal organizations.

5. The need for the NWMO to support Aboriginal students with bursaries and scholarships immediately to pursue careers in the science fields.
6. The NWMO was encouraged to add more Aboriginal peoples to their Board of Directors and the Advisory Council.
7. Elders encouraged the NWMO to develop and implement concrete plans to promote a diverse hiring policy.
8. Capacity building now, so Aboriginal communities can begin training for future employment and entrepreneurial opportunities.
9. To explore other options and remain adaptable to new concepts and approaches that would negate the need for a Deep Geological Repository. The Elders are very aware of the latent power of Mother Earth, and if she is not properly dealt with, the results will be disastrous. Elders question how the site will withstand a natural disaster such as an earthquake or the effects of global climate change.
10. A request to visit other countries that are dealing with the issue of used nuclear fuel was made by some of the Elders.
11. The need to demonstrate integration of Traditional Knowledge in a respectful way so it is not viewed as inferior to Western scientific knowledge.
12. The Elders encouraged ongoing cross-cultural training for NWMO staff as well as participation in traditional ceremonies whenever possible.
13. Intellectual property rights of the Aboriginal community must be protected.
14. The NWMO must ensure that the definition of community in the site selection process does not undermine Aboriginal collective rights.
15. Ensure culturally appropriate communication materials are developed before working with communities.
16. Communities involved in the site selection process must benefit economically, socially and culturally from the project. The Elders have also expressed concern about the economic, social and cultural impacts of a project of this magnitude on the lifestyle of members of isolated Aboriginal communities that will be affected. They are also concerned about the aftermath of the project and the residual impacts on the Aboriginal communities. They speak about how they have been impacted before and after by 'boom and bust' mining operations that did little to help them once their natural resources were depleted.
17. Memorandum of Understanding between the NWMO and the Crown – the Crown has a duty to consult and accommodate with esteemed members of the community prior to making a decision about the future of their lands/territories.
18. Involvement of youth in the long term and the recognition that there will need to be plans developed to ensure the transfer of knowledge between generations.

The NWMO has responded to some of the requests and are considering others. This needs to be a continued ongoing effort of the NWMO to develop the partnership and show respect to the Elders contribution so the relationship will continue to grow. The NWMO needs to continue to build on the activities that were initiated as a result of Elders recommendations: a brochure and video developed with the advice and assistance of Aboriginal communications experts; a newsletter; two summer youth projects conducted in Aboriginal communities; Cultural Awareness Training for all NWMO staff, Board members and Advisory Council; Elders Forum meetings in aboriginal communities; Niigani meetings in various locations in the nuclear provinces; along with advice given by Aboriginal organizations and people; the NWMO appointed Aboriginal members to the NWMO Board and Advisory Council; participated in Aboriginal ceremonies; sought understanding of traditional lifestyle; conducted a Traditional Knowledge Project with a traditional family to learn first-hand about a traditional way of life.

Conclusion

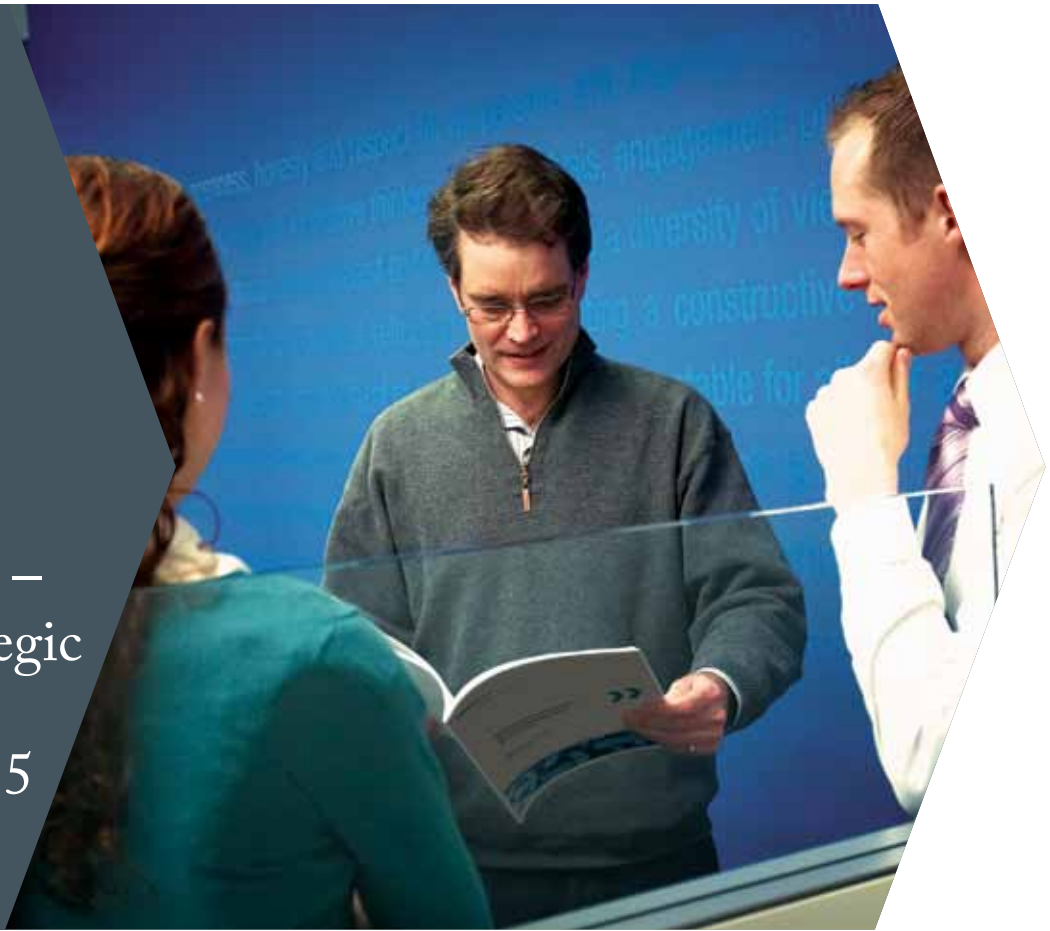
In many respects, the journey has only started, in terms of finding a solution to the safe and secure storage of used nuclear fuel. It will be years before a decision is made on how it will be stored and where. We are now in the implementation stage of a siting process, but much still needs to be done to complete this phase of the work. There is still a role for the Elders Forum in the foreseeable future, and the journey will be a shared one as the process moves forward.





Appendices

Appendix 1 – APM Strategic Plan 2011 to 2015





NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES

Implementing Adaptive Phased Management 2011 to 2015



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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 2011 to 2015 was released in draft for public review between October 12 and December 10, 2010. Following the review period, the plan was revised to reflect comments received.

Planning Priorities for 2011 to 2015

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 2011 to 2015, the NWMO will implement the process to decide where to contain and isolate Canada's used nuclear fuel for the long term. This five-year plan reflects a new focus on siting-related activities.

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. 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 will be community-driven – communities will determine if and when they wish to work with the NWMO. Activities set out in this plan represent the NWMO's preparations to be ready to respond in a timely way and work with communities. In the planning period, the NWMO expects a number of potentially interested communities to request site investigations, and the NWMO will support the community in its initial learning about the project and how its long-term well-being or quality of life might be fostered through its participation in the project.

The NWMO will periodically review the implementation of the process with Canadians to ensure that it continues to meet needs and expectations, and to make process refinements, if required. 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.

Strategic Objectives

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, specifically engagement, siting, technical research and development, social research, finance, governance and organizational issues.

The priorities for the 2011 to 2015 planning period are described under each of the strategic objectives.

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.

Strategic Objectives 2011–2015

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, 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.

Build Sustainable Relationships

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 2011 to 2015, 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 Elders Forum and Municipal Forum. The NWMO will also work together with potentially affected Aboriginal peoples as holders of Traditional Knowledge, 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 will evolve to include more directly the communities and regions interested in hosting the project. Over the next five years, we will build relationships with communities that wish to explore hosting the Adaptive Phased Management project, and those who would be affected by the siting of the project, including surrounding communities, Aboriginal peoples, the region and transportation communities as a group.

THE NWMO RECOGNIZES that there are Aboriginal peoples in all areas of Canada where the NWMO's work will take place. 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.

Going Forward

In the period 2011 to 2015, 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 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 and the surrounding areas;
- » 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 Aboriginal governments, and keep them and their members apprised of progress in the implementation of Adaptive Phased Management and the site selection process;
- » Continue to seek the advice of Elders and develop awareness and learning opportunities for NWMO staff about cultures, traditional practices, protocols and governance of Aboriginal peoples;
- » Continue to work with potentially affected Aboriginal peoples, including Traditional Knowledge holders, to implement the site selection process 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;
- » Assess effectiveness of NWMO engagement activities; and
- » Continue to report publicly on the input that the NWMO receives and how this advice has been considered.

In 2011, 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; 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 and Western science, and respectful engagement of Aboriginal peoples;
- » Continue briefings for Aboriginal organizations and engagement of Elders through work with Niigani and the NWMO Elders Forum;
- » 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;
- » Develop an NWMO education, outreach and capacity-building strategy for young Canadians 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, such as Pollution Probe's Annual Clean Air Commute.

» 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. Implementation of the process, including the selection of an informed and willing 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. Screening and 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.

Steps in the Siting Process – At a Glance

	The process is designed to be flexible and adaptive to allow individual communities to proceed at a pace and in a manner that reflect their needs and preferences.
Step 1	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 (initiated May 2010).
Step 2	Communities identify their interest in learning more, and the NWMO provides detailed briefing. An initial screening is conducted.
Step 3	For interested communities, a preliminary assessment of potential suitability is conducted.
Step 4	For interested communities, potentially affected surrounding communities are engaged if they have not been already, and detailed site evaluations are completed.
Step 5	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.
Step 6	The NWMO and the community with the preferred site enter into a formal agreement to host the project. The NWMO selects the preferred site and agreement is ratified.
Step 7	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.
Step 8	Construction and operation of an underground demonstration facility.
Step 9	Construction and operation of the deep geological repository and associated facilities.

The business plan assumes that over the five-year period, some communities will elect to move through sequential steps of screening, feasibility study and field investigations. It is also assumed that the NWMO will select communities from among those that have formally expressed interest for detailed site characterization and initiate this intensive phase of work toward the end of the planning period. Work plans for the 2011–2015 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 associated with implementation at a particular site, including transportation of used nuclear fuel required, are recognized and considered. 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 how the project may affect 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. To assist communities in capacity building, the NWMO has established the *Learn More Program*, outlined below. Funding will be provided to support interested communities as they work through each step.

LEARN MORE PROGRAM – FOCUS ON EARLY STEPS

The NWMO's *Learn More Program* provides resources in the form of information and funding to support participation in the early steps of the siting process, as described in *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* (May 2010). The five program components outlined below are offered to interested individuals, organizations and communities to support early consideration of Adaptive Phased Management. A program outlining support for participation in subsequent steps in the site selection process will be outlined as the process proceeds and as the needs of participating communities are better understood.

Learn More About Adaptive Phased Management

The NWMO will meet with any group to provide information about Adaptive Phased Management and the nature of the used nuclear fuel repository project. The NWMO will provide funding to assist a community to build its understanding of the technical safety dimensions of the project and to engage a third-party expert to review NWMO material published to date.

Learn More About the Potential Suitability of the Community to Host the Project

The NWMO will provide funding to geographically defined communities to hire a third-party expert to review the NWMO's initial screening of the suitability of the community.

Support for Visit to Interim Storage Facility Site

The NWMO will cover travel expenses for a small representative delegation from a community to visit an interim radioactive waste storage facility in Ontario or another nearby facility.

Support for Development or Refinement of a Long-Term Vision for Sustainability

Should initial screening suggest a community has potential to be suitable for the project, the NWMO will provide a community with resources to develop or augment a long-term vision for community sustainability.

Support Activities to Build Awareness and Understanding of the Project Within the Community

Should initial screening suggest a community has potential to be suitable for the project, the NWMO will provide resources for accountable authorities in the community to begin engaging citizens in the community about the project.

Additional Program Components

Additional components will be identified in response to the needs of participating communities and surrounding areas.

In the next few years, technical support to the siting process will focus on assessing the suitability of potential sites through geoscientific characterization and evaluation studies in interested communities. Beyond ensuring safety, the NWMO's commitment to any host community is that its long-term well-being or quality of life will be fostered through its 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. By 2013, the NWMO expects to be ready to begin detailed site evaluations on one or more sites, including further geological investigations, safety assessments, social and economic impact assessments, and the application of Aboriginal Traditional Knowledge, all in collaboration with the interested communities and surrounding areas.

Transportation is an important consideration in the assessment of any site. In order for a site to be considered technically safe, 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. Additional communication materials will be developed to support existing DVDs, backgrounders and engagement activities to respond to public and media concerns that are raised.

The NWMO is also developing the institutional policies, practices and structures required to support 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, and the community must be informed and willing to host the facility. The objectives of the site selection process are outlined below.

THE SITE SELECTION PROCESS IS DESIGNED TO USE A PARTNERSHIP-BASED APPROACH TO:

- » Ensure that any community that is selected to host this facility is both informed about the project and willing to host it;
- » Ensure that any site that is selected to host this facility will safely contain and isolate used nuclear fuel for a very long period of time in an appropriate geological formation and that there is an acceptable way of transporting used nuclear fuel to the site;
- » Assist the potentially interested host community to consider carefully and thoroughly the project's potential benefits and risks when deciding whether to express interest, and ultimately, willingness to host the project;
- » Involve surrounding communities, regions and other jurisdictional levels potentially affected by the project and the transportation of used nuclear fuel in the identification and assessment of public health, environmental, social, economic and cultural effects of the project as part of a broader regional assessment;
- » Involve First Nations, Métis and Inuit who are potentially affected by the implementation of this project; and
- » Help foster an ongoing public conversation on questions to be answered and issues to be addressed throughout the site selection process.

Going Forward

In the period 2011 to 2015, the NWMO will:

- » Continue work to explore safety considerations through preparation of illustrative postclosure safety assessment to the Canadian Nuclear Safety Commission (CNSC) for pre-project review;
- » Continue work to explore technical safety considerations through preparation of generic used fuel transportation risk assessment;
- » 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 tools and methods for geoscientific assessment of candidate sites in both crystalline and sedimentary rock settings;
- » Provide engineering designs and preliminary 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 discussions to explore and help assess the extent to which the project might contribute to the well-being of the community;
- » Conduct initial screenings (Step 2), upon request of communities;
- » Conduct preliminary assessments (Step 3), upon request of communities and in collaboration with them;
- » Develop and confirm a process to select one or more suitable sites from among interested communities for regional study and/or detailed site evaluation (Step 4) as well as a process to communicate reasons for decisions;
- » Engage surrounding communities, regions and Aboriginal peoples in discussions to explore and assess the extent to which the project might contribute to their well-being as early in the site selection process as possible;
- » Identify preferred transportation modes and potential routes associated with each interested community under consideration (Step 4) 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;
- » Organize and help conduct regional studies for one or more communities moving to detailed site evaluations;

- » Establish NWMO presence in potential host communities that have elected to participate in detailed site evaluation studies to provide information, showcase displays, and support public capacity-building and engagement activities;
- » Establish centres of expertise in communities selected for detailed site characterization to support technical and social assessments and discussion of community well-being issues;
- » Convene workshops on siting-related topics;
- » Conduct research on partnership and power-sharing frameworks for consideration in structuring of a formal agreement with the host community, 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 2011, the NWMO will:

- » Prepare illustrative postclosure safety assessment in crystalline rock for CNSC pre-project review;
- » Prepare generic used fuel transportation risk assessment;
- » Continue, advance and report on ongoing and formal discussion of specific ethical and social considerations that should be addressed in the site selection process;
- » 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 and surrounding areas;
- » Provide appropriate support to any community, interested individual or group to contribute to shaping the knowledge platform on which this project and the site selection process is implemented;
- » Provide detailed briefings on the project, the Adaptive Phased Management site selection process and progress in its implementation, as requested by interested communities or organizations (Step 2);
- » Conduct initial screenings upon request of interested communities (Step 2);
- » Develop memoranda of understanding with communities electing to proceed to preliminary assessments;
- » Conduct preliminary assessments upon request of interested communities with potentially suitable sites (Step 3);
- » Prepare a discussion paper on ethical and social considerations to be addressed in the implementation of the site selection process reflecting insight from a workshop of practitioners;
- » Continue to develop communication materials to support learning and dialogue on transportation considerations;
- » Launch dialogue on transportation considerations, beginning with regulatory authorities at all levels of government, transportation experts and those working in the field;
- » 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 APM.

» Refine and Further Develop Generic Designs and Safety Cases for a Deep Geological Repository

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. 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.

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 development of the generic safety case and how detailed information about a site, once known, will be used to refine work in the future.

Going Forward

In the 2011 to 2015 time period, technical program activities will complete work to update reference designs and safety cases, complete a CNSC pre-project review of repository design and postclosure safety in crystalline and sedimentary rock, and identify design optimization opportunities in advance of submission of site preparation and construction licences in the 2018 time frame. 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 2011 to 2015, the NWMO will:

- » Update reference conceptual designs, safety cases and cost estimates for Adaptive Phased Management;
- » Demonstrate components of full-scale shaft seal and monitoring instrumentation;
- » Submit design concepts to the CNSC for a pre-project review of the feasibility of the used nuclear fuel deep geological repository concepts and safety cases;
- » Develop, evaluate and demonstrate used nuclear fuel container technology;
- » Maintain and improve performance assessment models, including groundwater flow, containment release and transport, and coupled thermal-hydraulic-mechanical processes;
- » Improve the system level safety assessment model with respect to capabilities, speed and validation;
- » Further increase confidence in the deep geological repository safety cases;
- » 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
- » Complete preliminary repository design optimization studies.

In 2011, the NWMO will:

- » Issue final conceptual design reports and generic cost estimate reports for a used fuel transportation system, deep geological repository in crystalline rock and deep geological repository in sedimentary rock;
- » Issue the Adaptive Phased Management conceptual design and illustrative postclosure safety assessment in crystalline rock to the CNSC for pre-project review;
- » Issue the report *APM Technical Program Activities for the Period 2012 to 2018*;
- » Complete the annual review of the NWMO's technical program by the Independent Technical Review Group;
- » Prepare the outline of a repository development plan and design optimization opportunities, including the development of a used fuel container and used fuel packaging plant;
- » Complete the update of a used fuel transportation safety assessment;
- » Demonstrate components of full-scale shaft seal and monitoring instrumentation; and
- » Complete 2011 improvement actions in response to 2010 Independent Technical Review Group recommendations.

CRYSTALLINE AND SEDIMENTARY ROCK FORMATIONS

CANADIAN AND INTERNATIONAL STUDIES have demonstrated that both sedimentary and crystalline rock formations can have favourable geologic, hydraulic and geochemical properties to safely contain and isolate used nuclear fuel for very long time frames. These types of rocks are being actively considered in several countries. Finland and Sweden are developing their used nuclear fuel repositories in crystalline rock. France and Switzerland are investigating sedimentary formations. Japan and other countries are considering both crystalline rocks and sedimentary rocks for their repository programs. Given the regional variability of these two geological formations, the selection of one formation over the other is a function of site-specific conditions and availability.

Sedimentary rocks are produced by the accumulation of sediments into topographic depressions on the surface of the Earth (e.g., lakes, oceans, bays and rivers). Such sediments may be produced by the erosion of previously existing rocks or the precipitation of dissolved minerals. The deposited sediments are gradually compacted by the weight of overlying beds and transformed into solid sedimentary rocks by a process called cementation. Sedimentary rocks are classified according to grain size and composition. Sedimentary rocks with large grain sizes are referred to as conglomerates or breccias. Fine-grained sedimentary rocks are commonly classified as argillaceous sediments and may be referred to as clays and shales.

Crystalline rocks consist of crystallized material and are further classified into igneous and metamorphic rocks. Igneous rocks are typically formed from the cooling and crystallization of magma from deep within the Earth. Granite is a good example of an igneous rock formed under the Earth's surface. Occasionally, igneous rocks are formed on the surface of the Earth by volcanic eruptions and are referred to as volcanic rocks. Metamorphic rocks are formed from pre-existing igneous or sedimentary rocks. These rocks are transformed (metamorphosed) by being compressed by the action of plate tectonics, which causes temperature and pressure to increase. The process of metamorphism reorganizes the existing minerals in the rock by changing the original crystal grain sizes or realigning minerals. Examples of metamorphic rocks include marble, serpentinite, quartzite, argillite, slate and gneiss.

» 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. The final cost will depend on such factors as the number of fuel bundles to be managed, timing of construction and geology of the site.

The highest present value cost scenario for long-term management of Canada's used nuclear fuel assumes a deep geological repository would be available starting in 2035. When updated to January 1, 2010, present value, the estimated cost of Adaptive Phased Management is in the range of \$7 billion to \$8.5 billion. These cost estimates include costs for reactor site storage, which are carried out and directly funded by the individual waste owners, and 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.

As Adaptive Phased Management is implemented, the NWMO must ensure that the cost estimates remain updated and that the funding formula will finance all aspects of Adaptive Phased Management. Contributions will be adjusted periodically to reflect updated projections of overall costs and the number of nuclear fuel bundles expected to be produced by each used nuclear fuel owner.

A particular emphasis during the planning period will be to initiate discussions and research on further developing the funding formula approved by the Minister of Natural Resources Canada in 2009 to incorporate new reactors and new owners of used nuclear fuel.

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.

THE NUCLEAR FUEL WASTE ACT

THE NUCLEAR FUEL WASTE ACT (NFWA) assigns responsibility to the major owners of used nuclear fuel to make financial provisions for its long-term management. The *Act* required each of the four waste owners to make annual deposits to trust funds established for this purpose.

The *NFWA* built in explicit provisions to ensure that the trust funds are maintained securely and used only for the intended purpose.

Going Forward

In the period 2011 to 2015, the NWMO will:

- » Incorporate revised baseline cost estimates for Adaptive Phased Management into the funding formula by 2011;
- » Update the total cost estimate for Adaptive Phased Management no later than 2012;
- » Identify key issues associated with updating the funding formula to accommodate scenarios involving new reactors and new owners of used nuclear fuel; develop a new funding formula to address these scenarios. The timeline for finalizing the funding formula will depend on the outcomes of the review phase; progress will be reported in the Annual Report published every March;
- » 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), and provide updates to confirm that the waste owners are meeting their financial obligations; and
- » Estimate and publish the financial implications of potential future scenarios of varying volumes of used nuclear fuel, when available.

Adapt Plans

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.

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.

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 energy policy 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 volumes 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 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, and identify areas for potential cooperation among waste owners. 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.

Going Forward

In the period 2011 to 2015, 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 inter-generational 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;
- » 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 volumes and types;
- » Publish a preliminary technical assessment of Generation III reactor used 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; 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.

» 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 environmental assessment has been completed 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 Nuclear and Hydro-Québec are the founding Members of the NWMO. The 2007 Membership Agreement and bylaw set out Member roles and responsibilities in furtherance of the objectives of the *NFWA* and the 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 pages 208–210.

ADVISORY COUNCIL

The *NFWA* requires that the governing body of the NWMO appoints an Advisory Council to review and comment on its study, and following the Government's selection of a long-term management approach for used nuclear fuel, on the NWMO's triennial reports. The Board of Directors appointed the Advisory Council in 2002, with membership renewed in 2008. In addition to meeting its statutory obligations, the Council provides independent guidance and advice to the NWMO. Current membership of the Advisory Council represents a broad range of expertise, including geosciences, nuclear engineering, strategic communications, 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 pages 224–227.

By 2012, current Council members' terms will be complete. In establishing appointments for the next phase, the NWMO Board will ensure appointments remain consistent with the requirements of the *NFWA*. The Board will also 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

The NWMO has continued to develop its internal governance. In April 2010, the NWMO achieved certification to the ISO 9001:2008 Management System. Work on the integrated internal governance will continue with the development and implementation of additional policies and procedures, or enhancements to existing governance, to ensure compliance with the ISO 14001 Environmental Management System and the portions of CSA N286-05, and ultimately N208-11 once issued, that apply to nuclear waste repositories. Simultaneously, internal governance will also be augmented or enhanced to enable compliance with the CSA 1000 Occupational Health and Safety Management System. The target is to be compliant with the ISO 14001 and CSA 1000 standards in the first quarter of 2011, prior to the start of geotechnical field investigations, which will be carried out in support of the Ontario Power Generation Deep Geologic Repository Project for Low and Intermediate Level Waste detailed design engineering.

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 and may be reappointed. 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. 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 statements 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 2012 and 2015 conventions 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, issued in the third fiscal year after the fiscal year in which a decision is made by the Governor in Council and for every third fiscal year after that. These 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 2011 to 2015, 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;
- » Interact with the CNSC on Adaptive Phased Management in the pre-project period consistent with the terms of the service agreement that identifies the CNSC's early involvement in the APM Project prior to submission of a licence application. These areas include participating in public meetings to provide information on the regulator's role, identifying regulatory requirements for a repository and providing regulatory review of conceptual APM repository designs;
- » 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 first triennial report in March 2011;
- » 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 any reports;
- » Report internationally on progress for the long-term management of Canada's used nuclear fuel at the 2012 and 2015 meetings 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

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 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 2011 to 2015, 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 invest in business systems and processes throughout the business planning period to support the growing organization;
- » Continue a graduate intern program to support maintenance of institutional memory and 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.

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. We welcome all suggestions and comments. Please write to us or submit comments to our website at www.nwmo.ca.

Appendix 2 – Support to OPG’s Deep Geologic Repository Project for Low and Intermediate Level Waste 2011 to 2015



The NWMO will continue to provide technical services and other support to Ontario Power Generation (OPG) to obtain regulatory approvals, and to design and construct OPG's proposed Deep Geologic Repository (DGR) Project for the safe, long-term management of low and intermediate level nuclear waste (L&ILW). All DGR activities and work programs have been undertaken with extensive strategic direction, oversight and approval from OPG – a practice that will continue throughout the regulatory approvals phase, and the design and construction phases.

DGR Project Regulatory Approvals Process

The regulatory approvals phase for the DGR began with the submission of the DGR Project Description by OPG to the Canadian Nuclear Safety Commission (CNSC) in late 2005. It will be completed when the site preparation and construction licence is issued, which is anticipated to take place in late 2012 or early 2013.

In 2011, the NWMO will complete the Environmental Impact Statement (EIS), Preliminary Safety Report and Technical Support Documents, for OPG to submit to the Joint Review Panel in support of the DGR regulatory approval process.

DGR Project Design and Construction Phase

During the year 2011, the NWMO will continue investigative work for the DGR project, including two pilot boreholes at the main and vent shaft locations and a grouting study. The results of these studies will provide information and support for the construction of the facility.

In accordance with its February 2011 agreement with OPG, the NWMO will be managing the design of the DGR facility, and pending a successful regulatory approvals process for a site preparation and construction licence, will also manage the construction phase. Site preparation activities are expected to take about six months; construction activities are scheduled to take place over five to seven years. Construction of the surface infrastructure and two headframe buildings, and the sinking of the two shafts, are scheduled to occur during the first three years, while the construction of the underground services area infrastructure, access tunnels and emplacement rooms will commence around the beginning of 2015 and continue on for about two years. All emplacement rooms will be constructed prior to the start of waste emplacement.

During the period 2011 to 2015, the NWMO, under service to OPG, will:

- » Finalize and accept three DGR engineering packages for surface infrastructure, underground layout and geotechnical support, and headframes, hoists and shafts;
- » Ensure Contractor Quality Plans are up-to-date and in place;
- » Complete procurement work for design/follow-up monitoring/construction contracts;
- » Commence and complete activities associated with site preparation:
 - Implementation of Environmental Management Plan (also for construction phase),
 - Implementation of follow-up monitoring identified in the EIS,
 - Preparation of site for construction activities, including the clearing and grading of the DGR project site, and the development of roads, construction laydown areas, stormwater management pond and ditches,
 - Set-up of construction trailers and temporary facilities, and
 - Installation of fuel depot for construction equipment.
- » Commence and complete activities associated with construction:
 - Implementation of follow-up monitoring identified in the EIS,
 - Construction of permanent buildings including two main shaft headframe and ventilation shaft headframe,
 - Shaft-sinking of main and vent shafts, and
 - Placement of excavated rock in waste rock management area.

DGR Communication Program

The NWMO is assisting OPG in the delivery of the DGR Communication Program that encompasses a broad approach that is related to key milestones in the development of the DGR and the progression of the regulatory approvals process. Annual communication plans prepared by the NWMO define the communication objectives, communication strategy, spokespeople, target audience, key messages and communication activities.

The DGR project is a community-driven process. The decision to proceed was based on demonstrated early public support. Project teams continue to work with a supportive host community, keeping stakeholders informed of their work at every step. The NWMO and OPG monitor and engage the local communities, including Aboriginal communities, to maintain a high level of support and trust.

During the period 2011 to 2015, the NWMO, under service to OPG, will:

- » Continue to establish and implement communication activities for the DGR;
- » Provide a broad range of engagement opportunities for members of the public to become updated, ask questions, provide meaningful comment and raise concerns about the DGR;
- » Continue to provide a broad range of engagement opportunities for Aboriginal communities to become updated, ask questions, provide meaningful comment and raise concerns about the DGR;
- » Continue to respond in a timely manner to issues raised by the public, including Aboriginal communities;
- » Inform persons living in the vicinity of the Bruce nuclear site of the general nature and anticipated effects on the environment, and the health and safety of persons during site preparation and construction, and subsequent phases of the project (including, but not limited to: site preparation and construction progress; results from follow-up monitoring; and DGR milestones, decisions and modifications); and
- » Monitor, document and evaluate the DGR Communication Program on an annual basis.

Appendix 3 – Listing of Engagement and Research Activities



A) Broad-Based Engagement Activities

Citizen Panels

The Citizen Panel program of work was designed to bring together a group of citizens, selected at random in each of the four provinces involved in the nuclear fuel cycle, to meet periodically to provide input on the NWMO's early plans over the course of four meetings. The topics discussed by the Panels largely mirrored those that were the focus of the NWMO's other engagement activities. The panels were recruited, organized, administered and reported on by a third-party contractor (Navigator Ltd.). As is the case with other NWMO engagement activities, the locations for the panels were chosen to include major population centres in each of the nuclear provinces and/or regions so that a broad range of views might be heard on these early planning questions.

Topics discussed included:

- » Review of and comment on NWMO's first corporate brochure (Phase 1 – conducted Fall 2007);
- » Input to the development of NWMO's first implementation plan (Phase 2 – conducted early 2008) and subsequent review of portions of a draft of this document that were published on the NWMO website for comment (Phase 3 – conducted early Spring 2008);

- » Review of the framework of values and objectives suggested as the starting point for collaborative development of the siting process, as identified in the NWMO's earlier report to government, *Choosing a Way Forward – The Future Management of Canada's Used Nuclear Fuel* (Phase 4 – conducted late Spring 2008).

In 2009, contractors Navigator Ltd. and Ascentum Inc. gathered citizen panelists from around Canada in Toronto and Ottawa for one-day discussions and deliberative dialogues on the NWMO's proposed process for selecting a site.

2008–2010 Reports:

- NWMO SR-2008-01: NWMO Citizen Panels Aggregate Report, Phase 2
- NWMO SR-2008-02: NWMO Citizen Panels Report, Phase 2, Panel 1
- NWMO SR-2008-03: NWMO Citizen Panels Report, Phase 2, Panel 2
- NWMO SR-2008-04: NWMO Citizen Panels Report, Phase 2, Panel 3
- NWMO SR-2008-05: NWMO Citizen Panels Report, Phase 2, Panel 4
- NWMO SR-2008-06: NWMO Citizen Panels Report, Phase 2, Panel 5
- NWMO SR-2008-07: NWMO Citizen Panels Report, Phase 2, Panel 6
- NWMO SR-2008-08: NWMO Citizen Panels Report, Phase 2, Panel 7
- NWMO SR-2008-09: NWMO Citizen Panels Report, Phase 2, Panel 8
- NWMO SR-2008-10: NWMO Citizen Panels Aggregate Report, Phase 3
- NWMO SR-2008-11: NWMO Citizen Panels Report, Phase 3, Panel 1
- NWMO SR-2008-12: NWMO Citizen Panels Report, Phase 3, Panel 2
- NWMO SR-2008-13: NWMO Citizen Panels Report, Phase 3, Panel 3
- NWMO SR-2008-14: NWMO Citizen Panels Report, Phase 3, Panel 4
- NWMO SR-2008-15: NWMO Citizen Panels Report, Phase 3, Panel 5
- NWMO SR-2008-16: NWMO Citizen Panels Report, Phase 3, Panel 6
- NWMO SR-2008-17: NWMO Citizen Panels Report, Phase 3, Panel 7
- NWMO SR-2008-18: NWMO Citizen Panels Report, Phase 3, Panel 8
- NWMO SR-2008-19: NWMO Citizen Panels Aggregate Report, Phase 4
- NWMO SR-2008-20: NWMO Citizen Panels Report, Phase 4, Panel 1
- NWMO SR-2008-21: NWMO Citizen Panels Report, Phase 4, Panel 2
- NWMO SR-2008-22: NWMO Citizen Panels Report, Phase 4, Panel 3
- NWMO SR-2008-23: NWMO Citizen Panels Report, Phase 4, Panel 4
- NWMO SR-2008-24: NWMO Citizen Panels Report, Phase 4, Panel 5
- NWMO SR-2008-25: NWMO Citizen Panels Report, Phase 4, Panel 6
- NWMO SR-2008-26: NWMO Citizen Panels Report, Phase 4, Panel 7
- NWMO SR-2008-27: NWMO Citizen Panels Report, Phase 4, Panel 8
- NWMO SR-2010-01: Final Report from the Citizens' Panel Dialogues and the Public Discussion Groups

Multi-Party Dialogues, Workshops and Discussion Sessions

In 2008, the NWMO initiated a dialogue with interested organizations (such as environmental groups, national and provincial Aboriginal organizations, and municipal associations representatives) and individuals organized and led by Stratos Inc. The focus of that dialogue was on important principles and elements for a fair process to identify an informed and willing community to host a deep geological repository for the safe containment and isolation of Canada's used nuclear fuel for the long term. Guided by this input, we developed a discussion document outlining a proposed process for selecting a site.

In 2009, multi-party dialogues were re-convened to test and refine the proposed process for selecting a site document. Day-and-a-half-long dialogue sessions were held to continue the discussion begun the previous fall. The comments and the views shared in these dialogues were used along with those received during information sessions and other dialogue activities to refine the process and ensure it is open, transparent, fair and inclusive.

Reports:

- NWMO SR-2008-30: Multi-Party Dialogues – Final Synthesis Report, Fall 2008
- NWMO SR-2008-31: Multi-Party Dialogues – Saskatoon, Fall 2008
- NWMO SR-2008-32: Multi-Party Dialogues – Ottawa, Fall 2008
- NWMO SR-2008-33a: Multi-Party Dialogues – Toronto Room 1, Fall 2008
- NWMO SR-2008-33b: Multi-Party Dialogues – Toronto Room 2, Fall 2008
- NWMO SR-2008-34: Multi-Party Dialogues – Montréal, Fall 2008
- NWMO SR-2008-35: Multi-Party Dialogues – Saint John, Fall 2008
- NWMO SR-2009-06: Multi-Party Dialogues – Saskatoon Session, September 16–17, 2009
- NWMO SR-2009-07: Multi-Party Dialogues – Ottawa Session, September 23–24, 2009
- NWMO SR-2009-08: Multi-Party Dialogues – Toronto Session, October 5–6, 2009
- NWMO SR-2009-09: Multi-Party Dialogues – Saint John Session, October 13–14, 2009
- NWMO SR-2009-10: Multi-Party Dialogues Fall 2009 – Synthesis Report
- NWMO SR-2009-12: Multi-Party Dialogues – Durham Nuclear Health Committee Session Report
- E-dialogues

In 2008, e-dialogues were convened and led by Dr. Ann Dale, Canada Research Chair in Sustainable Community Development, to solicit input to the design of the process for selecting a site for the long-term management of used nuclear fuel. The first e-dialogue was held on December 2, 2008, designed particularly to target young people. This dialogue included 10 experts who had various expertise in community engagement, either as an academic or a practitioner, including two international experts. The second e-dialogue was conducted on December 17, 2008, and included three experts on planning and risk.

The latest online real-time conversation was held on October 19, 2009, and was followed by a week-long e-forum until October 24, 2009. Led and moderated by Dr. Ann Dale, this e-dialogue was designed to bring as many diverse perspectives as possible around four key questions on the draft siting plan for used nuclear fuel.

Reports:

- NWMO SR-2009-05: NWMO e-dialogues Report (December 2008)
- NWMO SR-2009-11: NWMO e-dialogues Report (October 2009)
- NWMO e-dialogue Transcript (October 19, 2009)

Over 2009, a series of well-advertised Public Information Sessions were held in 17 regional centres in the four provinces involved in the nuclear fuel cycle. Organized by DPRA, all interested Canadians were invited to learn more about the NWMO, the Adaptive Phased Management approach and the proposed siting process. NWMO staff members were present to answer questions, and hear concerns and comments from more than 700 visitors who attended the sessions. Participants represented many interests, including government at all levels, First Nations and Métis, environmental and conservation groups, educational organizations, business and industry, unions, social organizations, media and members of the public.

Reports:

- NWMO SR-2010-03: Information Sessions Report – May to December 2009
- Appendix A: Regional Areas
- Appendix B: Information Sessions Story Boards
- Appendix C: Participant Materials
- Appendix D: Advertising and Notification

The NWMO established the Youth Roundtable in 2009 to provide advice on how the NWMO might better reach young audiences as part of its engagement program. The Youth Roundtable concluded its formal mandate and presented its recommendations to the NWMO in 2010.

Reports:

- Building Understanding and Engaging Young Adults in a Dialogue about Canada's Management of Used Nuclear Fuel
- Status of NWMO Response to Youth Roundtable Recommendations

NWMO SR-2009-02: Applying Community Well-Being: Lessons and Experience of Canadian Practitioners. AECOM Canada Ltd.

A workshop of Canadian practitioners with experience related to Community Well-Being (CWB) was held in January 2009. The aim of the workshop was to bring together experts and practitioners of CWB from across Canada to share their experiences, insights, and lessons learned regarding CWB and its application to a wide range of projects.

Public Attitude Research

A nationwide telephone survey was conducted among 2,631 Canadians between November 13 and November 30, 2008, by Ipsos Reid Public Affairs in order to solicit input from a randomly selected sample of Canadians about the key principles that should guide the design of a process to select a site for the long-term management of Canada's used nuclear fuel. The questionnaire also included questions that had been asked in previous surveys commissioned by the NWMO and were intended to track awareness on key variables related to the NWMO's work.

A follow-up nationwide telephone survey was conducted among 2,630 Canadians between October 20 and November 8, 2009, by Pollara in order to test and refine key components of the Proposed Process for Selecting a Site document with a randomly selected sample of Canadians. The questionnaire also included questions that had been asked in previous surveys

commissioned by the NWMO and were intended to track awareness on key variables related to the NWMO's work.

Reports:

- NWMO SR-2008-37: Ipsos Reid Nationwide Survey, December 2008 – Final Report
- NWMO SR-2010-02: Report on Nationwide Survey – Public Attitudes and Views on an Appropriate APM Siting Process

NWMO SR-2008-38: Brochure test among Aboriginal People

The objective of this research was to evaluate the brochure entitled *Managing Canada's Nuclear Fuel Waste* among Aboriginal peoples. The study was designed to gauge reactions to the brochure. This work was conducted by Environics Research Group.

NWMO SR-2009-05: NWMO Video Review Focus Groups

During the period of December 8–10, 2008, a contractor, Navigator Ltd. spoke to Canadians in three cities to assess reactions to the NWMO's informational video, *Moving Forward Together*. Using "Perception Analyzer" dial testing technology, focus group discussions measured understanding and the perceived credibility of the video among audiences in Saskatoon, Greater Toronto and Montreal.

NWMO SR-2009-13: Site Selection Process Document Testing

During the period of March 21–25, 2009, Navigator Ltd. spoke to Canadians in three cities to solicit feedback on a working draft of both the Executive Summary and one chapter of a larger NWMO document outlining the organization's site selection process. Navigator Ltd. used a red and green pen exercise to gauge understanding of the document, inquire as to whether the document met participant expectations on depth and content, identify any barriers to comprehension, and identify formats and media appropriate for the material.

NWMO SR-2010-04: Qualitative Testing: Regulatory Backgrounder

The primary objective of the study was to test reaction and receptivity to the NWMO backgrounder on relevant regulations. As a secondary objective, Pollara also tested reaction to NWMO backgrounders on transportation and the long-term plan, as well as the principles, process and contents of the Adaptive Phased Management plan itself.

NWMO SR-2010-13: Engaging Communities: Qualitative feedback on the Nuclear Waste Management Organization's exhibit

In October 2010, Navigator Ltd. conducted focus group sessions to solicit feedback on the NWMO's siting process exhibit. Sessions were divided into two parts: independent browsing of the exhibit and a group discussion. Each session allowed participants to provide feedback on content, techniques and approaches being used by the NWMO, as well as offer suggestions for additional materials to help residents of a community build understanding.

Letters, Submissions and Comments

Since 2008, the NWMO has received over 600 submissions from individuals and organizations interested in providing comment on our work. These submissions include letters, faxes, emails, completed workbooks and surveys, as well as submissions made via the NWMO's website, where visitors have been invited to publicly share their thoughts. Comments made through the NWMO's online submission form are published in the website's Submission Library (www.nwmo.ca/submissions_library), and the following is a list of individuals and organizations that made online submissions in the period 2008–2010.

Individual and Group Submissions to the NWMO Online Submissions Library

Individuals:

- | | |
|---------------------------|--------------------------|
| • Carol Berg | • Mark Nagus |
| • Elaine Blais | • Lilly Noble |
| • Allan Blakeney | • Cathy Orlando |
| • Darlene Buckingham | • Tyler Parcey |
| • Louis Charest | • Guy Pharand |
| • Arnold Christmann | • Alain Piché |
| • Scott Cosby | • Jola Pisz |
| • Michel Couturier | • Heather Porritt |
| • Gregory Cragg | • Claude Rainville |
| • Phil Cunningham | • Charles Rhodes |
| • JM Cuttler | • James Risdon |
| • Jacy Demore | • Walter Robbins |
| • Shirley Farlinger | • JAL Robertson |
| • Gary Fitzpatrick | • Dean S. Rogers |
| • David S. Geary | • Lipika Saha |
| • R. Anthony Gilbert | • Sorin Schwimmer |
| • Amy Gionet | • Blair Seaborn |
| • Ralph Kretz | • Tim Seitz |
| • Richard Kuhn | • Rene Sugar |
| • Jean Labrecque | • Ian Turnbull |
| • Larry Lack | • Elder Billy Two Rivers |
| • Marcie Lane | • Ann Wearing |
| • Victor Lau | • Edna Wheeler |
| • Tom and Patricia Lawson | • Gordon Williams |
| • James G. Learning | • Scott Williamson |
| • André Malo | • Detlef Zimmermann |
| • Ronald McIsaac | • Shawn |

Organizations:

- Assembly of First Nations
- East Coast First People Alliance
- ENRESA
- Nuclear Decommissioning Authority
- Saint John Citizens Coalition for Clean Air
- South Bruce Impact Advisory Committee

What We Heard

The NWMO's dialogue and public engagement efforts are being conducted iteratively through a series of stages. We report on our activities and what we learn by posting regular "What We Heard" updates on the NWMO website and producing specific summaries for individual engagement programs.

Reports:

- What We Heard – Report on Engagement Activities Issue No. 1, April 2008
- What We Heard – Report on Engagement Activities Issue No. 2, September 2008
- What We Heard – Comments Received about Implementation Plan 2010–2014 (Issue No. 3)
- What We Heard: Collaborative Development of the Siting Process (2009) (Issue No. 4)

B) Municipal Engagement

Adaptive Phased Management will be implemented in an informed and willing host community. Understanding the local perspective is therefore critical for the NWMO as we design and refine our plans and processes to find the eventual host site of the deep geological repository. Throughout 2008 to 2010, the NWMO has made continuous progress in its municipal engagement program with various activities aimed at building both relationships with and knowledge of the municipal sector across the four nuclear fuel cycle provinces.

Municipal Forum

At the end of 2008, with the cooperation of 18 senior leaders from provincial municipal associations and the Federation of Canadian Municipalities (FCM), 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:

- December 8, 2008 – Toronto (Inaugural Scoping Meeting)
- March 13, 2009 – Ottawa
- May 28–29, 2009 – Toronto (Darlington Waste Management Facility Tour Included)
- November 18, 2009 – Ottawa
- March 16, 2010 – Toronto
- May 11, 2010 – Conference Call
- July 21, 2010 – Ottawa
- October 28, 2010 – Toronto

Since the inaugural meeting in 2008, the Municipal Forum members have developed a high level of understanding of Adaptive Phased Management and the site selection process, have facilitated the NWMO's interactions with municipal associations and have contributed greatly to the development of a collaborative research agenda that will yield tools to assist municipalities as they consider their interest in the project going forward.

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 participated in each of the annual conferences listed next and provided presentations and briefings as indicated.

FEDERAL

Federation of Canadian Municipalities (FCM)

- 2008 Annual Conference and Trade Show (Presentation)
- 2009 Annual Conference and Trade Show
- 2010 Sustainable Communities Conference
- 2010 Annual Conference and Trade Show (Presentation)

PROVINCIAL

Saskatchewan

Saskatchewan Association of Rural Municipalities (SARM)

- 2009 Annual Convention and Trade Show
- 2009 Midterm Convention (Presentation)
- 2010 Annual Convention and Trade Show
- 2010 Midterm Convention

Saskatchewan Urban Municipalities Association (SUMA)

- 2008 Presentation to the Board of Directors
- 2009 Annual Convention and Trade Show
- 2010 Annual Convention and Trade Show

New Brunswick

Cities of New Brunswick Association (CNBA)

- 2008 General Meeting (Presentation)
- 2008 Conference and AGM (Presentation)
- 2009 Conference and AGM (Presentation)

Union of Municipalities of New Brunswick (UMNB)

- 2008 Combined Municipal Association Meeting (Presentation)
- 2009 Conference and Trade Show (Presentation)
- 2010 Conference and Trade Show (Presentation)

Quebec

Union des Municipalités du Québec (UMQ)

- May 29, 2008 – Presentation to the Environment Commission

Ontario

Association of Municipalities of Ontario (AMO)

- 2008 Conference and Trade Show
- 2009 Conference and Trade Show (Presentation)
- 2010 Presentation to the Board of Directors
- 2010 Conference and Trade Show (Presentation)

Counties, Regions & Single Tier Municipalities (CRSTM)

- 2008 Conference and Trade Show
- 2009 Conference and Trade Show

Federation of Northern Ontario Municipalities (FONOM)

- 2008 Presentation to the Board of Directors
- 2009 Conference and Trade Show
- 2010 Conference and Trade Show

Northwestern Ontario Municipalities Association (NOMA)

- 2008 Conference
- 2009 Conference and Trade Show
- 2009 Board of Directors Meeting (Presentation)
- 2010 Conference and Trade Show

Ontario Small Urban Municipalities (OSUM)

- 2009 Conference
- 2010 Conference and Trade Show

Rural Ontario Municipal Association (ROMA)

- 2009 Conference
- 2010 Conference and Trade Show

Related Municipal Conferences**Association of Managers, Clerks and Treasurers of Ontario (AMCTO)**

- 2010 Conference
- 2010 Zone 9 Annual Meeting (Presentation)

Economic Development Council of Ontario (EDCO)

- 2010 Conference

Northwestern Ontario Regional Conference (NWORC)

- 2009 Conference and Trade Show

Ontario Association of Community Futures Development Corporations Annual Meeting

- 2010 Conference

Ontario East Municipal Conference (OEMC)

- 2009 Conference
- 2010 Conference

Ontario West Municipal Conference (OWMC)

- 2010 Conference (Presentation)

The Ontario Rural Council (TORC)

- 2009 Conference and Briefing

Community Organizations

Throughout the design of the site selection process, the NWMO has conducted ongoing dialogue and updates through meetings with special community groups, including advisory committees, local health committees, citizen groups and municipal councils. Among them:

Canadian Association of Nuclear Host Communities (CANHC)

The NWMO continues to strengthen relations with the municipal leadership from Canada's existing nuclear communities, who together form the Canadian Association of Nuclear Host Communities (CANHC). As these communities will be directly impacted by Adaptive Phased Management 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 special group well-informed.

- February 27, 2008 – Annual General Meeting (Presentation) (Ottawa)
- October 7, 2008 – Briefing (via Conference Call)
- November 26, 2008 – Specialized Dialogue, Toronto
- February 25, 2009 – Annual General Meeting (Presentation) (Ottawa)
- November 6, 2009 – Briefing, Toronto
- February 24, 2010 – Annual General Meeting (Presentation) (Ottawa)
- May 11, 2010 – Briefing, Toronto
- November 16, 2010 – Briefing, Toronto

Durham Nuclear Health Committee, Durham Region, ON

- April 18, 2008 – Presentation at General Meeting
- October 30, 2008 – Specialized Dialogue
- November 14, 2008 – Presentation at General Meeting
- April 17, 2009 – Presentation at General Meeting
- May 28, 2009 – Specialized Dialogue
- April 16, 2010 – Presentation at General Meeting
- June 18, 2010 – Presentation at General Meeting
- November 20, 2010 – Presentation at General Meeting

AECL Environmental Stewardship Council – Pembroke, ON

- Briefing – February 12, 2009

Community Consultation Advisory Group (CCAG) – Bruce County, ON

- Briefing – March 25, 2009
- Briefing – February 25, 2010

Municipality of Clarington (Council Meeting), Clarington, ON

- Briefing – September 28, 2009

Municipal Council of Bécancour, Québec

- Briefing – February 4, 2008

Pickering Community Advisory Council (PCAC), Pickering, ON

- Briefing – November 18, 2008

Point Lepreau Community Liaison Committee (PLCLC), NB

- Briefing – January 10, 2008

South Bruce Impact Advisory Committee (SBIAC), Bruce County, ON

- Briefing – June 19, 2008

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 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;
- » Introduction to Learn More briefings;
- » Detailed Learn More briefings; and
- » Tours of Ontario Power Generation interim waste management facilities.

Through the Learn More Program, the NWMO will continue to provide support to those wishing to further their knowledge and build capacity.

Since the initiation of the site selection process in May 2010 and as part of the Learn More Program, the NWMO has received requests from communities wishing to learn more about the site selection process and continue to build their knowledge of Adaptive Phased Management.

C) Aboriginal Engagement

Throughout our work with Aboriginal peoples, we strive to build relationships at all levels of the community, province and nationally, and work to understand Aboriginal culture and protocols. Meaningful involvement and informed decision-making by affected Aboriginal communities as they work together with the NWMO in implementing Adaptive Phased Management must be built on a foundation of trust, knowledge and vision for the long-term well-being of the community.

National Associations

Assembly of First Nations (AFN)

- APM-REP-00611-0001 – Assembly of First Nations – Seven Generations Report, March 25, 2009

AFN Communications Documents/Fact Sheets:

2009

- First Nations and Used Nuclear Fuel – English & French
- Frequently Asked Questions: Used Nuclear Fuel – English & French
- Nuclear Fuel Cycle – English & French
- Used Nuclear Fuel Management – English & French
- Used Nuclear Fuel, Our Land, Our Choice – English & French
- Used Nuclear Fuel – English & French

2010

- Deep Geological Repository – English & French
- Multi-Barrier Containment – English & French
- Radiation and Health – English & French
- Transportation – English & French
- Used Nuclear Fuel – English & French
- Transportation Backgrounder – English & French
- Radiation and Health Backgrounder – English & French
- Used Nuclear Fuel & Long-Term Storage Backgrounder – English & French

Native Women's Association of Canada

- APM-REP-00615-0001 – Native Women's Association of Canada: Our Mother, The Earth: the Role of Aboriginal Women in Environmental Issues and Challenges, Discussion Paper prepared for the Native Women's Association of Canada in reference to Nuclear Waste Management, Mary Jamieson, April 2009
- APM-REP-00615-0002 – Native Women's Association of Canada – Final Report from Native Women's Association of Canada to NWMO – Proposed Process for Selecting a Site, March 2010
- APM-REP-00615-0003-R000 – Native Women's Association Canada, Finding Your Voice: Environmental Toolkit for Aboriginal Women, 2009

Regional/Local Organizations

Regional dialogue reports of First Nation and Métis organizations on *Moving Forward Together: An Invitation to Review the Proposed Process for Selecting a Site*:

- APM-REP-00621-0002 – Métis Nation Saskatchewan – Final Report on NWMO Engagements Regarding the NWMO Proposed Site Selection Process, December 15, 2009 Prepared by Nicole A. Swain BSc., Duty to Consult and Accommodate
- APM-REP-00622-0001 – Chiefs of Ontario – We are the Land, Nuclear Waste Discussion Report prepared for the Nuclear Waste Management Organization, November 2009
- APM-REP-00622-0003 – Métis Nation Ontario – The Nuclear Waste Management Organization's Adaptive Phased Management Regional Dialogue Métis Nation Ontario – Regional Dialogue, "What We Heard – Final Report" November 30, 2009
- APM-REP-00623-0001 – Assembly of First Nations Quebec & Labrador – Report on NWMO-FNQLSDI Project, Discussion Project between the First Nations and the Nuclear Waste Management Organization, Report produced by the First Nations of Quebec and Labrador Sustainable Development Institute (FNQLSDI) and Submitted to the Nuclear Waste Management Organization, Wendake, October 30, 2009.
- APM-REP-00623-0001 – Rapport de projet SGDN-IDDPNQL – Projet de discussion entre les Premières Nations et la Société de gestion des déchets nucléaires (SGDN); Rapport produit par l'Institut de développement durable des Premières Nations du Québec et du Labrador (IDDPNQL) Et Remis à la Société de gestion des déchets nucléaires, Wendake, QC, le 30 octobre 2009
- APM-REP-00624-0001 – Mawiw Council of First Nations – Final Report for Mawiw Council & Nuclear Waste Management Organization – Dialogue & Community Information Sessions in Tobique, Esbenoopititj, Elsipoqtoq, from July to November 2009, December 7, 2009, written by Brad Sappier
- APM-REP-00624-0002 – Union of New Brunswick Indians – Nuclear Waste Management Organization Adaptive Phased Management, Submitted by Union of New Brunswick Indians, Final Report, November 30, 2009

SUMMARY OF 2009 REGIONAL DIALOGUES LOCATIONS ON MOVING FORWARD TOGETHER: AN INVITATION TO REVIEW THE PROPOSED PROCESS FOR SELECTING A SITE

The dialogue format varied in each province. Early in the design of the dialogues, the NWMO recognized that people would need time to learn about and understand Adaptive Phased Management and the proposed site selection process in order to participate fully. A two-part process, information briefings followed by dialogue, was the preferred format for many of the sessions, with a series of questions centered on the site selection document, *Moving Forward Together: An Invitation to Review the Proposed Process for Selecting a Site*. NWMO technical and engagement specialists participated in the sessions along with one or more members of Niigani and the Elders Forum. Niigani and Elders Forum members provided presentations on the work of the Elders Forum during the dialogues and discussed the key issues they identified as important to Aboriginal peoples in the NWMO's work. They participated in the discussion and on an ongoing basis were a resource to Aboriginal organizations, at their request. In addition, a number of Aboriginal groups conducted meetings and information sessions directly with Aboriginal communities in order to provide as wide a range of opportunities for participation and learning as possible. In total, more than 800 people participated.

Ontario

Chiefs of Ontario:

August 18–19: Nigigoonsiminikaaning First Nation (near Fort Frances)
 August 26–27: Whitefish River First Nation (near Espanola)
 September 16: Six Nations of the Grand River, Ohsweken, ON (near Brantford)
 September 23–24: Moose Cree First Nation (near Moosonee, ON)
 October 7: Batchewana First Nation (near Sault St Marie) follow up session
 November 17–19: Special Chiefs Forum – Obashkaandagaang First Nation (near Kenora) – final session

Métis Nation Ontario:

August 21: Sudbury
 November 14: Toronto – Final session

Native Women's Association:

September 19: Thunder Bay, ON

Quebec

Assembly of First Nations – Quebec and Labrador:

September 10: Wendake, QC

New Brunswick

Union of New Brunswick Indians:

July 15: Fredericton
 October 15: Oromocto – Follow-up session

Community meetings and newsletter for residents conducted by the Union of New Brunswick Indians:

- Eel River Bar First Nation
- Metepenaiaag (Red Bank)
- Buctouche First Nation
- Fort Folly
- Madawaska Maliseet First Nation
- Red Bank First Nation

Mawiw Council of First Nations:

July 3: Fredericton

October 16: Fredericton – Follow-up session

November 12–13: Tobique First Nation

November 26: Burnt Church First Nation

November 27: Elsipoqtoq First Nation

Native Women's Association:

August 22-23: Moncton, NB

Saskatchewan

Métis Nation Saskatchewan:

October 23-24: Regina – southern regions

October 26-27: Prince Albert – northeast regions

October 28-29: North Battleford – central regions

December 2: Ile-a-la-Crosse – northern and northwest regions

December 5: Saskatoon – Follow-up session to confirm input and finalize report

Native Women's Association:

September 11: Saskatoon, SK

Workshops and Presentations:

- July 7–8, 2008: Native Women's Association Canada – Environmental Roundtable – Workshop
- September 22, 2008: Federation of Saskatchewan Indian Nations – Workshop
- December 9, 2008: Native Women's Association Canada – Environmental Roundtable – Workshop
- March 25, 2009: Assembly of First Nations – Seven Generations Workshop
- July 13, 2009: Federation of Saskatchewan Indian Nations – Elders Advisory Council – Workshop
- February 18, 2010: Métis Nation Saskatchewan-Southern Region – Information Session
- April 15–16, 2010: National Roundtable on the Aboriginal Leadership Initiative – AFN & Health Canada – Workshop
- April 24–25, 2010: Assembly of First Nations National Policy and Planning Forum, Saskatoon, SK
- August 20, 2010: Métis Nation Ontario – Annual Assembly – Workshop
- November 4–5, 2010: Federation of Saskatchewan Indian Nations – Education & Training Session – Lands & Resources Commission Chiefs, staff, Elders and Youth – Waskesiu, SK

- November 23–24, 2010: Assembly of First Nations Traditional Decision-Making Workshop – Nakoda Lodge, Morley, AB
- 2008, 2009 & 2010: Youth Outdoor Wellness Conference, SK – Information Session

Trade Shows:

- 2009 Assembly of First Nations Annual Assembly, Calgary, AB
- 2010 Aboriginal Finance Officers Association, Ottawa, ON
- 2010 Canadian Council on Aboriginal Business, Toronto, ON
- 2010 AFN Annual Assembly, Winnipeg, MB

Elders Forum and Niigani

- NWMO DR-2008-01 – Elders Forum 4 Report, June 2008, Prepared by Joanne Barnaby, Forum Facilitator and Rapporteur
- APM-REP-00671-0001 – Elders Forum 5 Report, March 31–April 1, 2009, prepared by Joanne Barnaby, Forum Facilitator and Rapporteur
- APM-REP-00671-0002 – Elders Forum 6 Report, July 28–30, 2009, prepared by Joanne Barnaby, Forum Facilitator and Rapporteur
- APM-REP-00671-0003 – Elders Forum 7 Report, July 13–15, 2010, prepared by Joanne Barnaby, Forum Facilitator and Rapporteur
- Niigani Newsletters: June 2008, October 2008, December 2008, June 2009, December 2009, July 2010, October 2010, December 2010.

Aboriginal Traditional Knowledge

- NWMO DR-2008-03 – Report of Traditional Knowledge Project, November 2008, Joanne Barnaby, Joanne Barnaby Consulting, and Alan Emery, Ph.D., KIVU Nature Inc.
- APM-REP-00660-0001 – Report of the NWMO Traditional Knowledge Workshop – 2009, December, Facilitator, Glenn Sigurdson

Communications Documents

- NWMO Aboriginal Brochure (English and French)
- Moving Forward Together DVD, Aboriginal version (2008, updated 2010)
Available in the following languages:
 - English
 - French
 - Woodland Cree – Sakaw Nehiyaw
 - Dene – Denesuline
 - Oji-Cree – Anishiniimowin
 - Ojibway – Ojibwaa-gaadenoon
 - Maliseet – Wolastoqiy
 - Mi'kmaq – Mi'kmaq
 - Swampy Cree – Omaskiko Ininiw
 - Innu – Innu
 - Michif – Apihtow Kosan Pikswewin
- Moving Forward Together brochure (2010)
Available in the following languages:
 - Woodland Cree – Sakaw Nehiyaw
 - Dene – Denesuline
 - Oji-Cree – Anishiniimowin
 - Ojibway – Ojibwaa-gaadenoon
 - Maliseet – Wolastoqiy
 - Mi'kmaq – Mi'kmaq
 - Swampy Cree – Omaskiko Ininiw
 - Innu – Innu
 - Michif – Apihtow Kosan Pikswewin

Other Reports/Documents

- NWMO DR-2008-02 – Report of 2008 Summer Project: Project to Develop Awareness and Understanding of NWMO and Adaptive Phased Management with Aboriginal Peoples, August 2008, Prepared by Brian Gillingham and Mahogany McGuire
- Memorandum of Understanding between Her Majesty The Queen in Right of Canada as Represented by the Minister of Natural Resources and Nuclear Waste Management Organization, August 2009
- APM-REP-00621-0001 – Federation of Saskatchewan Indian Nations, Report on Information Workshop on First Nations and Nuclear Waste Disposal, September 22, 2008, Saskatoon, SK, Prepared by Office of the Chief, Murray Long, Coordinator
- NWMO Aboriginal Policy: Working Draft, June 2009 – English
- NWMO Aboriginal Policy: Working Draft, June 2009 – French
- NWMO Aboriginal Policy – April 2010, English and French

D) Social Research Papers

NWMO SR-2008-29: Stakeholder Participation and Volunteer Siting in Radioactive Waste Disposal in Belgium (Anne Bergmans)

This paper describes the community partnership approach that was taken in Belgium for the siting of a repository facility for the disposal of low and intermediate-level, short-lived radioactive waste.

NWMO SR-2009-03: Summary of Economic Benefits Linked to Adaptive Phased Management (AECOM Canada Ltd.)

This document is a brief summary of the possible economic benefits derived from the implementation of the Adaptive Phased Management program for used nuclear fuel in Canada.

NWMO SR-2009-04: Context and Application of Community Well-Being (AECOM Canada Ltd.)

The purpose of this paper is to provide background regarding community well-being. The first section defines community well-being; the second section discusses its use and application and what can be learned from its application; and the third section suggests possible characteristics of a framework for measuring community well-being.

NWMO SR-2010-09: A Preliminary Assessment of Illustrative Generic Community Economic Benefits from Hosting the APM Project (AECOM Canada Ltd.)

The NWMO commissioned AECOM to update and elaborate on existing community economic benefit knowledge that may be of interest to Canadians. This update was designed to allow for a better understanding of the possible range of economic benefits and other implications that might result in a province, economic region or community should it choose to host the APM Project.

In 2009–2010, Bill Leiss, Professor emeritus at the School of Policy Studies, Queen's University, and a scientist with the McLaughlin Centre for Population Health Risk Assessment, University of Ottawa, prepared a series of papers on the subject of risk communication. A noted scholar and author on the subject of risk, Dr. Leiss produced three papers designed to be read in sequence and to help interested citizens determine for themselves the best way to approach the risks associated with nuclear fuel waste storage and disposal.

Reports:

- NWMO SR-2010-10: Paper #1: Thinking about risk and safety
- NWMO SR-2010-11: Paper #2: How might communities organize their discussions about hosting a site for used nuclear fuel?
- NWMO SR-2010-12: Paper #3: What is happening in other countries

In 2009, the NWMO sponsored a Learn More Program that encouraged any community, interested individual or group to contribute to shaping the knowledge platform on which the APM project will proceed. This program continued in 2010 as *Research Support Program – Studies in the Humanities and Social Sciences*. These programs were designed to help build understanding of

important issues related to the implementation of APM, including the site selection process, through inviting independent perspectives.

Reports:

- Research Support Program – A Resource Guide to Aboriginal Well-Being in Canada – Annette Chrétien
- Research Support Program – Community Well-Being: An Overview of the Concept – Brenda Murphy

E) Organizational Documents

Siting Process and Discussion Documents

- » Moving Forward Together: Designing the Process for Selecting a Site (August 2008)
- » Moving Forward Together: Designing the Process for Selecting a Site – Invitation to Review a Proposed Process for Selecting a Site (May 2009) – Summary
- » Moving Forward Together: Designing the Process for Selecting a Site – Invitation to Review a Proposed Process for Selecting a Site (May 2009) – Full Version
- » Moving Forward Together: Process for Selecting a Site (May 2010)

Implementation Plans

- » Implementing Adaptive Phased Management 2008 to 2012
 - Concept Paper – Preparing for Implementation
- » Implementing Adaptive Phased Management 2009 to 2013
- » Implementing Adaptive Phased Management 2010 to 2014 (March 2010)
 - Implementing Adaptive Phased Management 2010 to 2014 – Draft for Review – November 2009
 - Questionnaire for Implementing Adaptive Phased Management 2010 to 2014 – Draft for Review
- » Implementing Adaptive Phased Management 2011 to 2015 (March 2011)
 - Implementing Adaptive Phased Management 2011 to 2015 – Draft for Public Review – October 2010
 - Share Your Thoughts on Implementing Adaptive Phased Management 2011 to 2015 – Draft for Public Review

Information Sheets

- » Transportation of Used Nuclear Fuel (2008)
- » Security and Safeguards (2008)
- » Monitoring and Retrievalability (2008)
- » Health Effects of Radiation and Radioactivity (2008)

Backgrounders

- » Who We Are (2008)
- » Project Description (2008)
- » Security and Safeguards (2008)
- » Monitoring and Retrievalability (2008)
- » Climate Change (2008)
- » Nature of the Hazard (2008)
- » Transportation (2008)

- » Status of National Used Fuel/High-Level Radioactive Waste Management Programs (2008)
- » The Canadian Nuclear Regulatory Framework (2008)
- » Who We Are (2009)
- » Project Description of Canada's Long-Term Plan for Used Nuclear Fuel Management (2009)
- » Transportation (2009)
- » Status of National Used Fuel/High-Level Radioactive Waste Management Programs (2009)
- » The Canadian Nuclear Regulatory Framework (2009)
- » Who We Are (2010)
- » Project Description (2010)
- » Multiple-Barrier System (2010)
- » Used Nuclear Fuel Reprocessing (2010)
- » Ensuring Safe Transportation of Used Nuclear Fuel (2010)
- » Regulatory Oversight of Adaptive Phased Management (2010)
- » Planning for Climate Change (2010)
- » Choosing a Way Forward (2010)
- » Community Sustainability Visioning (2010)
- » Frequently Asked Questions (2010)
- » Status of National Used Fuel/High-Level Radioactive Waste Management Programs (2010)

Newsletters

- » NWMO News V6.1 – May 2008
- » NWMO News V6.2 – September 2008
- » NWMO News V6.3 – December 2008
- » NWMO News V7.1 – March 2009
- » NWMO News V7.2 – August 2009
- » NWMO News V7.3 – December 2009
- » NWMO News V8.1 – July 2010
- » NWMO News V8.2 – September 2010
- » NWMO News V8.3 – December 2010

F) Technical Papers

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 published during the period 2008–2010.

- » NWMO TR-2008-01: Technical Research and Development Program for Long-Term Management of Canada's Used Nuclear Fuel – Annual Report 2007
- » NWMO TR-2008-02: No-Effect Concentrations for Screening Radiological Impacts on Non-Human Biota
- » NWMO TR-2008-03: DECOVALEX THMC TASK E – Implications of Glaciation and Coupled Processes
- » NWMO TR-2008-04: Preliminary Results of One-Dimensional Consolidation Testing on Bentonite Clay-Based Sealing Components Subjected to Two Pore-Fluid Chemistry Conditions
- » NWMO TR-2008-05: Triaxial Characterization of Light and Dense Backfill to Determine Properties for Use in Numerical Modelling
- » NWMO TR-2008-06: The Effects of Initial Conditions and Liquid Composition on the One-Dimensional Consolidation Behaviour of Clay-Based Sealing Materials
- » NWMO TR-2008-07: Theory Manual for Copper Corrosion Model in Sedimentary Rock
- » NWMO TR-2008-09: Preliminary Microbial Analysis of Limestone and Shale Rock Samples
- » NWMO TR-2008-10: Technical Implications of Reactor Refurbishment and New Nuclear Build on APM
- » NWMO TR-2008-11: The Effect of Intermediate Dry Densities ($1.1\text{--}1.5\text{ g/cm}^3$) and Intermediate Porewater Salinities ($60\text{--}90\text{ g NaCl/L}$) on the Culturability of Heterotrophic Aerobic Bacteria in Compacted 100% Bentonite
- » NWMO TR-2008-12: The Effect of High Chloride Concentration on Stress Corrosion Cracking Behaviour of Copper
- » NWMO TR-2008-13: Modelling the Compliance of Swelling Clay Sealing Systems: In-Floor Borehole and Horizontal Borehole Numerical Simulations
- » NWMO TR-2008-14: Developing a Reasoned Argument that No Large-Scale Fracturing or Faulting Will Be Induced in the Host Rock by a Deep Geological Repository
- » NWMO TR-2008-15: Review of Satellite, Airborne and Surface Based Geophysical Tools
- » NWMO TR-2008-16: The Role of Rock Engineering in Developing a Deep Geological Repository in Sedimentary Rock
- » NWMO TR-2008-17: URL Excavation Design, Construction and Performance
- » NWMO TR-2008-18: Nuclear Fuel Waste Projections in Canada – 2008 Update
- » NWMO TR-2008-19: The Role of Dissolved Hydrogen on the Corrosion/Dissolution of Spent Nuclear Fuel
- » NWMO TR-2008-20: The Effects of Fluid Composition on the One-Dimensional Consolidation Behaviour of Clay-Based Sealing Materials

- » NWMO TR-2008-21: Stress Corrosion Cracking Behaviour of Copper in Acetate Solutions
- » NWMO TR-2008-22: Watching Brief on Reprocessing, Partitioning and Transmutation-2008
- » NWMO TR-2008-24: Thermal Sensitivity Analyses on Container Spacing and Tunnel Spacing
- » NWMO TR-2009-01: Technical Research and Development Program for Long-Term Management of Canada's Used Nuclear Fuel – Annual Report 2008
- » NWMO TR-2009-03: X-Ray Radiography Techniques for Measuring Diffusive Properties of Sedimentary Rocks
- » NWMO TR-2009-04: Reactive Transport Modelling in Fractured Rock – Redox Stability Study
- » NWMO TR-2009-05: Seismic Activity in Northern Ontario Portion of the Canadian Shield
- » NWMO TR-2009-07: Theory Manual for the Steel Corrosion Model Version 1.0
- » NWMO TR-2009-08: Development of Delayed Hydride Cracking Test Apparatus and Commissioning Tests for CANDU Fuel Bundle Assembly Welds
- » NWMO TR-2009-10: Hydrogeochemistry of Groundwaters at and below the Base of the Permafrost at Lupin: Report of Phase III
- » NWMO TR-2009-11: High Lake Permafrost Comparison Site: Permafrost Phase IV
- » NWMO TR-2009-12: Technical Summary of the Safety Aspects of the Deep Geological Repository Concept for Used Nuclear Fuel
- » NWMO TR-2009-13: Feasibility of Using Geoscientific Criteria for Early Screening of Large Geographic Areas that would be Unsuitable for Safely Hosting a Deep Geological Repository
- » NWMO TR-2009-14: Transport of Used Nuclear Fuel – A Summary of Canadian and International Experience
- » NWMO TR-2009-15: Preliminary Evaluation of the Ultracentrifugation Method for Extraction of Pore Fluids from Sedimentary Rock
- » NWMO TR-2009-18: Sorption in Highly Saline Solutions – State of the Science Review
- » NWMO TR-2009-21: Used Nuclear Fuel Inventory and Transportation Estimates
- » NWMO TR-2009-26: Bentonite and Latex Colloid Migration Experiments in a Granite Fracture on a Metre Scale to Evaluate Effects of Particle Size and Flow Velocity
- » NWMO TR-2009-27: Alpha, Beta and Gamma Dose Rates in Water in Contact with Used CANDU Fuel
- » NWMO TR-2009-28: Application of Numerical Modelling in Choosing Container Spacing, Placement-Room Spacing and Placement-Room Shape for a Deep Geological Repository Using the In-Floor Borehole Placement Method
- » NWMO TR-2009-29: Hydrogen Effects on Carbon Steel Used Fuel Containers
- » NWMO TR-2009-30: Nuclear Fuel Waste Projections in Canada – 2009 Update
- » NWMO TR-2009-31: Coupled Thermal-Hydraulic-Mechanical Modelling of the Canister Retrieval Test
- » NWMO TR-2009-32: Watching Brief on Reprocessing, Partitioning and Transmutation (RP&T) and Alternative Waste Management Technology –

Annual Report 2009

- » NWMO TR-2009-35: Field Measurements of the Transfer Factors for Iodine and Other Trace Elements
- » NWMO TR-2010-01: Technical Program for Long-Term Management of Canada's Used Nuclear Fuel – Annual Report 2009
- » NWMO TR-2010-04: Investigations of Diffusive Transport Processes in Sedimentary Rock
- » NWMO TR-2010-06: The Effect of CaCl_2 Porewater Salinity (50-100 g/L) on the Culturability of Heterotrophic Aerobic Bacteria in Compacted 100% Bentonite with Dry Densities of 0.8 and 1.3 g/cm³
- » NWMO TR-2010-07: Anaerobic Corrosion Studies of Carbon Steel Used Fuel Containers
- » NWMO TR-2010-09: Glaciation Scenario: Groundwater and Radionuclide Transport Studies
- » NWMO TR-2010-10: Glaciation Scenario: Safety Assessment for a Deep Geological Repository for Used Fuel
- » NWMO TR-2010-11: Initial Evaluation of Mechanical Stress Distributions in Spent CANDU Fuel Bundles
- » NWMO TR-2010-12: CANDU Fuel Element Model Development and Sensitivity Study
- » NWMO TR-2010-17: Nuclear Fuel Waste Projections in Canada – 2010 Update
- » NWMO TR-2010-19: The Corrosion of Zirconium Under Deep Geological Repository Conditions
- » NWMO TR-2010-21: Stress Corrosion Cracking of Carbon Steel Used Fuel Containers in a Canadian Deep Geological Repository in Sedimentary Rock
- » NWMO TR-2010-22: Coupled Thermal-Mechanical Modelling of a Deep Geological Repository using the Horizontal Tunnel Placement Method in Sedimentary Rock using CODE_BRIGHT
- » NWMO TR-2010-24: Watching Brief on Reprocessing, Partitioning and Transmutation (RP&T) and Alternative Waste Management Technology – Annual Report 2010

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