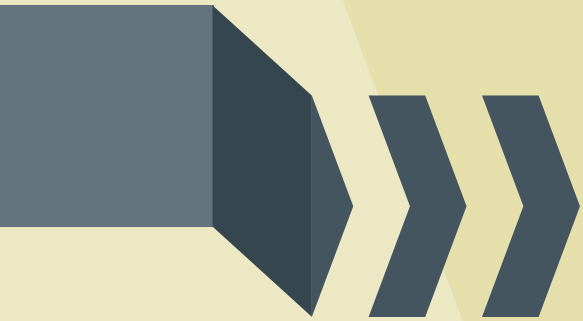


Learning More Together

Annual Report 2011

nwmo

NUCLEAR WASTE MANAGEMENT ORGANIZATION

SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Nuclear Waste
Management Organization

22 St. Clair Avenue East, Sixth Floor
Toronto, Ontario M4T 2S3 Canada
Tel. 416.934.9814 Toll Free 1.866.249.6966
www.nwmo.ca

Learning More Together

Annual Report 2011

nwmo

NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

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

March 2012

Dear Minister,

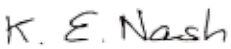
We are pleased to submit to you the annual report of the Nuclear Waste Management Organization (NWMO) for fiscal year 2011.

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

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

Respectfully submitted,

Gary Kugler
Chairman



Ken Nash
President and CEO

Nuclear Waste
Management Organization

22 St. Clair Avenue East, Sixth Floor
Toronto, Ontario M4T 2S3 Canada
Tel 416.934.9814 Toll Free 1.866.249.6966
www.nwmo.ca

Table of Contents

Corporate Overview

NWMO Mandate

The Nuclear Waste Management Organization (NWMO) was established in 2002 by Canada's nuclear electricity producers in accordance with the *Nuclear Fuel Waste Act* (*NFWA*).

Operating on a not-for-profit basis under Part II of the *Canada Corporations Act*, the NWMO is responsible for designing and implementing Canada's plan for the long-term management of used nuclear fuel. Used nuclear fuel is created from the generation of electricity in nuclear power plants.

Ontario Power Generation (OPG), New Brunswick Power Corporation[1] and Hydro-Québec (HQ) are the founding Members of the NWMO, and along with Atomic Energy of Canada Ltd. (AECL), are required to fund the NWMO's operations. The Member corporations provide for the NWMO's operating expenses. The *NFWA* also required

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

the NWMO to establish an Advisory Council whose independent comments on the organization's work are made public.

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

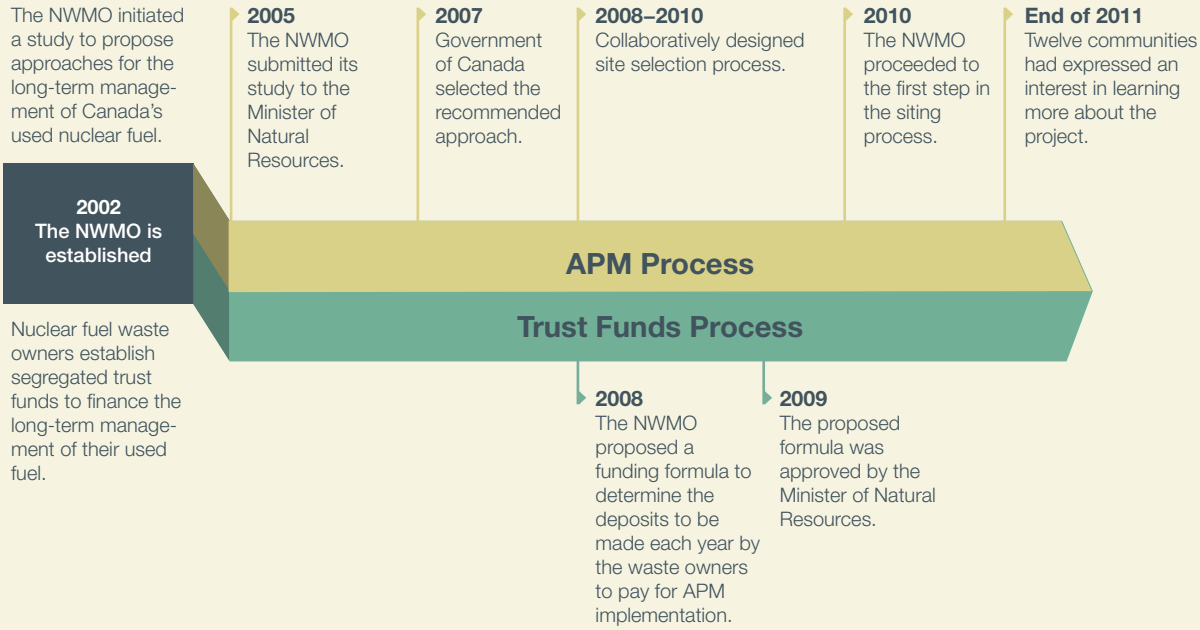
In June 2007, the Government of Canada selected Adaptive Phased Management (APM) as Canada's plan for the long-term management of used nuclear fuel. Technically, APM has as its end point the containment and isolation of used nuclear fuel in a deep geological repository constructed in an appropriate rock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

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

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

The first milestone in implementing APM was the collaborative design of a process to select a site for Canada's used nuclear fuel repository and a Centre of Expertise, as required by APM. This was finalized in 2010, after extensive input from Canadians, and in May of the same year, the NWMO proceeded to the first step in the siting process with a broad program to provide information, answer questions and build awareness among Canadians about APM and the siting process itself.

The site selection process is designed to ensure, above all, that the site which is selected is safe, secure, and located in a willing host community. The process must meet the highest scientific, professional and ethical standards. The safety and appropriateness of any potential site will be evaluated through a series of progressively more detailed scientific, technical and social assessments over a series of steps spanning many years. A robust safety case will



need to demonstrate with confidence that the project can be safely implemented at the site and can meet or surpass the requirements of regulatory authorities.

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

In 2008, as required by the legislation, the NWMO proposed a funding formula to determine the deposits to be made each year by the waste owners to pay for APM implementation. The proposed formula was approved by the Minister of Natural Resources in April 2009. Every year in its annual report, the NWMO specifies the amount each waste owner must deposit for the next fiscal year, along with the rationale by which those respective amounts were calculated.

Used Nuclear Fuel

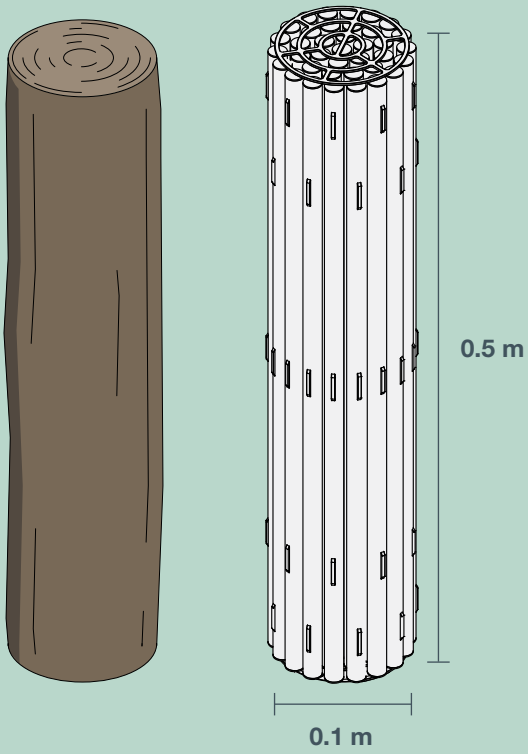
Canada has been generating electricity from nuclear power for almost 50 years. In that time, just under 2.3 million used fuel bundles have been produced. Each fuel bundle is about the size and shape of a fireplace log, with a total weight of approximately 24 kilograms.

After a fuel bundle is removed from a reactor, it is safely managed in facilities licensed for temporary storage at each reactor site. First, it is placed in a water-filled pool for seven to 10 years while its heat and radioactivity decrease. Afterwards, used fuel bundles are placed in dry storage containers, silos or vaults.

About 85,000 used nuclear fuel bundles are generated in Canada each year. Table 1 summarizes the current inventory of nuclear fuel waste in Canada as of June 30, 2011. The inventory is expressed in terms of number of CANDU used fuel bundles and does not include fuel currently in the reactors, which is not considered "nuclear fuel waste" until it has been discharged from the reactors.

Based on about 20 kilograms of heavy metal in a fuel bundle, 2.3 million bundles is equivalent to 46,000 tonnes of heavy metal (t-HM).

CANDU Fuel Bundle



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

>2 million

There are currently just over 2 million used nuclear fuel bundles in Canada. If stacked like cordwood, all this used nuclear fuel could fit into six hockey rinks from the ice surface to the top of the boards. At the end of the planned operation of Canada's existing nuclear reactors, the number of used nuclear fuel bundles will total about 4 million.

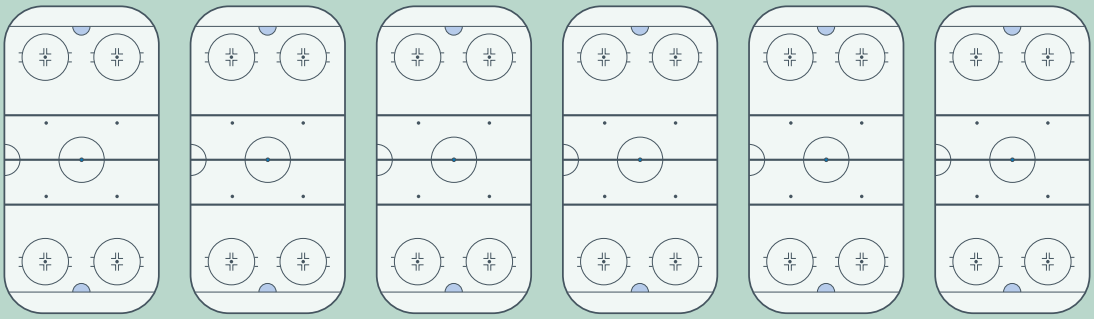


Table 1: Summary of Nuclear Fuel Waste in Canada as of June 30, 2011

Wet Storage — 1,545,642

Owner	Location	Number of Bundles
OPG	Bruce A[2]	361,206
	Bruce B[2]	368,773
	Darlington	334,092
	Pickering A & B	407,280
AECL	Douglas Point	0
	Gentilly-1	0
	AECL Whiteshell	0
	AECL Chalk River	0
HQ	Gentilly-2	33,533
NBPN	Point Lepreau	40,758

Dry Storage — 728,231

Owner	Location	Number of Bundles
OPG	Bruce A[2]	60,288
	Bruce B[2]	175,478
	Darlington	65,631
	Pickering A & B	226,211
AECL	Douglas Point	22,256
	Gentilly-1	3,213
	AECL Whiteshell	2,268
	AECL Chalk River	4,886
HQ	Gentilly-2	87,000
NBPN	Point Lepreau	81,000

= 20,000 bundles

AECL
Atomic Energy of Canada Ltd.

HQ
Hydro-Québec

NBPN
New Brunswick Power Nuclear

NPD
Nuclear Power Demonstration

OPG
Ontario Power Generation Inc.

Total Bundles

2,273,873

Owner	Location	Number of Bundles	Current Status
OPG	Bruce A[2]	421,494	2 units operational, 2 units under refurbishment (expected 2012 return to service)
	Bruce B[2]	544,251	4 units operational
	Darlington	399,723	4 units operational
	Pickering A & B	633,491	A – 2 units operational, 2 units permanently shut down B – 4 units operational
AECL	Douglas Point	22,256	Permanently shut down
	Gentilly-1	3,213	Permanently shut down
	AECL Whiteshell	2,268	Permanently shut down (see note 1)
	AECL Chalk River	4,886	Mostly fuel from NPD (permanently shut down) and with small amounts from other CANDU reactors (see note 3)
HQ	Gentilly-2	120,533	Operational (expected to be shut down for refurbishment in 2012)
NBPN	Point Lepreau	121,758	Currently undergoing refurbishment (expected 2012 return to service)

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

Total of:
- 17 units in operation
- 3 units under refurbishment
- 6 units permanently shut down

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

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.


MISSION
MISSION


s the
management of
s nuclear waste in
spects the
VALUES
The fundamental beliefs that guide us in our work include:
Integrity – We will conduct ourselves with openness, honesty a
respect for all persons and organizations with whom we deal.
Excellence – We will pursue the best knowledge, understan
innovative thinking in our analysis, engagement processes
decision-making.
Engagement – We will seek the participation of all com
interest and be responsive to a diversity of views and p
We will communicate and consult actively, promoting
reflection and facilitating a constructive dialogue.
Accountability – We will be fully responsible for t
and efficient management of resources, and be
our actions.
Transparency – We will be open and transpa
communications and decision-making, so th
to all Canadians.
MISSION
The purpose
develop an
collaborat
management approach for the long-term care
fuel that is socially acceptable, technic
ally responsible and economicall


Accountability
Integrity

Chairman's Message

The NWMO is well on the way to establishing itself as an international leader in planning for the safe stewardship of used nuclear fuel over the long term. Adaptive Phased Management (APM), a plan developed in collaboration with interested Canadians, presents a clear path forward, incorporating the best scientific practices while relying on collaboration with interested communities, specialists and organizations for its implementation. Relationships and community partnerships have acquired even greater importance as the site selection process enters its preliminary stages.

In the years to come, the NWMO's work will increasingly take place at a community level, both with interested communities and those that surround them, with Aboriginal as well as non-Aboriginal communities. Building trust, and doing so in a manner that is both transparent and respectful of communities' values and needs, is vital to the process. Providing communities with information, building their capacity to understand the work and its potential impact on them, placing independent experts at their disposal – all are part of building sustainable relationships and making the siting process one of partnership and collaboration.

Especially vital are our relationships with Aboriginal peoples. These links continue to be a major focus of our engagement activities, and in 2011, they were expanded through liaison agreements with the Assembly of First Nations, as well as Aboriginal organizations in New Brunswick, Ontario and Saskatchewan. The restructuring of the Elders Forum, an advisory body entrusted with helping the NWMO interweave Aboriginal Traditional Knowledge in its work, is also a top priority.

To keep abreast of the latest technical advances, an Independent Technical Review Group (ITRG) conducts annual reviews of our technical program. Likewise, we continue to work actively with a wide range of international

agencies and organizations, including the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD). Scientific exchanges like these, along with our ongoing partnerships with universities and consultants, help ensure that the best available science is being incorporated in the vital areas of repository design, container technology and community engagement.

"Providing communities with information, building their capacity to understand the work and its potential impact on them, placing independent experts at their disposal – all are part of building sustainable relationships and making the siting process one of partnership and collaboration."

The Board of Directors continues to benefit from the expert guidance offered by the Advisory Council. The composition of that Council was reviewed in light of the project's increasing focus on working with interested communities, and Dr. Wesley Cragg, who has an extensive background in business ethics, was recently appointed to the Council. The Honourable David Crombie agreed to serve as the Council's chair for another three years.

In 2011, the NWMO also completed a five-year review of the APM cost estimate, which provided a basis for financial planning. Trust fund deposits being made by Members will be adjusted to meet the future needs of implementing APM. An independent auditor, Deloitte & Touche LLP, conducted an audit of the organization's finances.

Implementing APM will be a long process. At each step along the way, the NWMO is committed to working collaboratively with interested communities, Aboriginal peoples, the public at large and specialists. Working together, we can be assured that Canada's used nuclear fuel will be cared for over the long term in a way that protects humans and the environment.

Gary Kugler
Chairman

President's Message

The year 2011 was one of significant progress for the NWMO. The siting process moved forward, with 12 communities publicly stating an interest in learning more about Adaptive Phased Management (APM). Expanded engagement activities, with interested communities, Aboriginal peoples, municipal organizations, and government officials, helped grow our relationships with each of these groups. Work has also begun on reaching out to and involving people living in the areas surrounding interested communities. The technical program completed conceptual designs for repositories in both crystalline and sedimentary rock formations, and produced associated cost estimates. Our contract with Ontario Power Generation (OPG), to seek regulatory approvals for a deep geologic repository for low and intermediate level waste near Kincardine, Ontario, achieved a major milestone with the submission of all materials required to support OPG's application for a Site Preparation and Construction Licence.

Much work was done in 2011 to support the implementation of the nine-step process for selecting a location for a deep geological repository for used nuclear fuel. By year-end, a total of 12 communities had publicly expressed an interest in learning more about the project. The NWMO *Learn More Program* is aimed at providing communities the resources and opportunities to understand APM, used nuclear fuel and Canada's plan for the long-term management of that fuel. Activities in 2011 included a series of open houses held in several of the communities where local citizens directly interfaced with NWMO staff to learn about the project. There were also meetings between community members and staff from the Canadian Nuclear Safety Commission (CNSC) to learn about the strict regulatory standards and processes in place to protect people and the environment. The NWMO also conducted

initial screenings to determine if there were any obvious conditions not to continue dialogue with the community. Towards year-end, discussions were initiated with several communities on their potential interest in desktop feasibility studies to be initiated in 2012.

The NWMO continued to engage Federal and Provincial governments. We arranged information sessions on a range of topics related to APM, including transportation. We also continued to receive valuable guidance from our forum of Aboriginal Elders and our forum of leaders from Municipal Associations.

"By year-end, a total of 12 communities had publicly expressed an interest in learning more about the project."

A key milestone in 2011 was the completion of conceptual designs for repositories in both crystalline and sedimentary rock formations incorporating technological advances that have occurred in Canada and through our agreements with similar organizations to the NWMO in Sweden, Finland, France and Switzerland. These updated designs will form the basis for the submission of postclosure safety assessment to the CNSC during 2012 and the pre-project review for conformance with regulatory expectations. The NWMO also used these designs as a basis for the updated cost estimate for the long-term management of Canada's used nuclear fuel. These estimates will form the basis for determining the contribution to the *Nuclear Fuel Waste Act (NFWA)* trust funds to ensure that those that produce nuclear generated electricity pay for the long-term cost of used fuel management.

The Independent Technical Review Group (ITRG), comprising experts from several countries, conducted its annual review of the NWMO's technical program and provided a positive report. In particular, they noted key areas of innovative work on repository technology development, including copper coating technology for used fuel containers.

Work toward a separate deep geologic repository for low and intermediate level waste entered a new phase with the submission of supporting documents for OPG's application for a site preparation and construction licence for a proposed facility to be located near Kincardine, Ontario. This submission to the CNSC for a Joint Review Panel for the project was prepared as part of the NWMO's service agreement with OPG. Detail design activities and field tests were also carried out in preparation for eventual construction, subject to a site preparation and construction licence being granted to OPG by the Joint Review Panel.

The NWMO continued to develop its organizational capability to meet a growing and increasingly complex work program. During 2011, staff levels were increased by 20% to 132, and plans were established to continue to make similar progress in future years to ensure that capabilities are in place both in the short and long term.

We also continue to engage interested organizations through ongoing briefings, and to engage interested Canadians more broadly through our website and printed materials to help them learn about, review, and refine, as needed, APM and the site selection process.

The NWMO remains committed to fulfilling the expectations of Canadians that nuclear fuel waste be safely managed in a manner that meets or exceeds all applicable regulatory standards and requirements for protecting the health, safety and security of humans and the environment, now and in the long term.

K. E. Nash

Ken Nash
President and CEO

Our Work

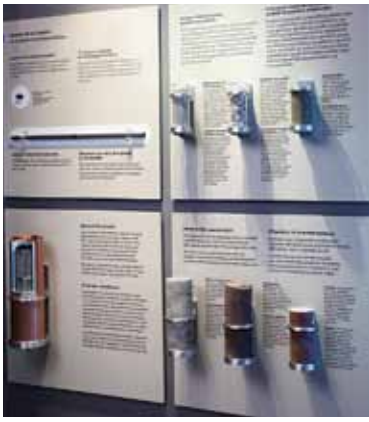
The NWMO is responsible for implementing Adaptive Phased Management (APM) – Canada's plan for the long-term management of used fuel produced by Canadian nuclear electricity generators. The NWMO is committed to carrying out its work collaboratively with interested and affected citizens and organizations in a manner that is socially acceptable, technically sound, environmentally responsible and economically feasible.


nwmo
Moving Forward Together
Triennial Report
2008 to 2010
nwmo
Implementing Adaptive Phased Management 2012 to 2016
OCTOBER 2011

The NWMO's work in 2011 was guided by seven strategic objectives previously identified in collaboration with interested Canadians. It is against these that the organization reports on its activities for the year:

1. **Building Sustainable Relationships**
2. **Collaboratively Implementing the Site Selection Process**
3. **Optimizing Repository Designs and Further Increasing Confidence in Safety**
4. **Providing Financial Surety**
5. **Adapting to Change**
6. **Ensuring Governance and Accountability**
7. **Building and Sustaining a High-Performing Organization**

In addition to implementing APM, the NWMO has a services contract to develop and license a proposed deep geologic repository for low and intermediate level waste owned by Ontario Power Generation (OPG). This work, which is separate from APM, is also profiled in our annual report.



2011 – At a Glance

Building Sustainable Relationships	The NWMO's ongoing dialogue with the Canadian public was complemented by a new series of initiatives to enhance our engagement activities with Aboriginal peoples, federal and provincial agencies, and municipal organizations.
Collaboratively Implementing the Site Selection Process	Collaboration in the siting process was fostered by actively seeking input from interested communities, and by making that process flexible and adaptive to local needs.
Optimizing Repository Designs and Further Increasing Confidence in Safety	Two different conceptual designs for deep geological repositories for used nuclear fuel – one in crystalline rock and the other in sedimentary rock – were completed along with associated cost estimates.
Providing Financial Surety	The costs, present and future, of safely managing used nuclear fuel continued to be borne by those who produce it, as mandated under the *Nuclear Fuel Waste Act*.
Adapting to Change	In implementing APM, the NWMO continued to adapt its processes and plans in response to changing knowledge and societal expectations.
Ensuring Governance and Accountability	Multiple layers of oversight and peer review helped ensure that the NWMO's work was both transparent and guided by the latest scientific advances.
Building and Sustaining a High-Performing Organization	The NWMO's staff grew from 110 to 132, giving the organization the depth and expertise it needs to manage a growing and increasingly complex workload.

Additional Work

The NWMO prepared an Environmental Impact Statement, Preliminary Safety Report and other documents for OPG's proposed deep geologic repository for the long-term management of low and intermediate level waste from OPG-owned or -operated reactors. OPG submitted these documents to the Canadian Nuclear Safety Commission (CNSC) in support of an application for a Site Preparation and Construction Licence for the project. The NWMO also entered into an Engineering Procurement and Construction Management agreement with OPG to provide design and construction management services for the proposed repository.

Building Sustainable Relationships

STRATEGIC OBJECTIVE

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

Adaptive Phased Management (APM) will be implemented over many decades and will involve generations to come. Its success depends on the NWMO's building and sustaining relationships that will support and direct implementation well into the future. 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.

Throughout 2011, the NWMO was active in engaging and building relationships with communities that were interested in learning more about the APM siting process. These activities are described in the next section (*Collaboratively Implementing the Site Selection Process*).

With the initiation of the site selection process, the NWMO's engagement and relationship-building activities are increasingly focused on the groups and interested individuals whose input and participation are vital to successfully implementing APM. In addition to engaging with interested communities, the NWMO also concentrated on:

1. **Involving Aboriginal organizations and municipal associations;**
2. **Strengthening relationships with federal and provincial governments, and briefing ministry staff to ensure that they are prepared to address inquiries and policy questions from interested communities;**
3. **Engaging with young Canadians on this important long-term issue; and**
4. **Continuing to communicate to the Canadian public about the NWMO's work.**

1. Involving Aboriginal Organizations and Municipal Associations

National and Provincial Aboriginal Organizations

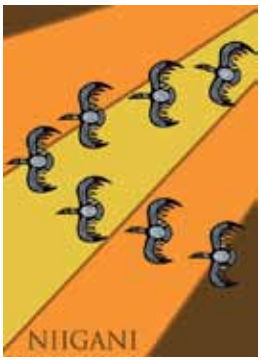
Over the past several years, the NWMO has built on valuable relationships developed with National and Provincial Aboriginal organizations, and has sought to develop agreements appropriate to each group. These agreements are designed to support broad-level Aboriginal involvement and capacity building at each stage of APM, and each reflects the unique needs, priorities, and cultural and political protocols of the individual Aboriginal organization. In 2011, the NWMO continued to keep these organizations informed and involved by providing updates and information sessions to organization executives, senior staff members, community

representatives and members. The information sessions were designed by individual Aboriginal organizations, with the NWMO providing presentations and information.

In some cases, the NWMO has supported working groups to learn more about the APM project; in other cases, it has entered agreements to share information with each other on traditional indigenous laws and the project. In all cases, the objective has been to try addressing the concerns and questions people have.

NWMO staff also attended Aboriginal trade shows, where they explained APM and encouraged input from attendees.

Elders Forum and Niigani



The NWMO continued to seek the advice of the Elders Forum. The Forum met twice in 2011, in July and then again in November. The restructuring of the Elders Forum was the primary focus of discussion through the year, following broad agreement, among members, the NWMO, and the Advisory Council, that the Forum needs to be restructured so as to be better aligned with the NWMO's future work. A draft Terms of Reference was developed reflecting advice received from National Aboriginal organizations and institutions, as well as the Elders Forum itself. The groups consulted included the Assembly of First Nations, the Native Women's Association of Canada, the Truth and Reconciliation Commission of Canada, the Aboriginal Healing Foundation, the Federation of Saskatchewan Indian Nations, and the First Peoples Group.

The draft Terms of Reference will be amended based on further feedback from Elders and Aboriginal organizations. The NWMO has begun the process of re-establishing the Elders Forum based on the new Terms of Reference.

The NWMO has been fortunate to have had the benefit of the wisdom of Elders and looks forward to meeting with a restructured forum of Elders in the near future.

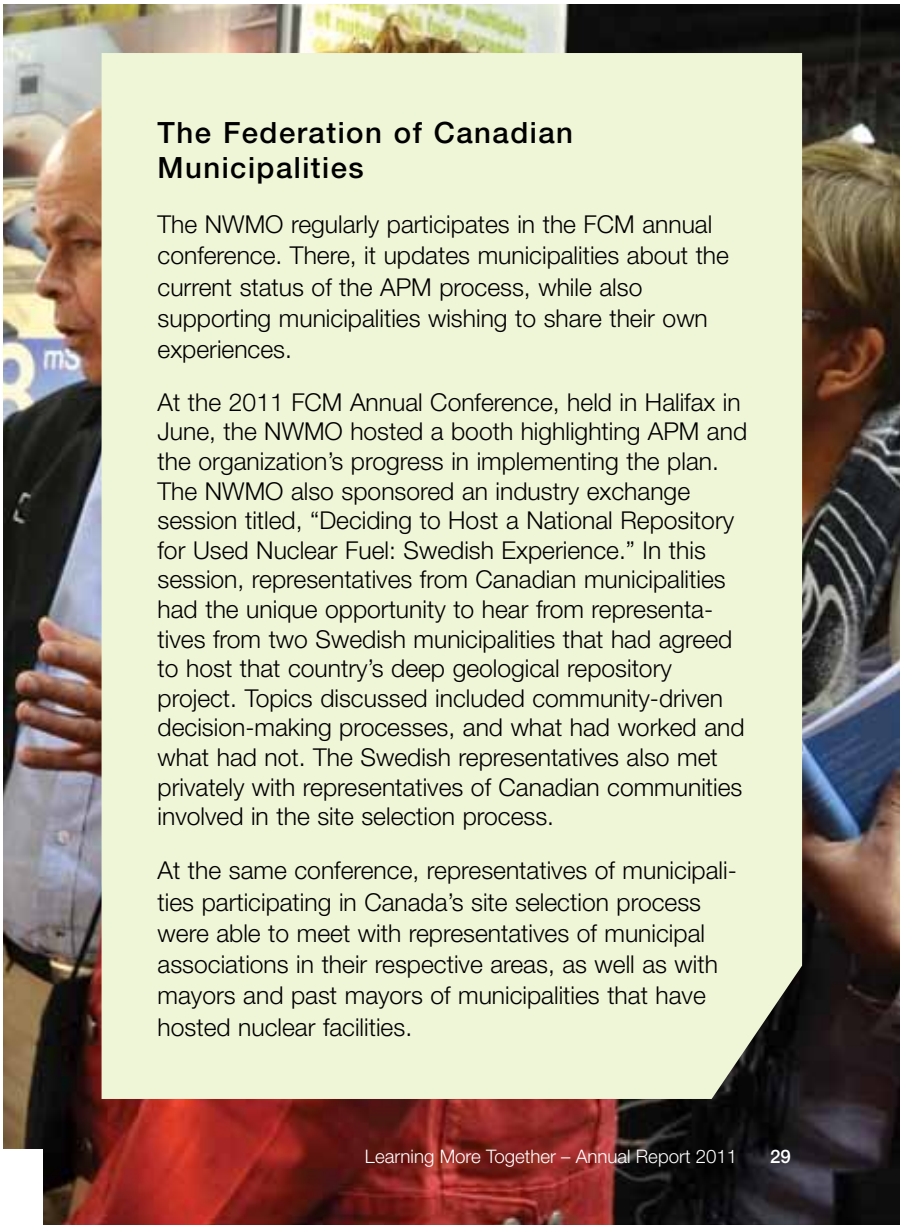
Incorporating Aboriginal Traditional Knowledge

Incorporating Aboriginal Traditional Knowledge in APM remains a high priority for the NWMO, especially as the organization engages local Aboriginal communities in the siting process. Toward this end, the NWMO conducted cultural training for its staff in December 2011. Among the topics covered were traditional practices and protocols, and the history of Ontario's First Nations.

Involving Municipal Associations

The Municipal Forum, established in 2009 by the NWMO with the support of the Federation of Canadian Municipalities (FCM), met three times in 2011. With their collective municipal experience and understanding of local, rural and urban issues, the Forum members provided valuable insights into communicating and working with municipalities. The Forum also continued to function as an effective link to municipal associations and their membership, which includes hundreds of large and small municipal entities.

The NWMO participated in more than 20 conferences addressing municipal issues. The sponsors of these conferences included economic development associations, the Canadian Association of Nuclear Host Communities, and municipal associations from Ontario, Saskatchewan and New Brunswick.



The Federation of Canadian Municipalities

The NWMO regularly participates in the FCM annual conference. There, it updates municipalities about the current status of the APM process, while also supporting municipalities wishing to share their own experiences.

At the 2011 FCM Annual Conference, held in Halifax in June, the NWMO hosted a booth highlighting APM and the organization's progress in implementing the plan. The NWMO also sponsored an industry exchange session titled, "Deciding to Host a National Repository for Used Nuclear Fuel: Swedish Experience." In this session, representatives from Canadian municipalities had the unique opportunity to hear from representatives from two Swedish municipalities that had agreed to host that country's deep geological repository project. Topics discussed included community-driven decision-making processes, and what had worked and what had not. The Swedish representatives also met privately with representatives of Canadian communities involved in the site selection process.

At the same conference, representatives of municipalities participating in Canada's site selection process were able to meet with representatives of municipal associations in their respective areas, as well as with mayors and past mayors of municipalities that have hosted nuclear facilities.

2. Strengthening Relationships With Federal and Provincial Governments

By building and strengthening relationships with representatives of provincial and federal governments, the NWMO fosters greater understanding of the organization's work and facilitates the exchange of information. Since APM touches on the mandates of numerous government departments, the NWMO's practice has been to identify a lead ministry as the primary point of contact. To maximize linkages related to the long-term management of used nuclear fuel, the NWMO also encourages coordination of engagement across relevant ministries and across various levels of management in the public service. In addition, NWMO staff continued to keep elected representatives informed about APM and offer briefings to build understanding of the site selection process.

Canadian Nuclear Safety Commission

The NWMO laid the groundwork for an agreement for a federal-provincial working group on transportation, with the Canadian Nuclear Safety Commission (CNSC), Transport Canada and several provincial ministries agreeing to participate. The NWMO's technical staff met twice with the CNSC, briefing its staff on such topics as the development and design of a deep geological repository, initial screenings, feasibility studies and community engagement. In December, NWMO technical staff submitted an interim pre-project report on conceptual repository design and safety for review.

Youth and the NWMO's Corporate Social Responsibility Program (CSRP)

Founded in 2008, the CSRP contributes to national organizations reflecting the NWMO's interest in increasing youth involvement in science and technology. Under the auspices of Youth Science Canada, the NWMO again sponsored Team Canada at the MILSET[1] Expo-Sciences International, a non-governmental, non-profit, and politically independent youth organization that aims to develop a scientific culture among youth by fostering networking and international collaboration. The NWMO also operated a trade show booth at the 2011 Canada-Wide Science Fair, another initiative of Youth Science Canada.

In addition, the CSRP has since 2009 been making annual financial contributions to the Shad Valley program, an intensive one-month university-based development program for high-achieving secondary school students with strong academic records. The four-week program exposes students to topics of study related to science, engineering, mathematics, technology, business, entrepreneurship and innovation.

Approximately 85% of Shad Valley graduates study math, sciences, engineering, medicine and related disciplines at the post-secondary level. Shad Valley integrates many separate streams of subjects and helps students hone their abilities, most notably in teamwork, creative problem solving and effective communication.

[1] International Movement for Leisure Activities in Science and Technology

ABOVE: Team Canada participated in the 13th edition of the MILSET Expo-Sciences International held from July 18 to July 23, 2011.

3. Engaging With Young Canadians

The long timeline for implementing APM makes youth involvement critical for its success. Engaging young people helps ensure that future generations have the knowledge base to make informed decisions as APM evolves.

In 2011, nearly 700 students, from elementary as well as high schools, attended information sessions offered by NWMO staff in potential host communities. In these sessions, they learned more about APM and had their questions answered.

At the post-secondary level, NWMO staff were invited to conduct seminars at six post-secondary institutions (University of Toronto Scarborough, Ryerson, Queen's, Guelph, Lakehead and Durham). The NWMO also hired two engineering students as part of its cooperative education program.

4. Continuing to Communicate to the Canadian Public About the NWMO's Work

In 2011, the NWMO's Communications group continued to design and deliver outreach materials and programs for individuals, organizations, communities and the media.

As more communities expressed interest in learning about Canada's plan for managing used nuclear fuel, the Communications group provided information kiosks installed in public locations like town halls and community centres. The stands were stocked with key NWMO documents, backgrounders and DVDs, and included an interactive video monitor offering information on subjects like the nuclear fuel cycle and transportation of used nuclear fuel. In addition to kiosks, communities engaged in the *Learn More Program* (see *Collaboratively Implementing the Site Selection Process*) were provided with document stands offering interested visitors a selection of printed materials. Communities were also provided communication advice and support, including provision of draft news releases and web materials.

The Communications group organized and advertised open houses in communities for which initial screenings were completed during the year. In these sessions, community members met with technical and social research staff who heard their concerns and answered questions about APM and the site selection process.

The NWMO website was continually updated throughout 2011, and as in previous years, the draft five-year implementation plan (for 2011 to 2015) was posted for public comment (see *Adapting to Change*). Efforts were made to provide access to presentations and other materials used at conferences and seminars for interested people unable to attend. A record number of video presentations was made available. Among these were a session at the FCM conference involving municipal representatives from Sweden who had completed a siting process for a deep geological repository, and a series of technical workshops delivered by NWMO staff at the Canadian Nuclear Society (CNS) Conference on Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities. As always, all of the organization's discussion documents, technical and social research reports, and Board and Advisory Council minutes were posted on the website. To further enhance web-based engagement with Canadians, a consultant was hired to help develop a social media strategy.

Newsletters were published over the year and distributed electronically, at public sessions and to NWMO mailing list subscribers. The NWMO maintained an information booth presence at a range of conferences and trade shows, providing interested visitors with copies of documents and reports, and responding to questions about the organization's work.

Significant work was done with the media to broaden knowledge about the NWMO and its work. Outreach included meetings with editorial boards, reporters and columnists. Interview requests were responded to from print, radio, television and web-based outlets. Also in 2011, the NWMO Communications group hosted the first of a planned series of information days for local and regional media serving communities that have expressed interest in learning about APM. Reporters were briefed by NWMO staff with the same information and material given to community representatives, including a tour of a current nuclear waste management facility, plus a separate briefing provided by the CNSC.

The NWMO continued to participate in national and regional environmental initiatives. As part of these initiatives, 53 NWMO employees participated in Pollution Probe's Clean Air Commute for 2011, sparing the air 1.7 tonnes of pollution.

Collaboratively Implementing the Site Selection Process

STRATEGIC OBJECTIVE

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

The site selection process for Canada's used nuclear fuel repository and Centre of Expertise was developed collaboratively with Canadians through a two-year dialogue conducted between 2008 and 2010. The site selection process lays out a nine-step road map for decision-making and for identifying an informed and willing host community for this national infrastructure project. The site selection process was designed to reflect the ideas, experience and best advice of the broad cross-section of Canadians who participated in dialogues and who shared their thoughts on what an open, transparent, fair and inclusive process for making this decision would include. As a road map for decision-making that will span 10 years or more, it is understood that continuous learning, learning through doing, and adaptation are important features of the process. The site selection process was initiated in May 2010, and 2011 marks the first full year of its implementation.

Because the process is designed to be flexible and because it encourages individual communities to proceed at a pace and in a manner reflecting their needs and preferences, the year's end saw interested communities at different steps in the process. A total of 10 had entered Step 2 by requesting briefings and initial screenings from the NWMO. In Saskatchewan, these were Creighton, English River First Nation and Pinehouse. In Ontario, these were Ear Falls, Hornepayne, Ignace, Nipigon, Red Rock, Schreiber and Wawa.

Following an initial screening, Red Rock was removed from further consideration as its geological characteristics did not appear suitable for the project.

Creighton, Hornepayne, Ignace, Schreiber and Wawa elected to move into Step 3 in 2011 by formally requesting a feasibility study to be initiated. Since that time, other communities have also entered Step 3 of the site selection process.

Steps in the Siting Process

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 in May 2010).** 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 that successfully complete an initial screening, 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	**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 an 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.** The implementation of the deep geological repository will be regulated under the *Nuclear Safety and Control Act* 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.** 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 deep geological repository and associated facilities.** 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.

Building Awareness

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 in May 2010). Awareness-building activities will continue throughout the full duration of the siting process.

Building awareness is Step 1 in the nine-step siting process. At the same time, it is also meant to continue over all nine steps. In 2011, the NWMO continued work initiated in 2010 to provide opportunities for interested individuals, organizations and communities to learn more about Canada's plan, the activities of the NWMO, and the process it will use to select an informed and willing community for Canada's used nuclear fuel repository and Centre of Expertise. Individuals, organizations and communities interested in learning more were invited to contact the NWMO to receive a package of information and/or to schedule a briefing in order to learn more. In this very early stage of the site selection process, interested individuals, organizations and communities that contacted the NWMO did so in confidence and without obligation, and so their names are not published here. All information shared during these initial contacts and briefing sessions is published on the NWMO website at www.nwmo.ca/sitingprocess_theprocess. Visitors to the NWMO website were invited to review this material, scrutinize it for accuracy, and join the discussion through sharing comments and introducing questions.

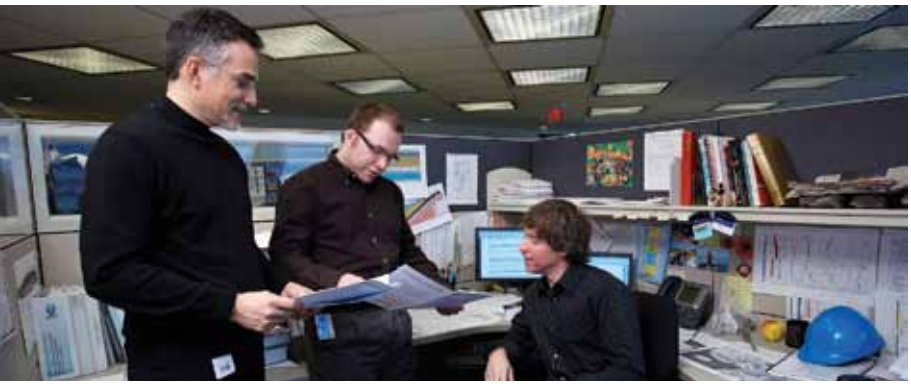
The relationship-building and communications activities described in the previous section, *Building Sustainable Relationships*, played a key role in building awareness of the NWMO's activities and recent developments in the siting process.

Learning More and Initial Screening

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.

By the end of 2011, 10 communities had formally entered Step 2 in the siting process. As part of Step 2, communities that express interest in learning more about Canada's plan for the long-term management of used nuclear fuel, the activities of the NWMO and the site selection process were invited to contact the NWMO and participate in a range of activities. These activities centre on learning and include an initial screening to provide preliminary insight on the potential suitability of the community against a list of initial screening criteria using readily available information.



Activities Supported by the NWMO *Learn More Program*

- **Learn More About Adaptive Phased Management (APM).** 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.
- **Visit an 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.
- **Develop or Refine 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.
- **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.

Initial Screenings

Initial screenings were an important activity in 2011. The screenings' objective was to determine very early in the community's involvement whether, based on readily available information and five screening criteria, there are any obvious conditions that would exclude the community from further consideration in the site selection process.

The five screening criteria require that:

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

The NWMO commissioned third-party firms to conduct the initial screenings and prepare reports that outline the findings. If the initial screening is successful and the community chooses to continue to explore its potential interest in the project, the area will be the subject of progressively more detailed assessments against both technical and social factors to confirm the suitability of the community in subsequent steps of the site selection process. Several years of studies would ultimately be required to confirm whether a site within an area could be demonstrated to safely contain and isolate used nuclear fuel.

By the end of 2011, 10 initial screenings were completed. As a result of these preliminary screenings, one community was removed from further consideration as its geological characteristics did not appear suitable for the project. Additional screenings, in addition to the 10 already mentioned, are underway at the request of individual communities. Screening reports are available on the NWMO website at www.nwmo.ca/sitingprocess_learnmore.

The NWMO's *Learn More Program*: Early Steps

Communities expressing an interest in learning more about APM participate in an initial briefing with the NWMO, and a tour is organized of an interim storage facility for used nuclear fuel. Communities are also encouraged to contact the Canadian Nuclear Safety Commission (CNSC) for an independent meeting with the regulator to learn about (a) the regulatory framework that will govern the project; and (b) the regulatory body itself.

To ensure that communities participating in the early steps of the site selection process do not have to do so out of pocket, the *Learn More Program* offers them resources in the form of information and funding (see *Activities Supported by the NWMO* Learn More Program). In the early months of engaging with the NWMO on the site selection process, interested 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, 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 additional initiatives were launched:

- **Travel expenses associated with a visit to the CNSC:** Communities are encouraged to learn more about the regulatory framework governing the long-term management of used nuclear fuel by meeting with the CNSC. The timing and agenda for the meeting is established directly by the CNSC in concert with the community, in order to ensure the community's areas of interest and questions are addressed. The NWMO is informed once the meeting has taken place and reimburses the travel expenses of community representatives associated with attendance at the meeting, consistent with the NWMO participant expense guidelines.

- **Administrative expenses associated with the *Learn More Program*:** Some communities have indicated they require support to coordinate the activities as outlined in the *Learn More Program*. In order to address this need, upon request resources are made available to communities for expenses incurred through considering the project at Step 2 in the site selection process (12-month period). This may include costs associated with a community working group, travel expenses for meetings with surrounding communities or region, and professional fees or part-time staff resource support. Use of the funds is subject to third-party audit.
- **NWMO-initiated meetings:** The NWMO may also initiate meetings for which modest participant expenses are covered, consistent with NWMO participant expense guidelines.

Through the *Learn More Program*, community delegations also received support to attend the Federation of Canadian Municipalities (FCM) Annual Conference. Additionally, some 50 community delegates received funding to attend the Canadian Nuclear Society (CNS) Conference on Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities.

Uptake of the *Learn More Program* features differed by community, consistent with the principle that communities should explore the project at a pace and in a manner that suit their individual needs. Step 2 activities are continuing into 2012 and will be carried over to support communities wishing to proceed to the next steps in the process. Program elements which involved direct learning were used by all communities. This included activities such as visiting an interim storage facility to see how used nuclear fuel is currently managed, receiving a briefing from NWMO staff in various expertise areas, and meeting with the CNSC. Meet the NWMO open houses and the facilitated learning events described above were also accessed by all communities for very similar reasons.

RIGHT: Community representatives interested in learning more about APM tour interim storage facilities for used nuclear fuel at the Pickering Nuclear Generating Station.

Meet the NWMO Open Houses

ABOVE: Attendees at an open house sponsored by the NWMO are given a virtual tour of the proposed deep geological repository.

In each instance where the initial screening criteria were met, the results were first presented to the local council, followed by an open house a few weeks later for all interested community members. These community visits, each lasting several days, took place between April and November 2011, and took the form of open houses, school visits and presentations to individual groups (most notably local councils, tourist operators, seniors and business people).

The activities were supported by information kiosks, videos, poster boards and written documents, available in English and French. DVDs and translated documents were also available in Aboriginal languages. Interested citizens had the opportunity to tour an interactive exhibit addressing subjects such as radiation, current arrangements for handling used nuclear fuel, the rationale behind APM, transportation issues, the siting process, and potential impacts on the eventual host community. NWMO staff answered a wide range of questions from citizens, who were encouraged to give their contact information so that they could continue to receive updates and additional information about the APM process.

The NWMO also held a one-day open house in Nipigon in December. This was made at the request of the mayor and council, and it occurred prior to the completion of an initial screening. The purpose was to explain the project and the siting process to interested citizens and potentially affected people in neighbouring communities.

Input at Information Sessions

Most of the people who visited the NWMO's information sessions reported that the information provided was helpful, and so was the opportunity to ask questions and speak directly with NWMO staff. Key points of conversation are outlined in the following table and provide some sense of how community residents have begun to learn about the project, along with the questions and concerns that were most important to them.

What Attendees Wanted to Know More About

Health and Safety

What is radiation; how does it affect people's health? How long is used nuclear fuel hazardous to people and the environment?

Visitors were interested in components of the NWMO exhibit that discuss radiation, show that it is all around us, and explain the technology that keeps it from harming people and the environment.

How can we be sure this is safe? Will drinking water be contaminated and/or will birds, plants and animals be harmed?

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

Adaptive Phased Management

How was APM selected as Canada's plan? Were other approaches considered, and why were they not selected?

Visitors were interested to hear about the research behind APM and the public input that is crucial to its values, objectives and implementation.

Used Nuclear Fuel

What is used nuclear fuel?

Visitors who had assumed that used nuclear fuel is liquid were reassured to learn that it is a solid and that it is encased in a reinforced bundle.

Project Timelines

Has the site been selected already? How quickly will decisions be made about the community and site for the deep geological repository?

Visitors were interested to learn that (a) the site selection process is a long and deliberate one; (b) decisions will not be made for many years; (c) the time will be taken for the community to thoroughly think through its interest in hosting the project; and (d) the time will be taken to rigorously assess the long-term safety of the site.

Decision-Making

Who will make the decisions, and how will citizens/others be involved?

Visitors who worried that they would be excluded from decision-making were reassured to learn they have a critical role in deciding whether the community will proceed.

How will surrounding communities and Aboriginal people be involved?

Visitors were interested to learn the site selection process requires the involvement of surrounding communities and Aboriginal peoples in decision-making.

On what basis are sites selected/disqualified?

Visitors were interested to learn about the detailed safety criteria and testing over many years that will be used to select a site.

Benefits/Impacts of the Project

What kinds of jobs are required for the project? Will workers underground be safe? What types of opportunities are there for small/local business?

Many were interested to learn about the number and types of jobs involved in the project over many decades, and the NWMO's willingness to invest in local training, hiring and procurement.

Impacts on Way of Life

What impacts will this have on our way of life, on the sustainability of our community well into the future, on young people's futures, and on hunting and fishing activities?

Many were interested to hear how the project could be implemented in a way that preserves valued components of community life while providing a foundation for growth.

Deep Geological Repository

How will the used fuel be contained and isolated from the environment? How do the barriers work? How are used fuel containers constructed and sealed?

Visitors were interested to learn about the extensive research, in Canada and abroad, that has gone into establishing the international consensus on best practices to be used.

Transportation

Is transportation safe? How vulnerable is transportation to terrorist attack and accident?

Visitors were interested in the extent of government oversight of transportation, the robustness of containers, and the testing required by Transport Canada and the International Atomic Energy Agency. The video of extreme tests conducted on used fuel containers was found to be especially helpful.

Visitors were interested to know that other countries routinely transport used nuclear fuel safely using a range of transport modes.

Events in Japan

What are the implications of the events in Japan on this project? How does APM address seismicity?

Many were interested to hear about the different approach, circumstances and type of facility involved in the APM project.

Informing Aboriginal Communities

In 2011, the NWMO focused its Aboriginal engagement activities to begin the involvement of local Aboriginal communities in the vicinity of the communities that have expressed an interest in the siting process. The goal of these activities was to inform neighbouring Aboriginal communities about the interest of these communities in learning about the siting process, and to provide the opportunity for information sharing and involvement at the pace they wish from the beginning of the process. In each instance, the NWMO attempted to contact neighbouring Aboriginal communities, along with their relevant Treaty, Tribal, Métis and other affiliated organizations. In these communications, the NWMO (a) noted the interested community's wish to learn more about the siting process; (b) offered to provide updates and further information; and (c) encouraged questions about the process and involvement in it.

During the local information sessions and open houses described previously, extensive use was made of the NWMO's communication materials that have been translated into nine Aboriginal languages.

The NWMO reached out to Treaty organizations and Tribal Councils, and began the process of meeting with them, providing information on APM and the site selection process, and working towards understanding their concerns and the issues of importance to them. Meetings were also held with a number of First Nation and Métis leaders. A member of the NWMO Elders Forum participated in these meetings whenever possible.

Also whenever possible, engagement with Aboriginal communities was built into the community sessions NWMO staff conducted in interested communities. At these sessions, neighbouring First Nation and Métis communities were invited to visit and meet with NWMO staff, and their participation in the process was encouraged. At the same time, staff worked with interested communities to support them in their own engagement activities with neighbouring Aboriginal communities.

ABOVE: Aboriginal youth attend an information session in Pinehouse, Saskatchewan.

Differing Views

The NWMO is involved in an ongoing dialogue with Canadians, and while there is broad agreement on key points, questions and concerns continue to be raised by some. The NWMO recognizes that differences of view will inevitably arise, and that conflict is an opportunity for further dialogue and new thinking and ideas. Responding constructively and respectfully is a challenge the NWMO is committed to meeting. Points of contention include the safety of the transportation of used fuel; appropriate engagement of surrounding communities and Aboriginal peoples; financial surety; the safety of a deep geological repository; and the role of nuclear energy in meeting Canada's energy requirements.

Feasibility Studies: Questions We Ask

1. Safety, security and protection of people and the environment are central to the siting process.
   Is there the potential to find a safe site?

2. The project will be implemented in a way that will foster the long-term well-being of the community.
   Is there the potential to foster the well-being of the community through the implementation of the project, and what might need to be put in place (e.g., infrastructure, resources, planning initiatives) to ensure this outcome?

3. At a later step in the process (Step 5), the community must demonstrate it is informed and willing to host the project.
   Is there the potential for citizens in the community to continue to be interested in exploring this project through subsequent steps in the site selection process?

4. The project will be implemented in a way that will foster the long-term well-being of the surrounding area.
Is there the potential to foster the well-being of the surrounding area and region, and establish the foundation to move forward with the project?

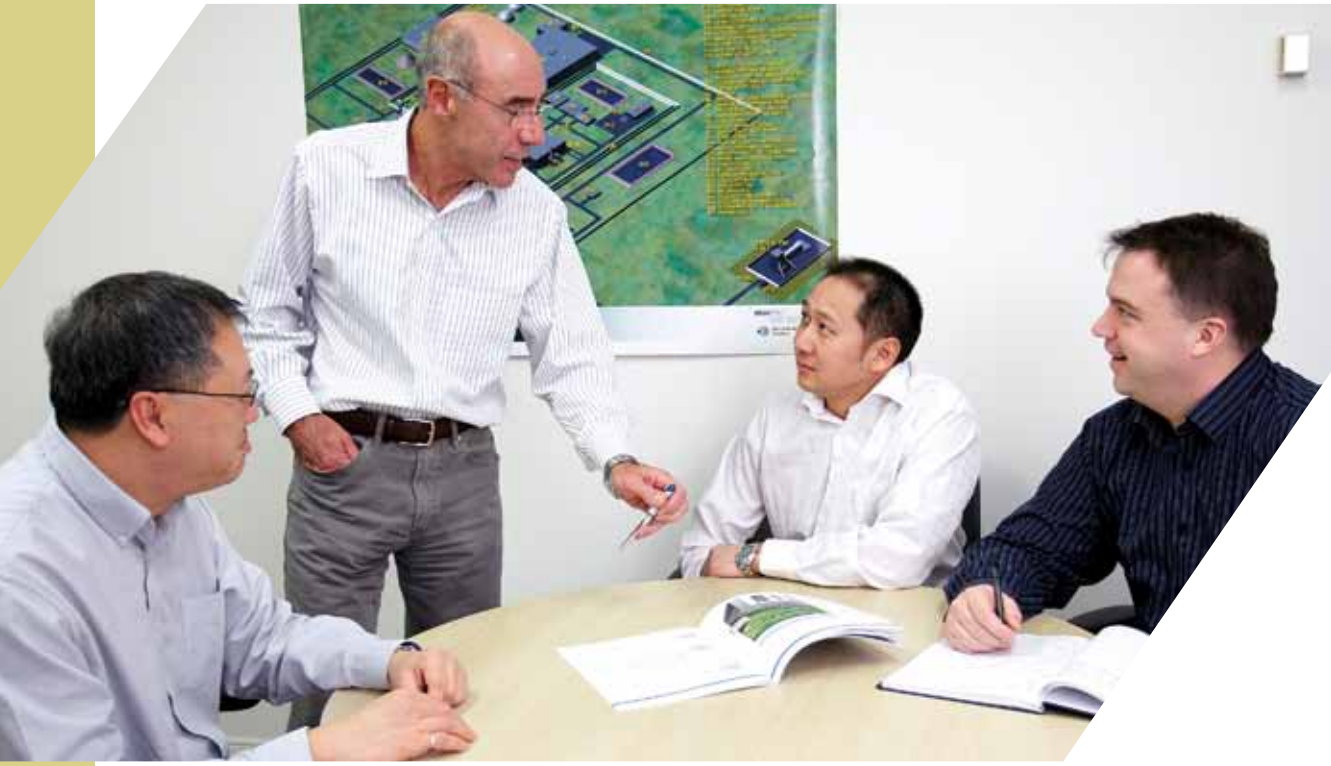
Preparing for Feasibility Studies: The Next Step in the Site Selection Process

In fall 2011, the NWMO conducted briefing sessions with the local council of each of the communities involved in Step 2 of the site selection process to help build understanding of what is entailed in the next step in the site selection process and to help inform the council's decision on behalf of the community on whether to proceed to the next step in the site selection process. As outlined in *Steps in the Siting Process*, communities that have passed an initial screening can request a preliminary assessment of potential suitability (Step 3). At the request of the community, the NWMO will conduct a feasibility study collaboratively with the community to determine whether the project is both safe and suitable for the community.

A two-page information sheet and brochure were prepared and distributed to support these discussions. These materials and additional information packages are published on the organization's website at www.nwmo.ca/sitingprocess_feasibilitystudies.

Feasibility studies are designed as an opportunity for both the community and the NWMO to explore key questions in assessing the community's suitability for hosting a deep geological repository. Feasibility studies will be initiated by the NWMO in 2012.

As of the end of 2011, five communities had requested initiation of feasibility studies.



Optimizing Repository Designs and Further Increasing Confidence in Safety

STRATEGIC OBJECTIVE

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

The NWMO's technical program is fundamental to the successful implementation of Adaptive Phased Management (APM). Canadians expect the approach that has been selected for the long-term management of used nuclear fuel to be based on the most advanced scientific knowledge available, both domestically and internationally. Every year, the organization makes a significant investment to ensure that it has a robust and effective technical research program.

A key goal of the APM technical program is to complete the preliminary designs, cost estimates, research activities and safety cases for a used nuclear fuel deep geological repository. To support this goal, the NWMO is:

1. **Refining the reference designs for a deep geological repository in both crystalline and sedimentary rock;**
2. **Enhancing scientific understanding of processes that may influence repository safety; and**
3. **Maintaining awareness of technological advances and developments, as well as alternative methods for long-term management of used nuclear fuel.**

NWMO/NSERC Scholarships

Seven graduate students from Canadian universities presented their research at the 9th Annual NWMO Geoscience Seminar in June 2011. Their research was focused on further demonstrating applied techniques, the development of new methods for site characterization and the assessment of geosphere stability. The NWMO supported six of these students collaboratively with the Natural Sciences and Engineering Research Council (NSERC) through the Industrial Postgraduate Scholarships Program. The students, pictured from left, were Heather Andres (University of Toronto), Ehsan Ghazvinian (Queen's University), Matthew Perras (Queen's University), Emily Henkemans (University of Waterloo), Joe Saso (University of New Brunswick) and Michael Makahnouk (University of Waterloo). In addition, Magda Celejewski (far right, University of New Brunswick) presented her research on the development of a new extraction method for the chemical characterization of pore fluids in low permeability sedimentary rock.

In 2011, the NWMO completed a number of generic studies on the design, cost and safety of an APM facility. In addition, NWMO staff initiated new work on the detailed design, fabrication and transfer logistics of used fuel containers. Transportation will be an important component of the APM program, and supporting work is underway in transportation safety.

NWMO staff continued to acquire practical experience relevant to deep repositories through their involvement in Ontario Power Generation's (OPG) Deep Geologic Repository Project for Low and Intermediate Level Waste in Kincardine, Ontario.

The technical program for 2011 involved researchers from 14 Canadian universities, contractors, and technical staff from both national and international organizations.

International Collaboration

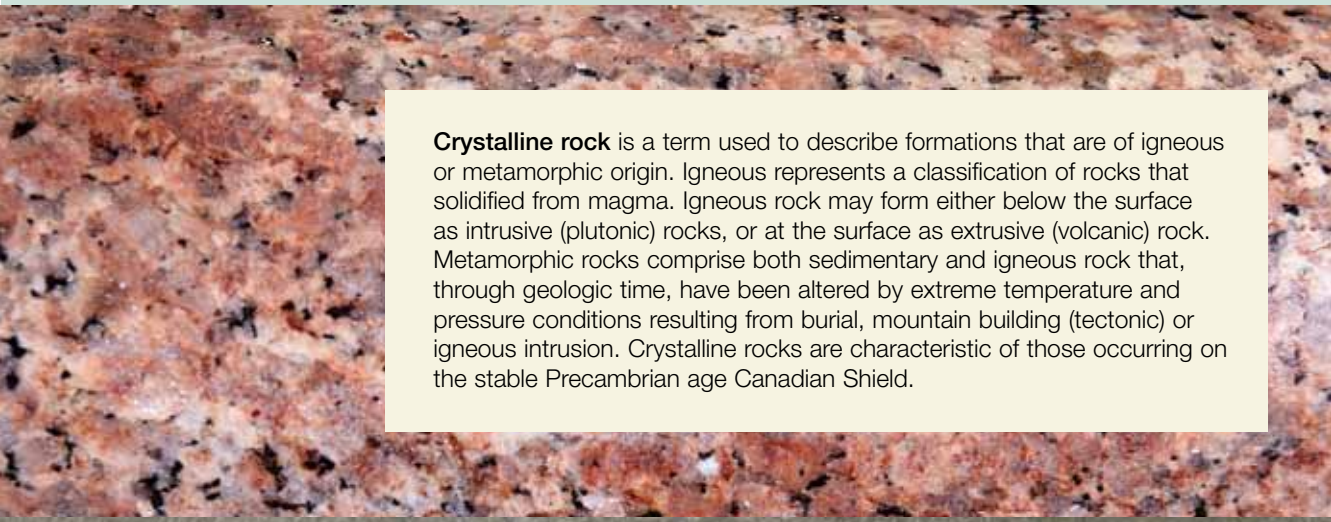
Partnering with other national radioactive waste management organizations allows the NWMO to foster international cooperation on research, development and demonstration of technology, learn from other countries' experience, and keep abreast of developments in repository design and safety case development for various host rock formations.

The Äspö Hard Rock Laboratory Agreement between the NWMO and the Swedish Nuclear Fuel and Waste Management Company (SKB) was renewed in 2011, enabling the NWMO to continue its active participation in joint underground research and demonstration of repository technology in crystalline rock. The NWMO participated in the Task Force on Engineered-Barrier Systems, the Long-Term Test of Buffer Material, and the Large-Scale Gas Injection Test (LASGIT). The NWMO also continued its participation in the Mont Terri Rock Laboratory in Switzerland, which is focused on underground studies and demonstrations of repository technology in sedimentary rock. The NWMO is actively participating in the European Fate of Repository Gases (FORGE) project, a collaborative development and comparison of models for gas transport in field-scale experiments and a generic repository. The NWMO continues to support the Nuclear Energy Agency's (NEA) Thermodynamic Database Project, which is developing a quality-assured database for key elements in radioactive waste management systems. The NWMO is also active in the NEA's Integration Group for the Safety Case, which is in the process of completing a report on current practices for conducting safety assessments. The NWMO is a member of BioProta, an international forum on biosphere modeling for radioactive waste facilities. In 2011, the NWMO hosted the BioProta annual meeting in Hamilton, Ontario.

Crystalline and Sedimentary Rock Formations: Why We Are Looking at Them

Research conducted both in Canada and internationally is focused on assessing the long-term safety of the multi-barrier deep geological repository design concept in both crystalline and sedimentary rock formations. As part of this multi-barrier concept, a key aspect is the role of the geosphere with respect to its ability to provide a stable environment that protects the engineered barrier components and provides a passive barrier to subsurface containment transport. While site-specific conditions will influence the ability of the geosphere to perform these barrier functions, international experience has illustrated that safe implementation of the deep geological repository concept can be achieved in both crystalline and sedimentary settings.

Canada enjoys a favourable position, with siting regions in which crystalline or sedimentary formations occur at appropriate repository depths. The APM siting program, initiated in May 2010, has had expressions of interest from communities situated in areas underlain by crystalline rock types, as well as sedimentary rock.



Crystalline rock is a term used to describe formations that are of igneous or metamorphic origin. Igneous represents a classification of rocks that solidified from magma. Igneous rock may form either below the surface as intrusive (plutonic) rocks, or at the surface as extrusive (volcanic) rock. Metamorphic rocks comprise both sedimentary and igneous rock that, through geologic time, have been altered by extreme temperature and pressure conditions resulting from burial, mountain building (tectonic) or igneous intrusion. Crystalline rocks are characteristic of those occurring on the stable Precambrian age Canadian Shield.

Sedimentary rock is a term used to describe formations that have formed through 1) compaction and cementation (lithification) of sediment derived from the weathering and erosion of pre-existing rock (i.e., shale) or organic material (i.e., limestones); or 2) separately by chemical precipitation (i.e., salt). A defining characteristic is that they are formed in layers. Each layer may preserve features that reflect the conditions during deposition, the nature of the source material and the means of transport.

The NWMO's knowledge base was further enhanced through active participation in workshops and conferences sponsored by such organizations as the Canadian Nuclear Society (CNS), the NEA of the Organisation for Economic Co-operation and Development (OECD), and the International Atomic Energy Agency (IAEA). The most notable of these was this year's CNS conference on Waste Management and Decommissioning and Environmental Restoration for Canada's Nuclear Activities, where NWMO staff presented 11 technical papers. These, along with videos, are posted online at www.nwmo.ca/sitingprocess_cnsconference.

Other conferences with NWMO participation included the Mont Terri Project Technical Discussion Meeting, the 13th International High-Level Radioactive Waste Management Conference, and the International Conference on Environmental Remediation and Radioactive Waste Management.

NWMO Participation in the University Network of Excellence in Nuclear Engineering (UNENE)

UNENE is a not-for-profit corporation founded in 2002. It is an alliance of universities, nuclear power utilities, and research and regulatory agencies, in Canada, for the support and development of nuclear education, and research and development capabilities in Canadian universities. The bulk of UNENE funding is directed towards Industrial Research Chairs (IRC) and Associate Chairs at McMaster University, Queen's University, the University of Toronto, the University of Waterloo, the University of Western Ontario, the University of Ontario Institute of Technology, and the Royal Military College of Canada.

The NWMO became an associate member of UNENE in 2011. The NWMO's funding to UNENE in particular supports education and personnel training activities. UNENE provides an accredited joint-university programme for a Master of Engineering in Nuclear Engineering. The master's degree is geared to the working professional, where courses are provided via distance learning, as well as during evenings and on weekends.

UNENE strives towards providing a supply of highly qualified personnel, supporting and funding nuclear research in universities, and creating a respected pool of university-based expertise for independent industry and public consultation.

The Enhanced Sealing Project (ESP)

The work related to repository monitoring conducted during 2011 had two different components: a seal monitoring experiment, and work on the development of a monitoring work program for the APM project.

The experimental component consisted of the continued monitoring of an instrumented shaft seal placed in the access shaft of the now decommissioned Atomic Energy of Canada Ltd. (AECL) Underground Research Laboratory, near Pinawa, Manitoba. Monitoring of the seal was initiated in 2010, and it is intended to continue for several years. The current monitoring period, which extends to the end of 2013, is funded via a partnership among the NWMO, AECL, SKB (Sweden) and Posiva (Finland). At the end of that agreement, the need for continuing to monitor the seal will be evaluated, and a decision will be made on the possible extension of the agreement.

Sharing and Integrating NWMO Geoscience Research

Since 2002, the NWMO has been hosting an annual Geoscience Seminar for the purposes of sharing the advances in the various technical work programs over the course of the previous year. The seminar brings together partners in academia, industry and international collaborators to discuss and integrate their leading-edge research and further the development of applied techniques and methods to assess geosphere stability. Seven NWMO-supported graduate students participated in the 2011 seminar and presented their research.

Work in the area of geoscientific site characterization is ongoing and is fundamental to the APM technical program. The overall purpose of the NWMO's applied geoscience program is to evaluate the adequacy of potential candidate sites for a deep geological repository by conducting site characterization activities. To this end, geoscience work programs are designed to achieve the following key objectives:

1. **Development of plans and methods to assess the suitability of potential candidate sites for a deep geological repository in willing host communities; and**

2. **Ongoing refinement of the understanding of geosphere processes related to the long-term stability and performance of a deep geological repository.**

ABOVE: Attendees at the 2011 NWMO Geoscience Seminar.

These two objectives are achieved 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 geoscience program is a partner and participant in the Äspö Hard Rock Laboratory Modelling Task Force and Mont Terri Underground Rock Laboratory Project, as well as the Greenland Analogue Project (GAP). The GAP is a collaborative project with both SKB and Posiva. The project's goal is to advance the understanding of processes associated with glaciation and their impact on the long-term performance of a deep geological repository.

Providing Financial Surety

STRATEGIC OBJECTIVE

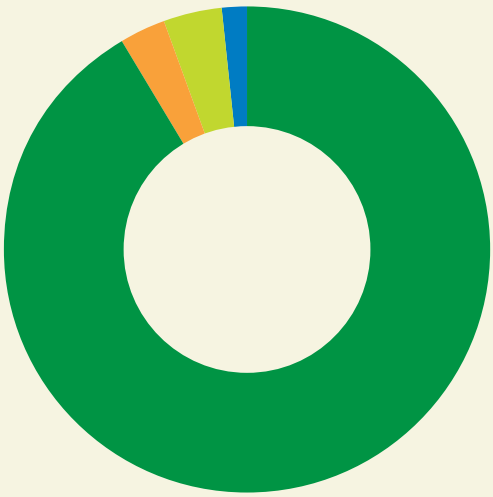
The NWMO will ensure funds are available to pay for the safe, long-term management of Canada's used nuclear fuel.

The *Nuclear Fuel Waste Act (NFWA)* specifically addresses the future financial obligations for managing used fuel over the long term. The legislation 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 $2.5 billion as of the end of 2011. This money is in addition to other segregated funds and financial guarantees the companies have set aside for nuclear waste management and decommissioning.

Trust Fund Balance

December 2011 ($ million)

Total: 2,509



Owners

Ontario Power Generation	2,296
Hydro-Québec	80
NB Power Nuclear	95
Atomic Energy Canada Ltd.	38

Experience in other countries has demonstrated the importance of safeguarding these funds so that they will be preserved for their intended purpose. The *NFWA* built in explicit provisions to ensure that the trust funds are maintained securely and used only for their intended purpose. The NWMO may have access to these funds only for the purpose of implementing the management approach selected by the Government once a construction or operating licence has been issued under the *Nuclear Safety and Control Act (NSCA)*.

These legislated obligations are the responsibilities of the individual companies named, and not the responsibility of the NWMO. The trust funds are noted here because of their significance in the overall provision for long-term nuclear waste management.

As required by the *NFWA*, the NWMO makes public the audited financial statements of the trust funds when they are provided by the financial institutions annually. They are posted at www.nwmo.ca/trustfunds.

In addition, the NWMO is required to provide a range of financial information in each of its annual reports following the Government's decision, as defined in Subsection 16(2) of the *NFWA*.

Financial Guarantees as Required by *NFWA* Section 16(2)(a)

As specified in the *NFWA*, this report provides the form and amount of the financial guarantees that all NWMO members – Ontario Power Generation (OPG), Hydro-Québec (HQ) and NB Power Nuclear (NBPN) – have provided to the Canadian Nuclear Safety Commission (CNSC). These guarantees for the year 2012 total $15 billion and are provided to cover the total cost (in present value terms) of managing the decommissioning of all reactors and permanently managing all nuclear waste (including used nuclear fuel) produced to date. A large portion of these guarantees, approximately $13 billion (as of year-end 2011), exists 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 in Attachment 1.

Total Cost Estimate as Required by *NFWA* Section 16(2)(b)

The *NFWA* requires the NWMO to address the cost and funding of the long-term management of used nuclear fuel. Cost estimates for the Adaptive Phased Management (APM) program were developed in 2003. A full update of those estimates was commenced by the NWMO in 2009 and completed in 2011.

The updated cost estimate for the APM program for managing 3.6 million used nuclear fuel bundles is $17.9 billion (2010 $). When stated in present value terms, which takes into account inflation and fund growth, the cost is $7 billion (2010 $).

This cost estimate covers APM lifecycle activity for the deep geological repository and related transportation of used fuel. In producing an estimate for the long-term planning around the APM program, a number of system design and costing assumptions were adopted to guide the projections. Among these were:

A. **Engineering and conceptual design assumptions for the deep geological repository and transportation.**
B. **Assumed repository capacity of 3.6 million fuel bundles.**
C. **An in-service date of 2035 for the deep geological repository.**
D. **Closure of repository in 2160.**

Each component of APM costs was systematically addressed to develop a full lifecycle cost estimate. Allowances and contingencies are also included in the APM cost estimate to account for cost risks.

This cost estimate will form the baseline from which cost estimates for a used fuel inventory greater than 3.6 million can be derived.

When updated to January 1, 2012, present value, the estimated cost of APM is $7.7 billion (for liabilities from 2012 onwards). Of the $7.7 billion, approximately $6.3 billion is the estimated cost of developing and building a repository, transporting the used fuel and operating the repository for the 2.3 million fuel bundles produced as of the end of June 2011. The costs of interim storage at the reactor sites and recovery of the used fuel from storage are not included as part of the $7.7 billion cost estimate since they are the responsibility of the waste owners.

A backgrounder, *Financial Surety and Updated Lifecycle Cost Estimate for Adaptive Phased Management*, is posted on the NWMO's website at www.nwmo.ca/backgrounders.

Cost to Be Funded Through the *NFWA* Trusts

The $6.3 billion present value cost estimate of a deep geological repository for the 2.3 million used fuel bundles includes $1.9 billion to develop the repository to a point of obtaining a construction licence, and $4.4 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 $4.4 billion) must be funded through contributions to the *NFWA* trust funds established by OPG, HQ, NBPN and AECL. As of December 2011, the total value of these funds including investment income was approximately $2.5 billion.

Budget Forecast for 2012 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 $1.9 billion (as stated in present value as of January 1, 2012) to site the long-term management option, develop its detailed design, evaluate its environmental impacts, and obtain a site preparation and construction licence from the CNSC. For 2012, the NWMO Board of Directors approved a budget envelope of $47.6 million. Annual costs beyond 2012 are subject to further review. Sharing of these costs will be in accordance with the percentages defined in the funding formula.

Funding Formula as Required by *NFWA* Section 16(2)(d)

In accordance with the requirements under the *NFWA*, the NWMO proposed a funding formula in its 2007 Annual Report to address the future financial costs of implementing the APM approach. This followed the Government's selection, in June 2007, of the APM approach for the long-term management of used fuel. The funding formula, based partly on projections of used fuel to be generated by each waste owner, allocates liabilities to each of the corporations for their portion of the estimated total cost. It identifies trust fund contributions by each nuclear waste owner for their portion of the estimated total cost. The funding formula was approved by the Minister of Natural Resources in April 2009.

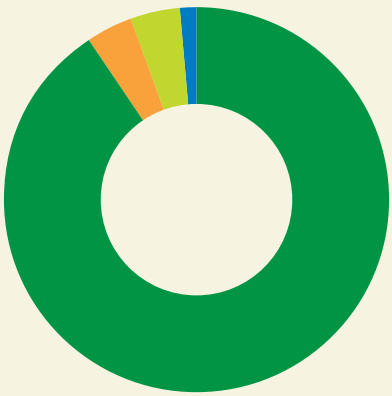
Cost Sharing

For the purpose of sharing NWMO costs, cost sharing has initially been done based on the number of fuel bundles produced as of June 30, 2006, adjusted to account for the assumed timing of transfer of used fuel to the repository. For OPG, this transfer is assumed to start in 2035. For HQ, NBPN and AECL, this transfer is assumed to start in 2050. The resulting cost-sharing percentage among the waste owners is approximately: OPG: 90.8%, HQ: 3.9%, NBPN: 4.2%, and AECL: 1.2%. These cost-sharing percentages have not changed since the funding formula was approved by the Minister of Natural Resources in April 2009.

These percentages apply to the sharing of both pre- and post-construction costs. Costs specific to a nuclear fuel waste owner, such as special fuel, and special transportation costs that are owner-specific, are attributed to the owner.

Owners

Ontario Power Generation	90.8%
Hydro-Québec	3.9%
NB Power Nuclear	4.2%
Atomic Energy Canada Ltd.	1.2%



Possible Future Reactors

In response to the request of the Minister of Natural Resources, discussions were held with a number of stakeholders regarding the development of a funding formula that could apply to possible new waste owners and used fuel from new reactors. The results of the discussions are summarized below:

1. **The principles used in the approved funding formula are reasonable and should apply to new owners and new reactors.**
2. **Fixed and variable costs and investments made to date need to be considered in any new funding formula for new owners and new reactors.**
3. **The characteristics of new fuel types must be considered.**
4. **The existing funding formula should be developed when specific circumstances are clear for new reactors and new owners.**
5. **The changes in the funding formula for new owners of new reactors may be different from the changes for an existing owner with new reactors.**

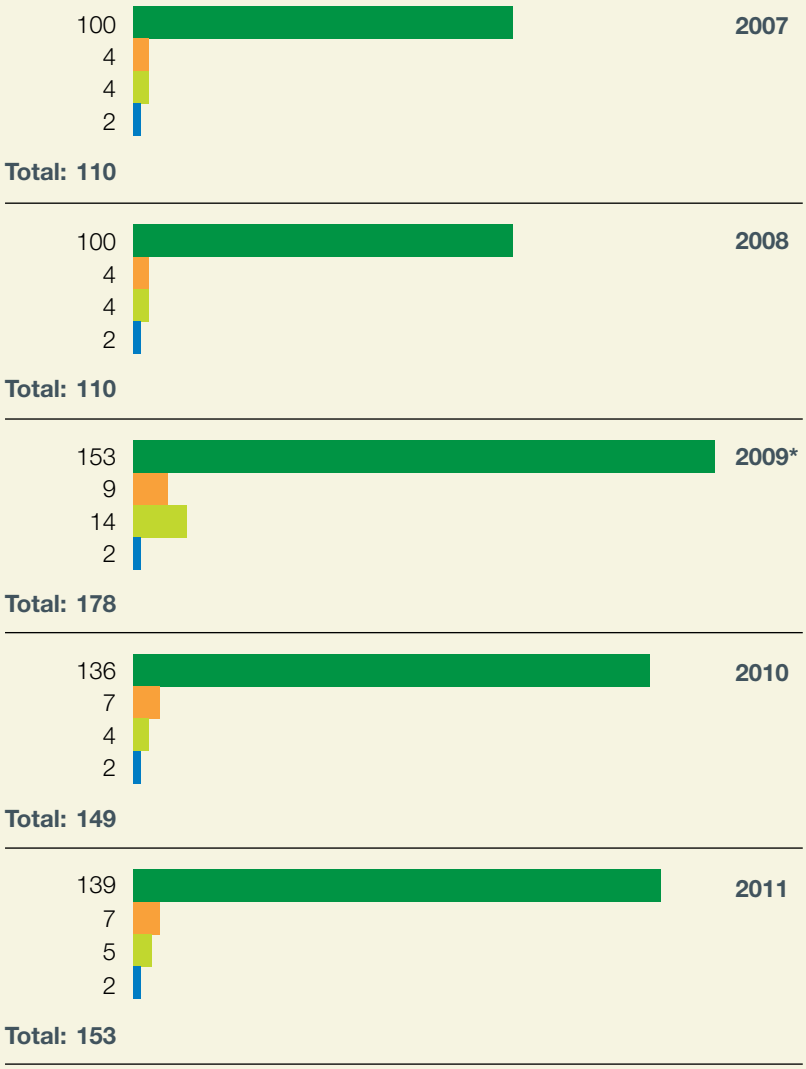
The NWMO proposed to apply the above principles to specific circumstances related to new owners and new reactors if they arise. The above results were reported to the Minister of Natural Resources in May 2011. In his response to the NWMO, the Minister indicated his agreement with the proposed approach.

Trust Fund Deposits 2007 to 2011 as Required by *NFWA* Section 16(2)(e)

Beginning in 2002, used nuclear fuel waste owners have been making annual contributions to the *NFWA* Trust Funds. The contributions for each waste owner are as follows:

Contributions to *NFWA* Trust Funds

Total Deposits to Trust Fund ($ million)



Owners

- Ontario Power Generation
- Hydro-Québec
- NB Power Nuclear
- Atomic Energy Canada Ltd.

* 2009 contributions include additional funding required for 2008 contributions under the Funding Formula that was approved in April 2009.

Trust Fund Deposits for 2012 as Required by *NFWA* Section 16(2)(e)

The *NFWA* Trust Fund deposits for 2012 stated herein have been developed based on the approved funding formula. Under this funding formula, the funding for the post-construction licence costs is divided into two parts:

1. **Funding for historical used fuel bundles (Committed Liability)**
2. **Funding for used fuel to be produced each year (Future Liability)**

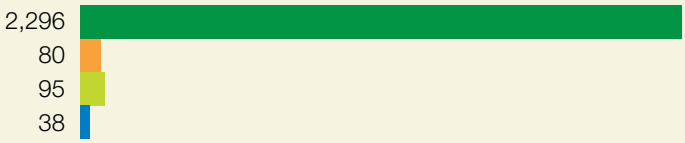
Committed Liability represents all costs that will be incurred regardless of whether any further used fuel bundles are generated in the future. This liability includes all fixed costs for the facility and variable costs attributed to the historical used fuel bundles. Contributions for the "committed" liability are to be amortized to the year 2035 in equal present value payments. The rationale for this amortization period is that 2035 is consistent with the earliest planned date when the deep geological repository would be available. This funding method has the advantage of distributing the funding obligations evenly to each year, taking into account the time value of money.

Future Liability represents the incremental cost of transferring to the repository, facility expansion, and additional operating and monitoring costs of used fuel bundles to be produced each year. Each future used fuel bundle would incur the same cost in present value terms, taking into account the time value of money.

The 2012 Trust Fund Deposits are shown on the next page.

Trust Fund Balance as at December 31, 2011

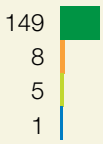
($ million)



Total: 2,509

Total Trust Fund Deposits for 2012*

(Committed and Future Bundles) ($ million)



Total: 163

Owners

- Ontario Power Generation
- Hydro-Québec
- NB Power Nuclear
- Atomic Energy Canada Ltd.

* Annual trust fund deposits are required to be made within 30 days of the submission of the Annual Report. The 2012 trust fund deposit amounts reflect the impacts of the latest cost estimates and final 2011 year-end trust fund balances. A deposit date of April 30 is assumed for illustrative purposes.

ATTACHMENT 1

Financial Guarantee Status – NWMO Members

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 consider 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 which is executed between the Province of Ontario and the CNSC.
- The *NFWA* Trust Fund forms part of the Used Fuel Fund under the *ONFA*.

The Provincial Guarantee Agreement provides an unconditional and irrevocable guarantee to supplement monies set aside by OPG in segregated funds including the *NFWA* Trust Fund to satisfy the total Financial Guarantee required by the CNSC.

OPG submitted documents to the CNSC in 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.

In 2010, the amount of the Provincial Guarantee was increased from $760 million to $1,545 million to address the decline in the equity markets. The CNSC accepted the increased Provincial Guarantee which covers all remaining years to the end of 2012.

The Annual Report to the CNSC for year 2012 shows a Financial Guarantee requirement of $12.103 billion. This will be satisfied by a 2011 year-end Used Fuel Fund balance of $6.550 billion, a Decommissioning Fund balance of $5.328 billion and a Provincial Guarantee of $1.545 billion for a total available guarantee of $13.423 billion.

The value of the OPG *NFWA* Trust Fund as of year-end 2011 is $2.296 billion. This value forms part of the segregated fund balance shown above.

Hydro-Québec

HQ has provided the CNSC with a Decommissioning Financial Guarantee of $685 million stated in present value as of June 30, 2016, that includes a guarantee associated with used fuel arising from the operation of Gentilly-2 and the cost of station decommissioning, including the long-term management of low and intermediate level radioactive waste.

- The total guarantee is made up of $340 million for decommissioning and long-term management of low and intermediate level radioactive waste, and $345 million for used fuel.
- The guarantee is in the form of an expressed commitment of the Province of Quebec to HQ that provides a guarantee of payment.
- The HQ *NFWA* Trust Fund contained $80 million as of December 31, 2011.

NB Power Nuclear

NBPN has provided the CNSC with a Decommissioning Financial Guarantee that includes costs associated with the long-term management of used fuel projected to be produced from the Point Lepreau Generating Station and the cost of station decommissioning, including the long-term management of low and intermediate level radioactive waste.

- The current used fuel financial guarantee is based on the present value of future costs to manage used fuel produced to the end of 2012. 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, 2011, was approximately $592 million and was comprised of the following:

    - Used Fuel Fund – $305 million
    - Station Decommissioning Fund – $192 million
    - *Nuclear Fuel Waste Act* Trust Fund – $95 million

Atomic Energy of Canada Ltd.

AECL is not a member of the NWMO. Its financial guarantee is in the form of an expressed commitment by the Government of Canada to the CNSC, combined with supporting estimates of the financial liability and the basis for same. The AECL *NFWA* Trust Fund contained approximately $38 million as of December 31, 2011.

Additional Information

Additional information is posted at www.nwmo.ca/backgrounders.

Adapting to Change

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.

One of the hallmarks of Adaptive Phased Management (APM) is its flexibility in the face of change and unforeseen events. Both are inevitable in a process spanning several generations, and while they present challenges, they can also present opportunities in the form of fresh input and new technologies for the long-term management of used nuclear fuel.

Continuous planning and continuous learning are the two principal ways the NWMO plans for change. Continuous planning takes the form of developing rolling five-year implementation plans in consultation with interested Canadians, while continuous learning focuses on three key areas:

1. **Research advances;**
2. **Energy policy; and**
3. **Evolving societal expectations, and refining social processes and plans.**

1. Research Advances

The NWMO's participation in national and international nuclear organizations is one of the ways staff keep abreast of the latest developments in such areas as safety case development, community-based site selection processes, and citizen engagement. These organizations include the Canadian Nuclear Society (CNS), the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD), and the International Atomic Energy Agency (IAEA).

During 2011, the NWMO continued to participate in the NEA's Radioactive Waste Management Committee and three of that committee's working groups: the Integration Group for the Safety Case, the Reversibility & Retrievability Project, and the Forum on Stakeholder Confidence. This last working group shares 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.

Annual input from the NWMO's Independent Technical Review Group (see *Ensuring Governance and Accountability*) is another mechanism for making sure that the organization is on the forefront of advances in the field.

Ongoing Monitoring of Advances in Reprocessing Used Nuclear Fuel

One of the questions that is most frequently asked of the NWMO is whether used nuclear fuel, and used CANDU fuel in particular, can be

recycled or reused. Reprocessing involves the separation of potentially fissile materials, such as plutonium, from used nuclear fuel through the application of chemical and physical processes for recycling in a reactor. In 2005, the NWMO made a commitment to keep a "watching brief" on technological developments in the field, and it has been posting updates on its website since 2008, at www.nwmo.ca/adaption.

In 2011, the NWMO continued to monitor the findings of international programs that reviewed and assessed the implications of advanced fuel cycles, including reprocessing, partitioning and transmutation (RP&T), on waste management issues. The programs' sponsoring organizations were the IAEA, the NEA of the OECD, the Electric Power Research Institute (EPRI), the US Blue Ribbon Commission on America's Nuclear Future (BRC), the US Government Accountability Office (GAO), and the US Nuclear Waste Technical Review Board (NWTRB). Additional strategic reviews were published by the EPRI and the UK Nuclear Decommissioning Authority (NDA). All these reviews were based on enriched uranium fuels, mostly light water reactor (LWR) fuels.

In each instance, the conclusion was that the costs of RP&T were prohibitively high, and that even if such a program were in place, there would still be a need for a deep geological repository for the residual high-level radioactive waste. In these fuel cycle scenarios, there would also be increased quantities of low and intermediate level wastes that would be generated by RP&T which would also require long-term management in a repository. Due to the unenriched nature and low burn-up of CANDU fuels, these issues are even more pertinent for CANDU fuels than for LWR fuels.

2. Energy Policy

The NWMO continues to monitor the status of potential new or refurbished reactors. It also continues to update its inventory of the nation's used nuclear fuel. This is posted on the NWMO's website at www.nwmo.ca/technicalresearch.

3. Evolving Societal Expectations, and Refining Social Processes and Plans

This past year marked an important transition in the implementation of APM. Whereas in previous years the NWMO's focus was on developing high-level social frameworks and processes to guide the implementation of APM, the organization is now increasingly focusing on interested communities, surrounding communities and potentially affected Aboriginal communities. This work has provided the opportunity to see Canada's plan for the long-term management of used nuclear fuel through the eyes of local communities, and to understand the needs, questions and concerns of the people who will be instrumental in carrying forward that plan.

Much of the NWMO's work in 2011 was directed at envisioning the project from the perspective of interested communities, while also continuing to sustain a dialogue more broadly with Canadians on the policy dimensions of this project. This last dialogue, with the Canadian public, focused on (a) testing the continued social acceptability of implementing APM; and (b) better understanding the questions and issues that need to be addressed as implementation proceeds.

What We Asked the Public

- The draft Plan is built around seven strategic objectives. Are the objectives that we have identified appropriate? Have we missed key areas?
- The draft Plan identifies work and activities we propose to undertake to accomplish these objectives. Have we set out appropriate activities?
- The draft Plan is intended to anticipate the challenges ahead and plan for them. Over the next five years, what are the key challenges that will need to be addressed?
- What will the NWMO need to put in place to respond to these challenges?
- Other comments, questions or suggestions?

Soliciting Input on the NWMO's Draft Five-Year Implementation Plan

As it has been done in previous years, the NWMO solicited broad input on its seven corporate strategic objectives and associated planned activities by publishing a draft of its rolling five-year strategic plan (*Implementing Adaptive Phased Management 2012 to 2016*) for public comment. A copy was posted on the NWMO website, while hard copies were mailed to individuals and organizations that had previously expressed an interest in NWMO activities, as well to provincial and federal ministers and political representatives, as well as involved government departments. A five-question survey (see *What We Asked the Public*) was posted on the organization's website and mailed with hard copies. All individuals who contributed their time and ideas were formally thanked by the NWMO.

Other Input

The NWMO also continued to (a) engage Canadians in a conversation about the appropriateness of the site selection process; and (b) identify with them the refinements that will need to be made to that process as it is implemented and experience is gained. A public survey on the NWMO website solicited comment on the challenges which people expect to encounter, and asked them to identify where more information and clarification are needed. The NWMO's Municipal Forum and Elders Forum also participated in this discussion and provided advice and counsel. The ethical framework, which was designed to guide all aspects and phases of the work of the NWMO, was also reviewed by a small group of ethical practitioners for additional elaboration or development which may be needed as work proceeds. The highlights of these many discussions are outlined in a report (*What We Heard 2011*) posted on the NWMO website at www.nwmo.ca/what_we_heard.

The ongoing process of dialogue and learning identified four key opportunities for refinement to the organization's social processes and plans, as well as to its community-based activities. These opportunities and the steps the NWMO took to address them are as follows:

1. **Better communication of the role transportation issues play in the siting process.** Questions and comments about the transportation of used nuclear fuel resulted in refinements to the NWMO's published materials, including the most recent implementation plan and descriptions of the siting process. The NWMO also responded by initiating engagement activities with key government agencies involved in overseeing and regulating the transportation of dangerous materials in Canada.

2. **More efforts to involve surrounding communities and Aboriginal peoples early in the siting process.** Public comment underscored the need for the early involvement of surrounding communities and potentially affected Aboriginal peoples, while still allowing enough time for interested communities to explore their own interest. In response, the NWMO (a) took a more active role with interested communities to help them in their own outreach and engagement activities; and (b) initiated its own complementary outreach activities.

3. **More outreach and learning at the community level.** In response to public comment, the NWMO worked with interested communities to help their residents learn more about the project, the NWMO and the site selection process. At the invitation of individual communities, the NWMO also organized a variety of learning opportunities, including: briefings by independent experts; the opportunity to share information and experiences with Swedish communities involved in a similar process, but that are farther along in their nation's program; community

open houses; and individual and group briefings. The NWMO also enhanced its support to communities by adding new program funding components in order to ensure that the full range of costs incurred by a community are covered by the NWMO support program. To assist communities in developing or refining a long-term vision for sustainability, the NWMO sponsored a panel of experts at the Federation of Canadian Municipalities (FCM) Sustainable Communities Conference in February 2011. These experts discussed recent work about approaches to community sustainability visioning and working to ensure community well-being.

4. **Greater integration of the NWMO's values at the community level.** Public comment attached particular importance to making sure that the ethical values the NWMO committed itself to during the study phase of its work are clearly stated and understood as we move forward with communities. Toward that end, the NWMO (a) is developing supporting materials to help ensure that the organization's values guide community actions; and (b) explicitly made those same values part of community agreements to proceed to the next phase of the siting process (feasibility studies).

Ensuring Governance and Accountability

STRATEGIC OBJECTIVE

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

The integrity of the NWMO's work is guaranteed by multiple layers of oversight and peer review. Internally, the NWMO is governed by its Board of Directors. The *Nuclear Fuel Waste Act (NFWA)* also requires the Board to appoint an Advisory Council that has a mandate to review and comment on the work of the NWMO. There is also a four-member international Independent Technical Review Group (ITRG) that conducts annual reviews of the NWMO's technical program to make sure that it meets the highest scientific standards.

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

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

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

Highlights of these reporting and accountability activities from 2011 are discussed in the sections below.

Technical Review

The ITRG provides ongoing review of the organization's technical research program. Through experience acquired in Canada, the U.K., Sweden and Switzerland, the four current members have extensive, internationally recognized expertise in technologies associated with implementing nuclear waste repository projects.

The ITRG's mandate is to inform the Board of Directors and the Advisory Council on whether the NWMO APM technical program is based on credible scientific and technical approaches and methodologies, is consistent with international practices, broadens and advances the NWMO's technical knowledge to adequately support implementation of APM, and has sufficient resources to achieve its mission.

In September 2011, the ITRG held its annual review meeting at the NWMO offices in Toronto, and in December, the group presented its findings to the NWMO Board and Advisory Council. The ITRG noted impressive development in the APM technical program over the past year, and indicated that the program has identified all the relevant issues and challenges and proposes a comprehensive work program to address them.

The NWMO has reviewed, considered and accepted the recommendations of the ITRG, and has prepared a response and action plan to address those recommendations. The ITRG 2011 Report and the NWMO response and action plan have been posted on the NWMO website at www.nwmo.ca/itrg.

Triennial Report to the Minister of Natural Resources

The *NFWA* requires the NWMO to submit a triennial report to the Minister of Natural Resources. The first of these, covering the years 2008 to 2010 inclusive, was submitted in March 2011. The minister's formal response, issued in June 2011, commended the "great progress" the NWMO had made, and noted that its "engagement of community leaders, decision-makers and interested individuals from the outset of the project is an excellent example of a best practice for initiating a project of this size and magnitude." The report is posted on the NWMO's website at www.nwmo.ca/annualreport.

Ongoing Activities with the Canadian Nuclear Safety Commission

The NWMO continued to update the CNSC and seek feedback as part of its agreement to obtain CNSC review of conceptual designs and illustrative safety assessments for a used fuel repository in both crystalline and sedimentary rock formations. This work reflects the NWMO's commitment to seeking regulatory guidance and oversight early in the implementation of APM, the goal being to confirm that the NWMO would be able to meet the expectations of the CNSC Regulatory Guide G-320 on Assessing the Long-Term Safety of Radioactive Waste Management. The NWMO held meetings with the CNSC in 2011 to discuss the pre-project report outline and interim acceptance criteria to use in the assessments. An interim report was then submitted to the CNSC in December 2011.

At the request of interested communities, CNSC staff provided independent briefings on the regulator's role in licensing an APM facility.

Early involvement of the CNSC was also sought in the area of transportation. The goal was to confirm that the regulatory requirements and expectations associated

with the transport of used fuel are consistently understood by all interested parties. This work area will be further expanded over the coming years.

Internationally, the NWMO reports on its progress at meetings of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)*. Reports to the *Joint Convention* are made under the auspices of the CNSC, and are part of the convention's requirement that Canada and other signatory nations demonstrate that they are meeting international commitments to manage radioactive waste and used nuclear fuel safely. In 2011, the NWMO began preparations with the CNSC for participation in the *Joint Convention* to be held in May 2012.

Quality Management

In 2011, the NWMO maintained and continued to operate the organization's ISO 9001:2008 certified management system. Throughout the year, the management system was further enhanced to be compliant with the CSA N286-05 Management System Requirements for Nuclear Power Plants that are applicable to the development of a repository for nuclear waste. Being in compliance with the CSA N286-05 management system requirements standard is an expectation by the CNSC.

The NWMO completed a number of audits in 2011 to confirm that the organization is in conformance with the established management system. Results from these internal and external audits were integrated into the organization's continuous improvement activities which included improvements to the management system. During the year, the organization also developed the necessary policies, procedures and standards to augment the management system and prepare the organization for the management of health, safety and environmental issues. The NWMO will be managing quality, health, safety and environmental issues as it moves forward, directly managing site characterization activities, and in the near future, site preparation and construction activities. As part of this preparation, in 2012, the NWMO will seek to obtain certification to the CSA Z1000 Occupational Health and Safety Management and the ISO 14001:2004 Environmental Management System standards.

Building and Sustaining a High-Performing Organization

STRATEGIC OBJECTIVE

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

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

The 22 new people the NWMO brought on board in 2011 brought its total staff up to 132. The new hires were in the fields of engineering, community relations, Aboriginal relations, communications and finance. The percentage of employees younger than 44 increased from 32% in 2009 to 44% in 2011.

The long-term nature of Adaptive Phased Management (APM) makes the maintenance and transmission of an institutional memory a key component of staff development and retention policies. To ensure that subsequent generations of NWMO staff are fully prepared to carry the process forward, the organization has implemented systematic procedures for archiving and retrieving policies, technical reports, field notes and briefings. It also continues to recruit in post-secondary institutions, an initiative that is complemented by its ongoing support of the Natural Sciences and Engineering Research Council's (NSERC) Industrial R&D Scholarship and Fellowship program for university graduate students.

Other Work

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

The NWMO is assisting Ontario Power Generation (OPG) in seeking regulatory approval for construction of a proposed deep geologic repository for the long-term management of low and intermediate level waste from OPG-owned or -operated reactors. In 2011, the NWMO continued to provide technical support and other services for this project, and in April, after 10 years of intensive community engagement, site investigation and technical assessments, the OPG submitted an Environmental Impact Statement, Preliminary Safety Report, and other documents to the Canadian Nuclear Safety Commission (CNSC) in support of an application for a Site Preparation and Construction Licence for the project. These documents were prepared by the NWMO and its contractors.

Also in 2011, OPG further contracted with the NWMO to manage the detailed design of the proposed deep geologic repository.

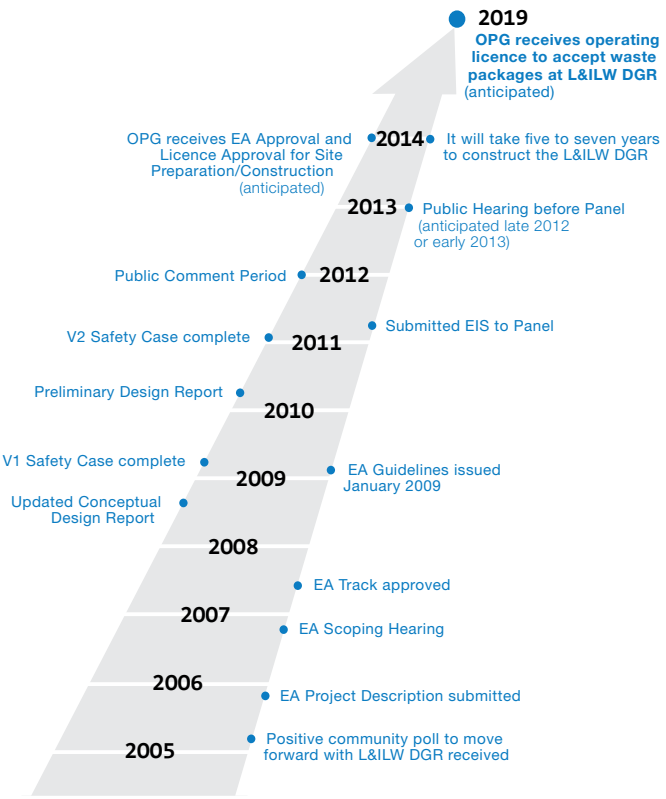
Progress was made toward the detailed design, and some additional field-work occurred in support of these design activities. This fieldwork was completed in accordance with new NWMO Health and Safety processes, and without a lost-time accident or medically treated injury.

The project began in 2001 when the Municipality of Kincardine approached OPG to enter into a Memorandum of Understanding to assess the feasibility of the long-term management of the low and intermediate level waste at the Bruce nuclear site.

The deep geologic repository is planned adjacent to OPG's Western Waste Management Facility (WWMF) on the Bruce nuclear site in the Municipality of Kincardine, and would manage about 200,000 cubic metres of packaged low and intermediate level waste. OPG's WWMF currently manages and provides interim storage for the low and intermediate level waste that is received from OPG's Pickering and Darlington nuclear stations and the Bruce Power stations. Used fuel would not be stored in the repository.

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

Additional information about OPG's Deep Geologic Repository Project is posted online at www.opg.com/dgr.



The Organization

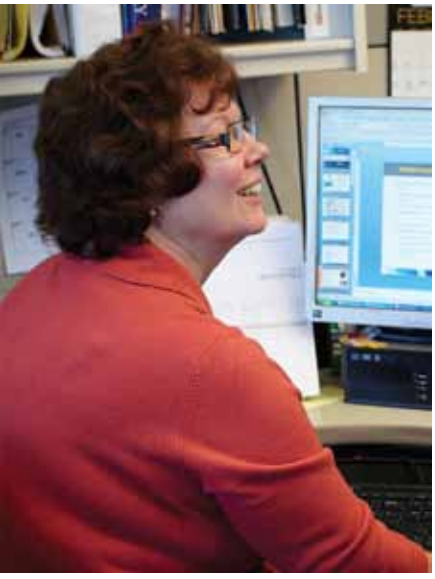
The Members

The NWMO was established in 2002 by Canada's nuclear electricity generators, following passage by the federal government of the *Nuclear Fuel Waste Act* (*NFWA*). Ontario Power Generation (OPG), New Brunswick Power Corporation and Hydro-Québec (HQ) are the founding Members, and along with Atomic Energy of Canada Ltd. (AECL), are required to fund the NWMO's operations.


wmo

Together, the Member corporations set both the underlying governance structures for the organization and the cost-sharing provisions for its operating expenses. The Members convened their Annual General Meeting by conference call on August 11, 2011. At that time, they:

- Received a report from the Board of Directors on the NWMO's activities since the last Annual General Meeting and were provided with an update on the development of the NWMO's site selection process;
- Were presented with the NWMO's first Triennial Report covering the period 2008 to 2010;
- Discussed waste owner cooperation on low and intermediate level waste in Canada;
- Appointed Deloitte & Touche LLP as the external auditor for the purposes of the 2011 audit; and
- Reviewed the results of the five-year review of the NWMO's bylaws and Members' Agreement.



Board of Directors

The Board of Directors is responsible for oversight of the organization and taking a leadership role in the development of the corporation's strategic direction.

As of December 31, 2011, the Board was composed of nine directors. Dr. Gary Kugler served as Chairman, and Mr. Ken Nash as President and CEO. Of the remaining seven directors, Ms. Josée Pilon was appointed by Hydro-Québec (HQ); Mr. Darren Murphy by the New Brunswick Power Corporation; and Mr. C. Ian Ross, Mr. Ron Jamieson, Dr. Deborah Poff, Mr. Pierre Charlebois, and Mr. Donn Hanbidge by Ontario Power Generation (OPG).

The Board of Directors convened four formal meetings and one conference call in 2011. In addition, the three Committees of the Board met a total of 13 times during the year. Early in the year, the Board provided comment on the NWMO's 2008 to 2010 Triennial Report, and approved the audited financial statements which were subsequently presented to the NWMO Members at the August Annual General Meeting. The Directors also reviewed and approved the NWMO's Performance Objectives and Measures for 2012. In fall 2011, the 2012 to 2016 NWMO Business Plan and Budget were presented to the Board for discussion and approval.

As part of the Board's mandate to understand international best practices in used fuel management, the directors visited the Swedish Nuclear Fuel and Waste Management Company (SKB) and Posiva, NWMO's sister organizations in Sweden and Finland, respectively. The goal of the fact-finding mission was to reach a more detailed understanding of the Swedish and Finnish programs, and to learn how the NWMO's compares.

Other activities by the Board of Directors included:

- Ongoing review and discussion of the NWMO's activities related to the Adaptive Phased Management (APM) site selection process, along with briefings on the communities expressing an interest in learning more about the project;
- Ongoing review of the NWMO's business risks and strategic Board decisions;
- A review of the ongoing implementation of service agreements with OPG with a particular focus on how the NWMO will approach the Engineering, Procurement and Construction Management (EPCM) agreement from an accounting perspective;
- A review of the annual report by the Independent Technical Review Group (ITRG), as well as a review of its membership and terms of reference;
- A review and discussion of the NWMO's 2011 communication strategy;
- The Elders Forum;
- A review of the Advisory Council's Terms of Reference, composition and membership as the terms of individual members expire and the NWMO moves further into the siting process; and
- A briefing on the US Blue Ribbon Commission (BRC) on America's Nuclear Future.

Committees of the Board of Directors

Audit, Finance and Risk Committee

The committee met five times in 2011. The 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 the terms of the Audit Service Plan. Meetings are held with the auditors each year to discuss their findings.

The committee also regularly reviewed in-year financial statements and reported its findings to the Board at large. Early in the year, with the guidance of the NWMO's actuary, the committee chose a new pension investment manager for the NWMO pension plan. It was also asked to provide input on how the NWMO might adjust its funding formula to include new waste and new waste owners (the request to do this came from the Minister of Natural Resources, and the NWMO's response was based on input from its current Members).

The committee's other activities included reviews of:

- Business risk;
- Expenses reported by the Chairman, the President and the organization's top five executives;
- The NWMO's financial policies;
- Updated cost estimates for APM;
- The Project Authority Register for NWMO's contractual work on behalf of the OPG's Deep Geologic Repository for low and intermediate level waste;
- The NWMO's financial position reports and business plans;
- Plans to update the reference plans for the *Ontario Nuclear Funds Agreement*;
- Pension plan performance and related developments;
- The APM engagement audit plan; and
- Strategies for publicly communicating the updated APM cost estimate.

As of December 31, 2011, there were four directors on the Audit, Finance and Risk Committee:

- Ian Ross, Chair;
- Ron Jamieson;
- Josée Pilon; and
- Donn Hanbidge.

Siting Committee

The committee met four times in 2011. Its activities included:

- A review of the activities underway in communities engaged in the *Learn More Program*;
- A review of the initial screenings of interested communities;
- Ongoing updates about the external environment in which the site selection process is unfolding, plus the relationship-building work the NWMO has engaged in to ensure that the choice to host the site is made by an informed and willing community;
- Discussions about community well-being and how it would be affected by hosting a repository;
- A review of plans to redevelop the Elders Forum; and
- Preparations for the next step in the siting process (feasibility studies).

As of December 31, 2011, there were four directors on the Siting Committee:

- Ron Jamieson, Chair;
- Deborah Poff;
- Darren Murphy; and
- Pierre Charlebois.

Human Resources and Compensation Committee

The committee met four times in 2011. It is responsible for overseeing the NWMO's human resources functions, including compensation practices, human resources policy, organization design, labour relations and the pension plan. As of December 31, 2011, the committee had four directors:

- Ian Ross, Chair;
- Pierre Charlebois;
- Josée Pilon; and
- Deborah Poff.

Members of the Board of Directors

Gary Kugler – Chair

Dr. Gary Kugler is the retired Senior Vice-President of Nuclear Products and Services at AECL, where he was responsible for AECL's commercial operations. During his 34 years with AECL, he held various technical, project management, business development and executive positions. Prior to joining AECL, he served as a pilot in the Canadian Air Force. Dr. Kugler is a graduate of the Institute of Corporate Directors' Director Education Program and also serves on the Board of OPG. 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

Mr. Ken Nash is a founding director of the NWMO and the immediate past chair of the organization's Board of Directors. He has held a number of senior management positions at Ontario Hydro and OPG in the areas of operations, finance, engineering, environmental management, nuclear waste management and policy development. He is also past chair of EDRAM, an association of waste management organizations from 10 countries, including Canada. He graduated from Salford University in 1973 with an Honours B.Sc. in Mechanical Engineering and is a member of the Professional Engineers of Ontario.

Pierre Charlebois

Mr. Pierre Charlebois is the retired Executive Vice-President and Chief Operating Officer at OPG and was responsible for the operation of OPG's nuclear, hydro and fossil businesses from 2006 to 2009. He was also Chairman of the Canadian Nuclear Association from 2007 to 2009. 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

Mr. Donn Hanbidge is the Chief Financial Officer at 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, internal audit, accounting, reporting, taxation, business and investment planning, treasury, and pension 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 Richard Ivey School of Business at the University of Western Ontario, and is a Chartered Accountant.

Ronald (Ron) L. Jamieson

Mr. Ron Jamieson is a member of the Board of Directors of the Ontario Power Authority. Prior to his retirement in late 2005, he served as Senior Vice-President of Aboriginal Banking at BMO Financial Group. Mr. Jamieson has held several senior executive positions in the financial services industry. Throughout his career, he has also been active in economic development initiatives for Aboriginal communities across Canada. Mr. Jamieson also served as chairman, president and CEO of Ontario Energy Corporation, whose mandate was to invest or participate in energy projects throughout Canada.

Darren Murphy

Mr. Darren Murphy is Vice-President of Finance and Human Resources, 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 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

Ms. Josée Pilon is an MBA graduate of Laval University. She is member of the steering committee on the evaluation project for the rehabilitation of Gentilly-2. As a special projects manager, she is responsible for evaluating business opportunities for new sources of energy from the private sector, including wind power, biomass and hydroelectric. She is also involved on the financial impact evaluation of new hydroelectric projects on municipalities. Prior to her current position, she held numerous business development positions in international projects.

Deborah C. Poff

Dr. Deborah Poff holds the position of President and Vice-Chancellor at Brandon University in Manitoba. Previously, Dr. Poff was a Professor of Philosophy and Political Science at the University of Northern British Columbia (UNBC). From 1994 to 2004, she was Vice-President and Provost at UNBC. In 2004, she was awarded a Fellowship in Public Policy with the Sheldon Chumir Foundation 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 in 2012 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

Mr. 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 OPG, and is Chair of GrowthWorks Canadian Fund Ltd. He is also a member of the Law Society of Upper Canada.

Officers

Chairman of the Board

Dr. Gary Kugler

President and CEO

Kenneth E. Nash

Vice-Presidents

Angelo Castellan	Environmental Assessment and Corporate Support
Michael Hung	Treasurer and Chief Financial Officer
Frank King	Chief Engineer
Patrick Moran	General Counsel and Corporate Secretary
Sean O'Dwyer	Human Resources
Kathryn Shaver	APM Engagement and Site Selection
Derek Wilson	Design and Construction

Executive Committee

Kenneth E. Nash	President and CEO
Angelo Castellan	Environmental Assessment and Corporate Support
Chris Hatton	APM Repository Design Development
Michael Hung	Treasurer and Chief Financial Officer
Frank King	Chief Engineer
Patrick Moran	General Counsel and Corporate Secretary
Sean O'Dwyer	Human Resources
Jamie Robinson	Strategic Communications
Sean Russell	APM Repository Research and Development
Kathryn Shaver	APM Engagement and Site Selection
Derek Wilson	Design and Construction


nwmo

The NWMO Team

As of December 31, 2011, the NWMO had 132 full-time staff.

Our Head Office

The head office of the NWMO is located at:
22 St. Clair Avenue East, 6th Floor
Toronto, Ontario M4T 2S3
Canada

Advisory Council

As required by the *Nuclear Fuel Waste Act (NFWA)*, the NWMO Board of Directors established an Advisory Council in 2002. In 2011, the Advisory Council comprised 10 members. The Honourable David Crombie continued to serve as Chair. The full Advisory Council membership is profiled on pages 104 to 107.

Statutory Reporting Requirements

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 results of NWMO public consultations and analysis of any significant socio-economic impacts of the organization's activities, are published in the NWMO's triennial reports. 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 and made public at the same time.

In fulfillment of its statutory obligation, the Council developed comments on the NWMO's work for inclusion in the NWMO's first triennial report, submitted to the Minister of Natural Resources in March 2011. Council's comments may be found in the triennial report posted on the NWMO website at www.nwmo.ca/annualreport.

Ongoing Advice to the NWMO

In addition to fulfilling its legislated reporting requirements, the Advisory Council outlines its activities on a yearly basis for inclusion in the NWMO Annual Report. The Council meets regularly with the NWMO senior management, closely following the development of the organization's plans and activities, and providing ongoing counsel and advice. At any time, the Council may choose to deliberate in camera.

At the Advisory Council's request, formal minutes of its meetings are recorded and posted on the NWMO website at www.nwmo.ca/advisorycouncilminutes.

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.

Advisory Council Membership

Current appointments to the Advisory Council are for three years each, and are based on several criteria: the type of work the NWMO will be engaged in over the next four years, the expertise that work will require, and the specific provisions of the *NFWA*. With the site selection process now in its early stages, members were invited to offer their advice on the sorts of expertise the Board should be looking for in making its next appointments to the Council. Council members advised that a breadth of expertise would continue to be required as site selection advances. Members discussed the range of social science advice required, including sensitivity to managing community impacts associated with a large project such as APM. The field of ethics was also identified as a particularly important area of expertise for future members, and to meet this need, Dr. Wesley Cragg was appointed to the Council at the beginning of 2012. During 2011, the members also reviewed proposed revisions to the Council's Terms of Reference for consideration by the Board of Directors.

Highlights of the Council's Activities in 2011

The Advisory Council met four times in person in 2011 and four times by conference call. At each meeting, NWMO staff briefed the Council on the progress of current projects, as well as on the status of plans under development. Topics of particular interest to Council members were also deliberated, and requests for additional information were met by NWMO staff. During 2011, much discussion was devoted to the Adaptive Phased Management (APM) site selection process, engagement of communities, and restructuring of the Elders Forum. Several members observed NWMO engagement activities first-hand, an experience that also afforded them an opportunity to hear directly from citizens engaging in the APM process.

Site Selection

Through the year, the Council was kept current on the progress of the APM site selection process, and the Council's advice was sought on the implementation of that process. Members expressed support for the approach the NWMO was taking in providing opportunities for communities to engage without obligation. The Council discussed the *Learn More Program* and opportunities available to communities, and noted the important role for experts and reviews of studies. The Council felt that the supporting documentation developed by the NWMO was both effective and balanced.

Later in the year, the Council discussed the next key milestone in the siting process, the approach to feasibility studies. The Council provided input to communications materials developed for communities and underscored the importance of clarity on decision-making criteria. Since the feasibility studies place a premium on community well-being, the Council advised the NWMO to be particularly mindful

to ensure that communities feel they are being treated well by the NWMO throughout their period of involvement. The NWMO was urged to be very clear about how either party can exit from the siting process up to the signing of a formal agreement to host a repository (Step 6).

In its deliberations, the Council emphasized the importance of engaging early on transportation issues and developing communications that will address the public's interests and questions.

Elders Forum

The Advisory Council and the NWMO look forward to continuing advice from Elders. Over the past couple of years, the Elders and the NWMO agreed that changes need to be made to the Forum. The restructuring of the Elders Forum was an important issue for the Council in 2011, and several members attended Forum meetings in July and November to hear first-hand the perspectives of Elders. The Council undertook a review of the NWMO's proposals for better aligning the operations of the Elders Forum with the organization's future work. Council members expressed support for NWMO's restructuring plans, and in meetings, provided advice that enhanced the definition and clarity of the new Terms of Reference. On several occasions, the Council discussed the importance of ensuring a continued role for Aboriginal youth and providing them opportunities for active participation. The Council supported the idea of having independent recommendations of Elders for appointment to the new forum, and proposed consideration of male and female co-chairs.

Technical Aspects of APM

The Council continued to be briefed on the progress of the NWMO's APM technical program. Early in the year, members received a report summarizing the steps taken in response to the Independent Technical Review Group's (ITRG) 2010 report. They later met with the ITRG's Chair to receive and discuss the findings of the group's 2011 review of the NWMO's APM technical program.

At the Council's request, the NWMO provided members with an outline plan for the development and demonstration of a system for transferring used fuel from interim reactor storage to long-lived repository containers that can be stored in a repository.

Cost Estimates for APM

The Council requested an update on the estimated costs for APM, including the deep geological repository and the transportation system for used nuclear fuel.

Communications

Early in 2011, Council members reviewed the NWMO's proposed communications strategy for the upcoming year. Members generally agreed with the strategy's direction, but made specific recommendations to make APM clearer to interested communities. They especially stressed the need for continuing transparency as APM enters a more sensitive phase. At a later meeting, they urged the NWMO to do more to seek opportunities to highlight and broaden awareness of its approach to public engagement.

Evolving External Landscape

At the Council's request, standing items on its agenda include the NWMO's review with members about the changing external landscape both in Canada and abroad, and a discussion of areas of potential risk. These regular updates included the status of plans for new nuclear build within Canada along with any potential impact on the NWMO's work. The Council supported the NWMO's proposed review of lessons learned from the earthquake and tsunami in Japan.

The Council continued to track the NWMO's work in support of its contract with Ontario Power Generation (OPG) to develop a deep geologic repository for low and intermediate level nuclear waste. Though there is no legal requirement for the Council to provide comments on this project, members viewed it as highly relevant to the NWMO's work on APM. In particular, they noted that the expertise gained in the Joint Review Panel process and in environmental assessments will be invaluable as APM goes forward. While the Council recognized that working on the OPG project is providing the NWMO with relevant experience on deep geological repositories, members cautioned that projects with other partners not divert attention and resources away from the NWMO's core business of managing used fuel. Noting the potential risk of negative repercussions of the NWMO's working on different projects, the Council urged the NWMO to ensure that project partners maintain the NWMO's standards of practice and values.

Staff Capability

In 2005, the Council recommended that the NWMO broaden its skill set, and since that time, the organization has been providing the Council with regular updates on hiring plans and the expertise new hires are bringing in-house.

Supplementary Activities

- The Council continued to provide input on the NWMO's engagement plans at the municipal level, and a Council member attended all meetings of the NWMO's Municipal Forum;
- In June, a Council member attended the Federation of Canadian Municipalities (FCM) conference; and
- In September, several Council members participated in the Canadian Nuclear Society (CNS) Conference on Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities.

For a full record of all Advisory Council advice in 2011 and the NWMO's dispositioning of that advice, please visit our website at www.nwmo.ca/actrackingmatrices.

Members of the Advisory Council

David Crombie – Chairman

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 and of the Order of Ontario.

David R. Cameron

Dr. David Cameron, a Fellow of the Royal Society of Canada, is Chair and Professor of Political Science at the University of Toronto. His professional career has been divided between public service – in Ottawa and at Queen's Park, Ontario – and academic life. A long-time student of Canadian federalism and Quebec nationalism, he has turned his attention to constitution-making in conflict and post-conflict situations in Sri Lanka, Iraq, Somalia, the Western Sahara and Jerusalem.

Marlyn Cook

Dr. Marlyn Cook is presently Chief of Staff with Weeneebayko General Hospital/Weeneebayko Area Health Authority 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.

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 and a member of the executive of the Ontario Chapter of The Wildlife Society. 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

Mr. 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, U.K. His term on the Council expired at the end of 2011.

Eva Ligeti

Ms. Eva Ligeti is the Executive Director of the Clean Air Partnership, a non-profit organization with a mandate to make Toronto more environmentally sustainable and a world leader in clean air. A lawyer, she served as Ontario's first Environmental Commissioner from 1994 to 1999. Ms. Ligeti serves on the Council of the FCM's Green Municipal Fund, is a member of the Province of Ontario's Expert Panel on Climate Change Adaptation, and is a co-chair of the Greening Greater Toronto Task Force. She teaches Environmental Law in the graduate program in Environmental Science at the University of Toronto.

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.

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

Mr. 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 R. Rhéaume

Mr. Michel Rhéaume is the CEO of RHEM Technologies Inc. in Grand-Mère, Québec, 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.

Wesley Cragg

Dr. Wesley Cragg was appointed to the Advisory Council as of January 1, 2012.

Auditor's Report and Financial Statements

Management's Responsibility for Financial Reporting

The accompanying financial statements of the Nuclear Waste Management Organization (NWMO) and all the information in this annual report are the responsibility of management and have been approved by the Board of Directors.

The financial statements have been prepared by management in accordance with Canadian generally accepted accounting principles. When alternative accounting methods exist, management has chosen those it deems most appropriate in the circumstances. Financial statements are not precise since they include certain amounts based on estimates and judgments, particularly when transactions affecting the current accounting period cannot be finalized until future periods.

Management has determined such amounts on a reasonable basis in order to ensure that the financial statements are presented fairly, in all material respects, and in light of information available up to February 15, 2012.

Management has a system of internal controls designed to provide reasonable assurance that the financial statements are accurate and complete in all material respects. The internal control system includes an established business conduct policy that applies to all employees. Management believes that the systems provide reasonable assurance that transactions are properly authorized and recorded, financial information is relevant, reliable and accurate, and the Organization's assets are appropriately accounted for and adequately safeguarded.

The Board of Directors is responsible for ensuring management fulfils its responsibilities for financial reporting, and is ultimately responsible for reviewing and approving the financial statements. The Board carries out this responsibility through its Audit, Finance and Risk Committee (the Committee).

The Committee is appointed by the Board and meets periodically with management, as well as the external auditor, to discuss internal controls over the financial reporting process, auditing matters and financial reporting issues; to satisfy itself that each party is properly discharging its responsibilities; and to review the financial statements and the external auditor's report. The Committee reports its findings to the Board for consideration when approving the financial statements for issuance to the members. The Committee also considers, for review by the Board and approval by the members, the engagement or reappointment of the external auditor.

The financial statements have been audited by Deloitte & Touche LLP, the independent external auditor, in accordance with Canadian generally accepted auditing standards on behalf of the members.

February 15, 2012

K. E. Nash

Ken Nash
President and CEO

Michael Hung
Chief Financial Officer

Independent Auditor's Report

To the Members of the Nuclear Waste Management Organization

We have audited the accompanying financial statements of the Nuclear Waste Management Organization, which comprise the statement of financial position as at December 31, 2011, 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 the Nuclear Waste Management Organization as at December 31, 2011, and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.

Deloitte & Touche LLP

Chartered Accountants
Licensed Public Accountants
Toronto, Ontario
February 15, 2012

Statement of financial position as at December 31, 2011	2011	2010
	$	$
Assets		
Current assets		
Cash (Note 3)	**9,936,140**	2,565,656
Accounts receivable (Note 5)	**105,880**	3,712
Member contributions receivable (Note 6a)	**-**	5,212,039
Prepaid expenses and deposits	**368,900**	428,336
	10,410,920	8,209,743
Capital assets (Note 4)	**3,250,408**	2,865,405
Deferred pension asset (Note 8)	**10,846,532**	9,321,260
	24,507,860	20,396,408
Liabilities		
Current liabilities		
Accounts payable and accruals	**9,798,716**	7,808,494
Deferred lease inducements (Note 9)	**261,861**	182,327
Deferred member contributions (Note 6b)	**420,343**	273,922
	10,480,920	8,264,743
Deferred capital contribution (Note 7)	**3,250,408**	2,865,405
Long-term deferred member contributions (Note 6c)	**3,755,620**	3,325,648
Other post-employment and pension benefits liability (Note 8)	**7,020,912**	5,940,612
	14,026,940	12,131,665
Net assets	**-**	-
	24,507,860	20,396,408

Approved by the Board of Directors, February 15, 2012

K. E. Nash

Ken Nash
President and CEO
Toronto, Canada

C. Ian Ross
Chair – Audit, Finance and Risk Committee
Toronto, Canada

Statement of operations and changes in net assets year ended December 31, 2011	2011	2010
	$	$
Revenue		
Member cash contributions received (Note 5)	**64,956,375**	41,805,255
Non-member cash contributions received	**317,020**	389,327
	65,273,395	42,194,582
Change in deferred capital contributions (Note 7)	**(385,003)**	320,469
Change in long-term deferred member contributions (Note 6c)	**(429,972)**	(439,594)
Change in member contributions receivable and deferred member contributions (Note 6a and 6b)	**(5,358,460)**	4,742,873
Total contribution revenue (Note 12)	**59,099,960**	46,818,330
Interest income (Note 12)	**28,120**	6,536
Total revenue	**59,128,080**	46,824,866
Expenses		
Adaptive Phased Management		
Staffing and administration (Note 5)	**13,904,093**	12,459,673
Siting process	**2,235,851**	1,058,492
Design and development safety case	**7,565,204**	8,208,124
Building relationships	**2,957,749**	2,015,013
Governance structure	**580,634**	628,880
Adapting to change	**186,412**	141,353
Funding formula/financial surety	**29,992**	23,815
	27,459,935	24,535,350
Deep Geologic Repository		
Regulatory review stage	**4,563,631**	10,940,838
Design stage	**16,155,941**	1,827,761
Staffing and administration	**8,075,093**	6,887,241
	28,794,665	19,655,840
Lifecycle Liability Management		
Contract services	**408,952**	618,388
Staffing and administration	**1,463,727**	1,215,588
	1,872,679	1,833,976
Amortization	**1,000,801**	799,700
Total expenses (Note 12)	**59,128,080**	46,824,866
Excess of revenue over expenses for the year	**-**	-
Net assets, beginning of year	**-**	-
Net assets, end of year	**-**	-

Statement of cash flows
year ended December 31, 2011

	2011	2010
	$	$
Operating activities		
Cash received from contributions	**65,273,395**	42,194,582
Interest received on short-term investments	**28,120**	6,536
	65,301,515	42,201,118
Cash paid for salaries and benefits, materials and services	**(56,545,227)**	(49,894,595)
	8,756,288	(7,693,477)
Investing activity		
Purchase of capital assets	**(1,385,804)**	(479,230)
Net increase (decrease) in cash	**7,370,484**	(8,172,707)
Cash, beginning of year	**2,565,656**	10,738,363
Cash, end of year (Note 3)	**9,936,140**	2,565,656

Notes to the financial statements

December 31, 2011

1. Description of organization

The Nuclear Waste Management Organization ("NWMO") is a not-for-profit corporation without share capital, established under the *Canada Corporations Act*, 1970 ("the Act"), as required by the *Nuclear Fuel Waste Act* (Canada), 2002 ("*NFWA*") which came into force November 15, 2002.

The *NFWA* requires electricity-generating companies which produce used nuclear fuel to establish a waste management organization. In accordance with the *NFWA*, the NWMO established an Advisory Council, conducted a study and provided recommendations on the long-term management of used nuclear fuel to the Government of Canada. The results of the study and the recommendations were submitted in November 2005. As part of the long-term mandate, the NWMO is now responsible for implementing 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 and Ontario Power Generation Inc. (OPG) ("Members") – which are Canadian companies that currently produce used nuclear fuel as a byproduct of electricity generation.

Pursuant to a Membership Agreement, the APM costs of the NWMO are shared pro rata by the Members based on the number of used fuel bundles owned by each member. The cost-sharing ratios among members have not been changed since inception of the Membership Agreement.

In addition to the above mandate, effective January 1, 2009, the NWMO entered into two new agreements with OPG to expand its operations to provide project management services for OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste (DGR services – Phase 1) and certain provision costing and accounting services relating to nuclear lifecycle liability management (LLM services).

Effective February 1, 2011, the NWMO entered into an Engineering, Procurement and Construction Management Agreement for the DGR phase 2 (design) and phase 3 (construction) services with OPG. The design services cover detailed engineering, geoscience characterization, environmental and safety assessment, community engagement and regulatory affairs. Phase 3, the construction services, is pending government approval, as well as both parties, OPG and the NWMO, mutually agreeing to proceed with this service.

2. Significant accounting policies

Basis of presentation

The financial statements of the NWMO are the representations of management, prepared in accordance with accounting standards for not-for-profit organizations established by the Canadian Institute of Chartered Accountants (CICA Handbook Part V) using the deferral method of reporting restricted contributions. The significant accounting policies adopted by the 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 and 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 associated cost has 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 owned by the NWMO 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

The NWMO's post-employment benefit programs include a contributory defined benefit registered pension plan, a defined benefit supplementary pension plan, and other post-employment benefits, including group life insurance, health care and long-term disability benefits. The NWMO has adopted the following policies with respect to accounting for these post-employment benefits:

(i) The NWMO accrues its obligations under pension and other post-employment benefit ("OPEB") plans. The obligations for pension and OPEB costs are determined using the projected benefit method pro-rated on service. Under this method, the benefit costs are amortized over the average remaining service period of active employees. Any excess of the net actuarial gain (loss) over 10% of the greater of the benefit obligation and the fair value of plan assets is amortized over the average remaining service period of active employees. The average remaining service period for active employees is 12 years (Note 8).

2. Significant accounting policies (continued)

(ii) The obligations are affected by salary levels, inflation and cost escalation of specific items (e.g. dental and health claims). Pension and OPEB costs and obligations are determined annually by independent actuaries using management's best estimate assumptions. The discount rates used by the NWMO in determining projected benefit obligations and the costs for the Organization's employee benefit plans are based on representative AA corporate bond yields.

(iii) Pension fund assets (approximately $30 million managed by the OPG pension investment manager, and $10 million by the NWMO pension investment manager) 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.

Research and development

Research and development costs are charged to operations in the year incurred.

Foreign currency translation

Monetary assets and liabilities denominated in foreign currencies are translated into Canadian currency at the year-end exchange rate. Any resulting gain or loss is reflected in staffing and administration expenses. Transactions in foreign currencies throughout the year have been converted at the exchange rate prevailing at the date of the transaction.

Financial instruments

The 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 and changes in net assets in the current period.
- Accounts 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.

The 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 organizations. Effective for fiscal years beginning on or after 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. The NWMO has decided to adopt the new Canadian accounting standards for not-for-profit organizations (under CICA Handbook Part III) for its fiscal year beginning on January 1, 2012. The impact of transitioning to these new standards has not been determined at this time.

3. Cash

Included in cash is an amount of $2,709,900 (2010 – $1,891,800) which is restricted as this amount is securing a letter of credit issued for the supplementary pension plan (Note 8).

	2011			2010
	Cost	**Accumulated amortization**	**Net book value**	Net book value
	$	**$**	**$**	$
Furniture and office equipment	**1,731,836**	**702,905**	**1,028,931**	1,037,646
Computer equipment and software	**1,223,369**	**744,309**	**479,060**	734,656
Leasehold improvements	**2,234,099**	**491,682**	**1,742,417**	1,093,103
	5,189,304	**1,938,896**	**3,250,408**	2,865,405

4. Capital assets

The net book value of leasehold improvements written off during the year, due to termination of a lease prior to the end of the lease term, resulted in a loss of $150,025, which is included in amortization expense.

5. Related party transactions, balances and other information

Transactions and balances not otherwise disclosed separately in the financial statements are as follows:

	APM	LLM/DGR	2011	2010
	$	$	$	$
Transactions during the year				
Member contributions				
Ontario Power Generation Inc.	**28,606,000**	**34,089,000**	**62,695,000**	40,168,075
NB Power	**1,201,000**	**-**	**1,201,000**	849,926
Hydro-Québec	**1,060,375**	**-**	**1,060,375**	787,254
	30,867,375	**34,089,000**	**64,956,375**	41,805,255
Transactions with Ontario Power Generation Inc.				
Payments				
Managerial services (included in staffing and administration)			**303,699**	31,335

Included in accounts receivable is an amount of $103,534 (2010 – $Nil) receivable from OPG.

Related party transactions are recorded at the exchange amount.

As of December 31, 2011, approximately $30 million (2010 – $28 million) 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). In accordance with the Pension Transfer Agreement, between the NWMO and OPG, certain fund expenses, administration charges and other adjustments may be deducted from these pension assets at the time of transfer. It is not possible for the NWMO to determine whether any deductions will be made by OPG or to estimate an amount at the reporting date.

6. Member contributions receivable and deferred member contributions

The NWMO receives contributions from its members and is solely funded through their contributions. The contributions received from the members are restricted in nature, and thus revenue is recognized when qualifying expenses are incurred. Amounts received in advance of qualifying expenses are recorded as deferred member contributions. Commitments for contributions which have not been received by the NWMO are recorded as contributions receivable when the amount is determinable and the ultimate collection is likely.

(a) Included in member contributions receivable is an amount of $Nil (2010 – $5,212,039) from OPG.

(b) Deferred member contributions

Deferred member contributions are made up of the following:

	2011	2010
	$	$
Deferred member contributions		
Ontario Power Generation Inc.	**150,902**	-
NB Power	**85,392**	55,370
Hydro-Québec	**27,864**	51,625
Atomic Energy of Canada Limited	**156,185**	166,927
	420,343	273,922

(c) Long-term deferred member contributions

Long-term deferred member contributions represent amounts received in advance to fund various employee future benefits as follows:

	2011	2010
	$	$
Deferred pension asset	**10,846,532**	9,321,260
Other post-employment benefits	**(7,020,912)**	(5,940,612)
Pension and other post-employment benefit liabilities – short term	**(70,000)**	(55,000)
	3,755,620	3,325,648

(d) The continuity of the deferred member contributions is as follows:

	2011	2010
	$	$
Balance, beginning of year		
Deferred member contributions – current	**273,922**	509,330
Deferred member contributions – long term	**3,325,648**	2,886,054
	3,599,570	3,395,384
Contributions received	**65,273,395**	42,194,582
Contributions receivable	**-**	5,212,039
Contribution revenue recognized	**(59,099,960)**	(46,818,330)
Amounts received previously recognized	**(5,212,039)**	(704,574)
Change related to capital contributions	**(385,003)**	320,469
	4,175,963	3,599,570
Balance, end of year		
Deferred member contributions – current	**(420,343)**	(273,922)
Deferred member contributions – long term	**3,755,620**	3,325,648

7. Deferred capital contributions

	2011	2010
	$	$
Balance, beginning of year	**2,865,405**	3,185,874
Contributions for the purchase of capital assets	**1,385,804**	479,230
Less amortization into revenue	**(1,000,801)**	(799,699)
Balance, end of year	**3,250,408**	2,865,405

8. Pension and other post-employment benefit plans

Effective January 1, 2009, the NWMO offers certain benefits to employees and retirees. A brief overview of these benefit plans is set out below.

(a) Registered pension plan

The registered pension plan is a contributory defined benefit plan covering most employees and retirees. The plan is funded, and fund assets include pooled funds that are managed by Connor, Clark & Lunn Investment Management Ltd. The benefit costs and assets related to this plan are recorded in the NWMO's financial statements.

(b) Supplementary pension plan

The supplementary pension plan is a defined benefit plan 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 the NWMO and are between the ages of 55 and 65.

The most recent actuarial valuation in accordance with CICA Handbook Section 3461 of the pension and supplementary pension plans was completed as of December 31, 2011. The valuation of the other post-retirement benefit plans as of December 31, 2011, is based on an extrapolation of the previous valuation.

A funding valuation, which was completed for the pension plan as of January 1, 2011, reported a surplus of $6.3 million on a going concern basis and a deficit of $5.2 million on a solvency basis.

The significant actuarial assumptions adopted in estimating the NWMO's accrued benefit obligations are as follows:

	Registered pension plan		Supplementary pension plan		Other post-employment benefits	
	2011	2010	**2011**	2010	**2011**	2010
	%	%	**%**	%	**%**	%
Assumptions for Benefit obligation and costs						
Discount rate at the beginning of the period	**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**	6.5
Discount rate at the end of the period	**4.75**	5.5	**4.75**	5.5	**4.75**	5.5
Expected return on plan assets	**6.5**	6.5	**-**	-	**-**	-
Average remaining service life for employees	**12 years**	12 years	**12 years**	12 years	**16 years**	16 years

Information for the NWMO's pension and post-employment benefits, including long-term disability (LTD) at December 31, 2011, is as follows:

	Registered pension plan		Supplementary pension plan		Other post employment benefits/LTD	
Year ended December 31	**2011**	2010	**2011**	2010	**2011**	2010
	$	$	**$**	$	**$**	$
Changes in accrued benefit obligation						
Accrued benefit obligation, January 1	**(30,113,000)**	(26,002,000)	**(2,154,100)**	(1,332,000)	**(6,207,942)**	(5,796,000)
Current service cost	**(1,434,000)**	(1,288,000)	**(281,000)**	(297,000)	**(394,000)**	(386,000)
Interest cost	**(1,747,000)**	(1,512,000)	**(137,000)**	(91,000)	**(350,000)**	(327,000)
Transfer in/buyback	**(1,668,379)**	-	**-**	-	**-**	-
Employee contribution	**(769,621)**	(749,000)	**-**	-	**-**	-
Benefits paid	**629,000**	343,000	**103,048**	37,900	**77,000**	99,058
Net actuarial (loss) gain	**(6,580,000)**	(905,000)	**(49,000)**	(472,000)	**(1,153,000)**	202,000
Accrued benefit obligation, December 31	**(41,683,000)**	(30,113,000)	**(2,518,052)**	(2,154,100)	**(8,027,942)**	(6,207,942)
Changes in plan assets						
Fair value of plan assets, January 1	**34,960,000**	28,573,000	**-**	-	**-**	-
Actual return on plan assets	**1,863,000**	3,435,000	**-**	-	**-**	-
Employees' transfers/buyback	**1,668,379**	-	**-**	-	**-**	-
Benefits paid	**(629,000)**	(343,000)	**-**	-	**(77,000)**	(99,058)
Employer's contributions	**2,421,000**	2,546,000	**-**	-	**77,000**	99,058
Employees' contributions	**769,621**	749,000	**-**	-	**-**	-
Fair value of plan assets, December 31	**41,053,000**	34,960,000	**-**	-	**-**	-
Funded status						
(Unfunded benefit obligation) funded excess	**(630,000)**	4,847,000	**(2,518,052)**	(2,154,100)	**(8,027,942)**	(6,207,942)
Unamortized net actuarial loss	**11,476,532**	4,474,260	**794,000**	793,000	**2,661,082**	1,573,430
Accrued benefit asset (liability), December 31	**10,846,532**	9,321,260	**(1,724,052)**	(1,361,100)	**(5,366,860)**	(4,634,512)
Short-term portion	**-**	-	**(4,000)**	-	**(66,000)**	(55,000)
Long-term portion	**10,846,532**	9,321,260	**(1,720,052)**	(1,361,100)	**(5,300,860)**	(4,579,512)
	10,846,532	9,321,260	**(1,724,052)**	(1,361,100)	**(5,366,860)**	(4,634,512)
Components of cost recognized						
Current service cost, net of employee contribution	**1,434,000**	1,288,000	**281,000**	297,000	**394,000**	386,000
Interest cost on accrued benefit obligation	**1,747,000**	1,512,000	**137,000**	91,000	**350,000**	327,000
Amortization of net actuarial loss	**82,000**	199,000	**48,000**	17,000	**65,000**	80,000
Expected return on plan asset	**(2,367,000)**	(1,953,000)	**-**	-	**-**	-
Cost recognized	**896,000**	1,046,000	**466,000**	405,000	**809,000**	793,000

The pension and other post-employment benefit costs recognized are included in the respective expense categories in the statement of operations and changes in net assets.

8. Pension and other post-employment benefit plans (continued)

Other post-employment benefits/LTD	2011	2010
	$	$
Effect of 1% increase in health care cost trends on:		
Accrued benefit obligation	**1,739,000**	1,181,000
Service cost and interest cost	**168,000**	154,000
Effect of 1% decrease in health care cost trends on:		
Accrued benefit obligation	**(1,319,000)**	(917,000)
Service cost and interest cost	**(125,000)**	(115,000)

The supplementary pension plan is not funded, but is secured by a letter of credit totaling $2,709,900 (2010 – $1,891,800).

9. Deferred lease inducements

	2011	2010
	$	$
Tenant inducements	**408,242**	263,076
Less accumulated amortization	**(146,381)**	(80,749)
	261,861	182,327

10. Guarantees

In the normal course of business, the NWMO enters into agreements that meet the definition of a guarantee.

(a) The NWMO has provided indemnities for various agreements such as lease agree ments. Under the terms of these agreements, the NWMO agrees to indemnify the counterparty for various items, including, but not limited to, all liabilities, loss, suits and damages arising during, on or after the term of the agreement.

(b) The NWMO indemnifies all directors, officers and employees acting on behalf of the NWMO for various items, including, but not limited to, all costs to settle suits or actions due to services provided to the NWMO, subject to certain restrictions.

The nature of these indemnification agreements prevents the NWMO from making a reasonable estimate of the maximum exposure due to the difficulties in assessing the amount of liability which stems from the unpredictability of future events and the unlimited coverage offered to counterparties. Historically, the NWMO has not made any payments under such or similar indemnification agreements, and therefore, no amount has been accrued with respect to these agreements.

The NWMO also arranged a standby Letter of Credit to secure its supplementary pension plan (Note 8).

11. Commitments

The NWMO has entered into a number of leases for office premises which expire at various dates up to July 2017.

The estimated annual minimum payments over the initial term of these leases for the next 5 years and thereafter are as follows:

	$
2012	702,465
2013	740,965
2014	656,233
2015	537,608
2016	537,608
Thereafter	268,804
	3,443,683

12. Segment reporting

The NWMO has two reportable segments as follows:

- Federal mandated program (Adaptive Phased Management for the long-term management of used nuclear fuel – "APM").
- Other direct services outside its mandated programs, which include the Deep Geologic Repository (DGR) and Lifecycle Liability Management (LLM) for Ontario Power Generation Inc. with service contracts which became effective January 1, 2009, and February 11, 2011.

Segment information is as follows:

	APM		DGR/LLM		Total	
Year ended December 31	**2011**	2010	**2011**	2010	**2011**	2010
	$	$	**$**	$	**$**	$
Contribution revenue	**28,292,734**	25,251,176	**30,807,226**	21,567,154	**59,099,960**	46,818,330
Interest income	**13,216**	3,856	**14,904**	2,680	**28,120**	6,536
Total revenue	**28,305,950**	25,255,032	**30,822,130**	21,569,834	**59,128,080**	46,824,866
Operating cost	**27,459,935**	24,535,350	**30,667,344**	21,489,816	**58,127,279**	46,025,166
Amortization of capital assets	**846,015**	719,682	**154,786**	80,018	**1,000,801**	799,700
Total expenses	**28,305,950**	25,255,032	**30,822,130**	21,569,834	**59,128,080**	46,824,866
Expenditure for capital assets	**874,442**	316,771	**511,362**	162,459	**1,385,804**	479,230

The allocation of the common service costs to each function of the above segment is based on the number of direct staff in each function.

13. Capital management

In managing capital, the 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. The NWMO has sufficient liquid resources to meet its current obligations.

Commonly Used Abbreviations

AECL	Atomic Energy of Canada Ltd.
APM	Adaptive Phased Management
BRC	US Blue Ribbon Commission on America's Nuclear Future
CNS	Canadian Nuclear Society
CNSC	Canadian Nuclear Safety Commission
CSRP	Corporate Social Responsibility Program
EDRAM	International Association for Environmentally Safe Disposal of Radioactive Materials
EPRI	Electric Power Research Institute
ESP	Enhanced Sealing Project
FCM	Federation of Canadian Municipalities
FORGE	Fate of Repository Gases Project
GAO	US Government Accountability Office
GAP	Greenland Analogue Project
HQ	Hydro-Québec
IAEA	International Atomic Energy Agency
IRC	Industrial Research Chair
ITRG	Independent Technical Review Group
LWR	Light Water Reactor
MILSET	International Movement for Leisure Activities in Science and Technology
NBPN	NB Power Nuclear
NDA	UK Nuclear Decommissioning Authority
NEA	Nuclear Energy Agency
NFWA	*Nuclear Fuel Waste Act*
NSCA	*Nuclear Safety and Control Act*
NSERC	Natural Sciences and Engineering Research Council
NWMO	Nuclear Waste Management Organization
NWTRB	US Nuclear Waste Technical Review Board
OECD	Organisation for Economic Co-operation and Development
ONFA	*Ontario Nuclear Funds Agreement*
OPG	Ontario Power Generation Inc.
SKB	Swedish Nuclear Fuel and Waste Management Company
UNENE	University Network of Excellence in Nuclear Engineering
WWMF	Western Waste Management Facility

Learning More Together

Annual Report 2011