PEOPLE. SCIENCE. INDIGENOUS KNOWLEDGE.

Moving towards partnership

Annual Report 2018

nwmo

NUCLEAR WASTE MANAGEMENT ORGANIZATION

SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Correction

On page 76, in the table header, it should read, “Trust fund balance ($ million) December 2018.”

NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

The Honourable Amarjeet Sohi
Minister of Natural Resources
Ottawa, ON K1A 0A6

March 2019

Dear Minister,

We are pleased to submit to you the annual report of the Nuclear Waste Management Organization (NWMO) for fiscal year 2018.

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

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

Respectfully submitted,

Wayne Robbins
Chairman

Laurie Swami
President and CEO

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1 Introduction to the NWMO

Welcome

Welcome to the Nuclear Waste Management Organization's (NWMO) annual report for 2018. Like last year, our theme is "Moving towards partnership." The title reflects our organization's momentum in creating partnerships of many kinds. With communities. With Canadians. With Indigenous peoples. With scientists. With universities. With other countries. With employees.

As we move towards partnership, safety is at the heart of everything we do.

In the following pages, we outline our activities and achievements for the year, highlight some of the exceptional people powering this project, describe how we are preparing for the future, and provide an update on our financial position.

Submitting this report to Canada's Minister of Natural Resources – and making it available to the public – fulfils one of our obligations under the *Nuclear Fuel Waste Act* (*NFWA*). As specified by the *Act*, our annual reports follow a three-year cycle: two annual reports followed by a triennial report that outlines the three previous years of activity. Next year, our triennial report 2017-19 will provide a précis of the theme "Moving towards partnership."

We hope this document serves to inform and enlighten you on who we are and what we are doing.

Values

Six fundamental values guide our work.

SAFETY

We place all aspects of public and employee safety – including environmental, conventional, nuclear, and radiological safety – first and foremost in everything we do.

INTEGRITY

We act with openness, honesty and respect.

EXCELLENCE

We use the best knowledge, understanding, and innovative thinking, and seek continuous improvement in all that we do in our pursuit of excellence.

COLLABORATION

We engage in a manner that is inclusive, is responsive, and supports trust, constructive dialogue, and meaningful partnership.

ACCOUNTABILITY

We take responsibility for our actions, including wise, prudent and efficient management of resources.

TRANSPARENCY

We communicate openly and responsibly, providing information about our approach, processes and decision-making.

Our place in the nuclear cycle

For nearly 60 years, Canada has been using nuclear power as a reliable energy source – to light our homes, businesses, schools, and hospitals.

As worldwide demand for energy grows and action on climate change intensifies, nuclear power is increasingly part of the conversation.

The NWMO's role is to ensure used nuclear fuel is safely managed in the very long term.

We must get this right. It is important for the environment, for industry, for Canadians, and for all nuclear countries that are pursuing similar projects and working together to share knowledge and best practice.

About the NWMO

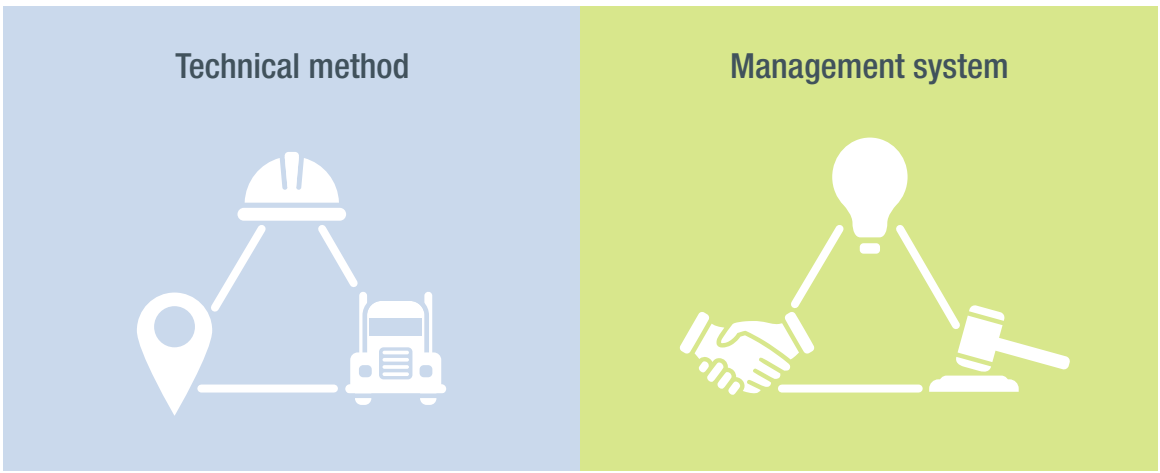
Canadians have said they want to move forward now on managing used nuclear fuel – and not leave it for future generations.

In 2002, the Government of Canada, through the *NFWA*, assigned responsibility for the long-term management of Canada's used nuclear fuel to the NWMO. Our organization was established by Canada's major nuclear fuel waste owners – Ontario Power Generation, Hydro-Québec and New Brunswick Power Corporation – and operates on a not-for-profit basis.

Canada's plan, called Adaptive Phased Management (APM), emerged through a three-year dialogue with Canadians (2002-05), including Indigenous peoples. Details of those conversations were outlined in *Choosing a Way Forward – The Future Management of Canada's Used Nuclear Fuel (Final Study)*, issued in November 2005.

In June 2007, the Government of Canada selected APM as Canada's plan for the long-term management of used nuclear fuel.

Adaptive Phased Management



APM involves both a technical plan, and a phased and flexible implementation plan.

APM is both a technical method (what we plan to build) and management system (how we will work with people to get it done). The technical method involves developing a deep geological repository in a suitable rock formation to safely contain and isolate the used nuclear fuel. The management system involves phased and adaptive decision-making – supported by public engagement and continuous learning. Central to the management system is an open, fair and inclusive site selection process.

Safety

Safety is a core value. The NWMO's commitment to safety applies to everything we do, from day-to-day activities to eventual impacts in the very long term. In the present-day, we start meetings with a "safety moment;" we work hard to promote the health and safety of employees; and our technical work is governed by stringent safety standards. Looking to the future, we are committed to ensuring our project keeps people and the environment safe from used nuclear fuel for hundreds of thousands of years. All aspects of our work will meet or exceed applicable federal and provincial regulatory standards and requirements for protecting the health, safety and security of people and the environment.

Guided by an Ethical and Social Framework

We are guided by an Ethical and Social Framework that was developed during the study phase of our work. It was first published in 2004, and we continue to use it and build upon it as we advance the project.

The ethical principles incorporated in the framework are respect for life in all its forms, including minimization of harm to human beings and other sentient creatures; respect for future generations of human beings, other species, and the biosphere as a whole; respect for peoples and cultures; justice (across groups, regions and generations); fairness (to everyone affected, and particularly to minorities and marginalized groups); and sensitivity to the differences of values and interpretation that different individuals and groups bring to the dialogue.

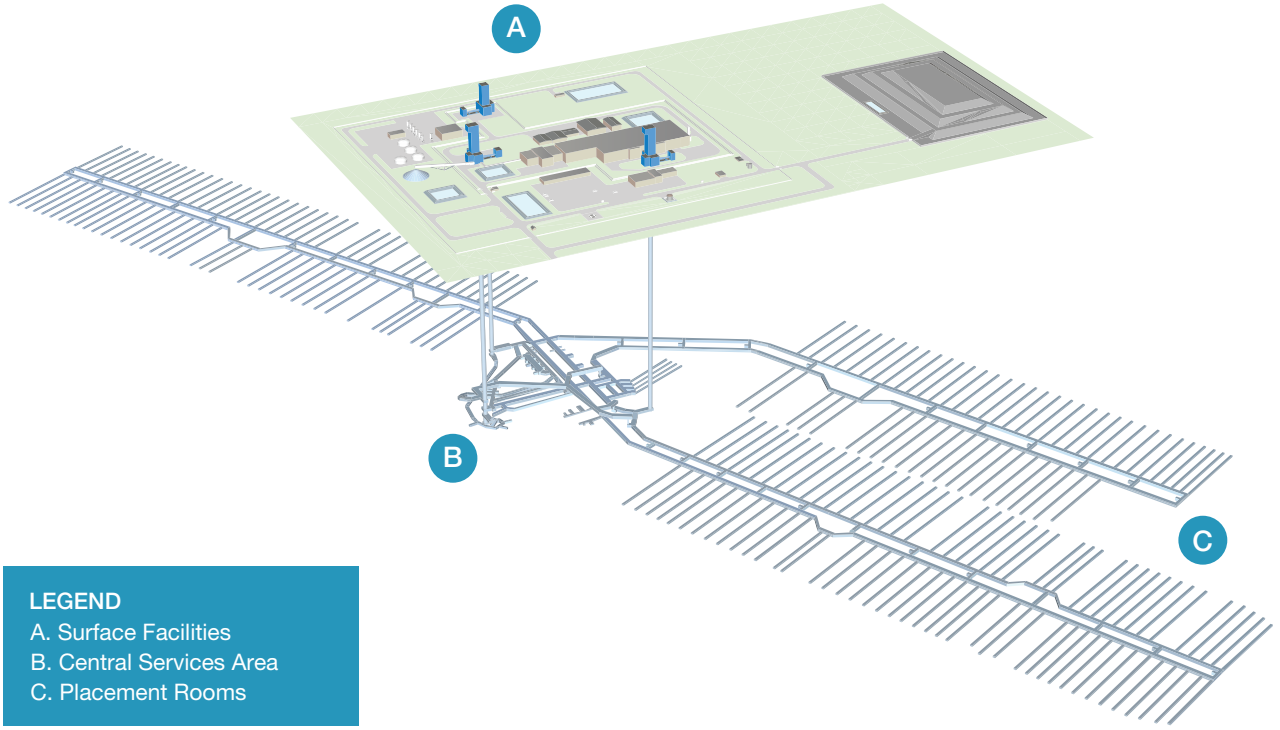
The framework was updated in 2018 to align with the current phase of work. For more detail, please see www.nwmo.ca/ethicalandsocial.

Public engagement and continuous learning are cornerstones of APM.

The deep geological repository

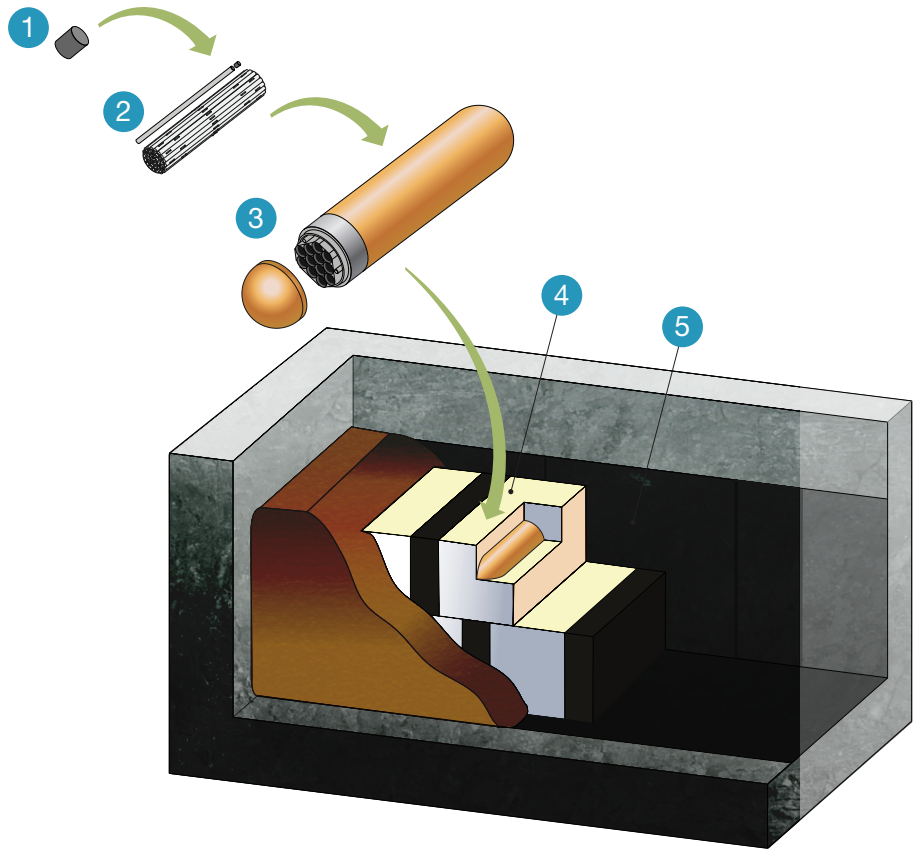
The deep geological repository is a multiple-barrier system designed to safely contain and isolate used nuclear fuel over the long term. It will be constructed at a depth of approximately 500 metres and consists of a network of placement rooms for the used nuclear fuel. The exact depth will depend upon the geology of the site chosen.

At the surface, there will be facilities where the used fuel is received, inspected and repackaged into purpose-built containers before being transferred to the main shaft for underground placement. There will also be facilities for administration, quality, security, processing of sealing material, and ongoing operation of the site.



LEGEND
A. Surface Facilities
B. Central Services Area
C. Placement Rooms

This diagram reflects the latest conceptual layout for the surface facilities, and the underground services area and placement rooms. This will continue to become more detailed as the project progresses.



This diagram shows the multiple-barrier system that will contain and isolate the used nuclear fuel.

Inside the deep geological repository, five barriers will work together to safely contain and isolate the used nuclear fuel from people and the environment.

1. The first barrier is the fuel pellet. Fuel pellets are ceramic, made from highly durable baked uranium dioxide powder; they are stored end-to-end in long tubes made of a strong corrosion-resistant metal.
2. The second barrier is the fuel bundle, which contains a number of these tubes.
3. The third barrier is a copper-coated, steel container. The containers are engineered to resist corrosion, and strong enough to keep the used nuclear fuel completely isolated until its radioactivity decreases to safe levels.
4. The fourth barrier is a buffer box made of highly compacted bentonite clay, which encases each container. Bentonite clay is a natural material proven to be a powerful barrier to water flow. It is also very stable, as observed in natural formations that are hundreds of millions of years old. Buffer boxes will be placed in rooms deep within the repository.
5. The fifth barrier is the rock itself, which will protect the repository from disruptive natural events, water flow and human intrusion.

The project also involves the development of a Centre of Expertise for technical, environmental and community studies.

Selecting a site

Where will the deep geological repository be located? In 2010, the NWMO initiated a site selection process to seek an informed and willing host, which is still underway. The process is community-focused, and underpinned by safety, fairness, collaboration, and shared decision-making. Fundamental to the process is the understanding that the APM project will only proceed with the involvement of the interested local community, First Nation and Métis communities, and surrounding communities, working in partnership to implement it.

With 22 communities initially expressing interest in learning about and potentially hosting the project, the NWMO began assessments for suitability. A series of progressively more detailed scientific, technical and social assessments has resulted in a gradual narrowing down of potential sites to five. The NWMO expects to select a preferred single site for the repository by about 2023. More information about the site selection process is available at www.nwmo.ca/sitingprocess.

Our timelines

The following graphic provides a glimpse at historic and future milestones of the project.

Developing Canada's plan	2002	The NWMO is created.
	2005	The NWMO completes three-year study with interested individuals, including specialists, Indigenous peoples and the Canadian public.
	2007	Government of Canada selects APM and mandates the NWMO to begin implementation.
Developing the siting process	2008 to 2009	Work takes place with citizens to design a process for selecting a preferred central site for the deep geological repository and Centre of Expertise.
Identifying a site using the siting process	2010	The siting process is initiated, with a program to provide information, answer questions and build awareness.
	2010 to 2013	Twenty-two communities initially express interest. In collaboration with interested communities, the NWMO conducts initial screenings.
	2012 to 2015	Preliminary studies are initiated to further assess suitability. Areas with less potential to meet project requirements are eliminated from further consideration.
	2015 to 2023	The NWMO expands assessment to include field studies. Areas with less potential are eliminated from further consideration.
	2017	Initial borehole drilling begins.
	2018	**Five communities remain in the site selection process.**
	2019 to 2023	Narrowing down process and subsurface studies continue.
	2023	A single preferred site is identified.
Towards construction	2024	Detailed site characterization begins. Construction of the Centre of Expertise begins.
	2028	Construction licence application submitted.
	2032	Construction licence granted (estimate).
Beginning operations	2040 to 2045	Operations of the deep geological repository begin.

The NWMO by the numbers

The NWMO is
16
years old.

We are planning
to select a preferred
single site for the deep
geological repository by
2023.

There are
5
areas remaining in the
site selection process.

We have
knowledge-sharing
agreements with
8
other countries.

The NWMO has
research projects
underway with
15
universities.

In 2018

We reached out to more than **14,000** youth through a variety of programs and outreach.

We conducted **45** Indigenous engagement activities with young people.

85% of our staff has received Indigenous cultural awareness training.

Our technical staff hosted **32** tours at our proof test facility.

We made **39** presentations to community liaison committees on APM-related topics.

We published **62** news articles on our website at www.nwmo.ca.

We sponsored **110** local initiatives proposed by communities.

We have **163** people working for us at our Toronto headquarters, at our proof test facility in Oakville and in community offices.

Our technical safety team prepared a **7th** safety case study.

2 Messages

Wayne Robbins, Chairman

It is my great pleasure to be involved in an organization that is fulfilling a very important mandate for the country – to safely and cost-effectively manage Canada's used nuclear fuel over the long term.

Much was accomplished in 2018, as the NWMO continued to advance the site selection process, further develop the engineered-barrier system that will be used in the deep geological repository, and conduct transportation studies. Also laudable is the NWMO's attention to, and preparations for, the next stages of the project, once a site is selected.

I cannot emphasize enough the expertise and varied capabilities of the NWMO team. Led by President and CEO Laurie Swami and her dedicated executive committee, employees across the organization continue to define excellence.

The Board of Directors takes an active role in overseeing the NWMO and leading strategic direction, particularly vital during this time of acceleration towards the future. We also oversee the succession planning functions that are so important in an organization that has timelines measured over decades.

While Adaptive Phased Management (APM) is a long-term project, it also has firm milestones, objectives and targets. In 2018, the Board focused on ensuring the NWMO has the necessary financial and human resources it needs to deliver on each phase of its mandate in a timely manner.

We are a hands-on Board. In the last year, we attended conferences, events and meetings to support the NWMO's work in building and strengthening relationships with key stakeholders. We met with not only industry leaders and government officials, but also a number of community leaders who are involved in the NWMO's site selection process, to hear their viewpoints and concerns. We participated in Indigenous ceremonies and took an active role in supporting the NWMO's initiatives on reconciliation.

The Board continued to regularly hear from the Advisory Council and receive its important contributions to the NWMO's work. Again this year, we met with and received feedback from the Council of Elders and Youth, an advisory body made up of First Nation and Métis Elders and youth.

In addition to our regular oversight function, we are committed to monitoring factors in the external landscape that could have a bearing on the APM project. APM is – by its essence, by its name, and indeed, by law – "adaptive." It is important to regularly gauge advances in the energy sector, challenges in obtaining social licence, and developments in nuclear waste management, and be ready to adjust the plan accordingly.

With strong oversight and exceptional leadership, the NWMO is making excellent progress in implementing the APM program for Canada's used nuclear fuel.

In this, Canadians can trust.

I invite you to read the following pages, which contain highlights of the NWMO's many activities in 2018.

Wayne Robbins

Chairman

Laurie Swami, President and Chief Executive Officer

Our people represent a wide range of disciplines, from geoscience to social engagement, engineering to finance, Indigenous Knowledge to communications, environmental protection and law.

Together with communities, we are implementing Canada's plan for used nuclear fuel.

But there is far more. We are innovating and educating – and always striving to be at the top of our game – so that national and even international conversations about clean energy include safe and acceptable solutions for nuclear waste. This is our unique opportunity.

As we approach 2023, when we expect to select a single preferred site for Canada's deep geological repository, the tempo and volume of our work have increased. We are preparing in a myriad of ways for that major milestone, while adapting to shifting priorities.

Early in 2018, we completed drilling our first borehole, the first of many that will be needed in our study areas. This allows us to analyze rock well below the surface, where the deep geological repository will be located. Our geoscience team is meticulously managing the analysis of the information, which will be added to social, cultural, environmental, and transportation considerations, to inform site selection.

Continuing our momentum, we are at the site, building roads and clearing the land to prepare to drill additional boreholes in 2019.

Also in the last year, we deepened the conversations about partnership in all the study areas involved in our project. In order to select a site, we need to have strong, aligned partnerships in place – not only with the municipalities in the siting area, but also with First Nation and Métis communities.

In all the work we do, we are committed to including Indigenous perspectives. In 2018, we took a significant step towards reconciliation with Indigenous peoples by acknowledging historical wrongs in Canada's past and the need to create a better future. This acknowledgment formed part of our Reconciliation Statement, which was finalized through an Indigenous ceremony. Many of us who took part, including leaders of the NWMO, the Board of Directors, and the Council of Elders and Youth, found it profoundly moving.

Another focus of effort that touches me deeply is encouraging the next generation to explore the STEM (science, technology, engineering, and mathematics) professions. The NWMO is very active in this area, providing sponsorships and donations so that children in the communities we work with can benefit from learning about science. How thrilling it is to see children programming robots, an activity made possible through our funding!

On the technical side of the NWMO, our engineers pushed hard to prepare for two major activities that will begin in 2019. One is serial production of the Canadian-designed used fuel container, and the other is preparations for a full-scale trial of emplacing the bentonite

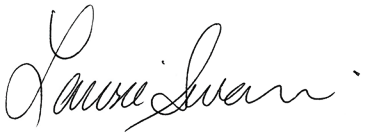
clay buffer boxes into a mock emplacement room. Our technical safety team also completed work to prepare our seventh detailed safety assessment in preparation for the eventual regulatory process.

Another highlight for the NWMO in 2018 was renewing co-operation agreements with five of our international counterparts – bringing our total to eight countries. This is significant because it demonstrates our continued commitment to sharing the very best information not only within Canada, but also around the world.

Our year was also defined by mobilizing beyond site selection in 2023 – preparing for the regulatory phase of Adaptive Phased Management, building awareness of the project among an emerging audience, being alert and ready to manage future risks, and ensuring we strike the right note in terms of human resources and workplace safety culture.

This report takes you inside the NWMO's year, and provides more detail on our progress and finances.

Canada's plan for used nuclear fuel is robust and technically sound. It is respectful of all peoples. On this, we are resolute. And in this, we take great pride.



Laurie Swami

President and CEO

3 Understanding and honouring Indigenous perspectives

Since our inception in 2002, the NWMO has been walking shoulder to shoulder with Indigenous peoples (First Nation and Métis).

Our commitment to understand and honour the perspectives of Indigenous peoples is manifest in many ways. We have an Indigenous engagement team building relationships in communities, as well as an Indigenous relations team ensuring there are robust policies to guide this work. There is Indigenous representation on our senior leadership team, Board of Directors and Advisory Council.

We receive guidance from the Council of Elders and Youth, an advisory body made up of First Nation and Métis Elders and youth. The emphasis of the Council is applying Indigenous Knowledge in implementing Adaptive Phased Management, and protecting air, land, fire, water, plants, medicines, animals, and humans.

As well as receiving ongoing guidance from the Council of Elders and Youth, we continue to follow and advance well-established practices: learning about legacy issues; marking important corporate occasions and milestones through ceremony; and adhering to our Indigenous Knowledge Policy, which was blessed by Indigenous ceremony.

In addition, our staff and contractors participate in Indigenous cultural awareness training.

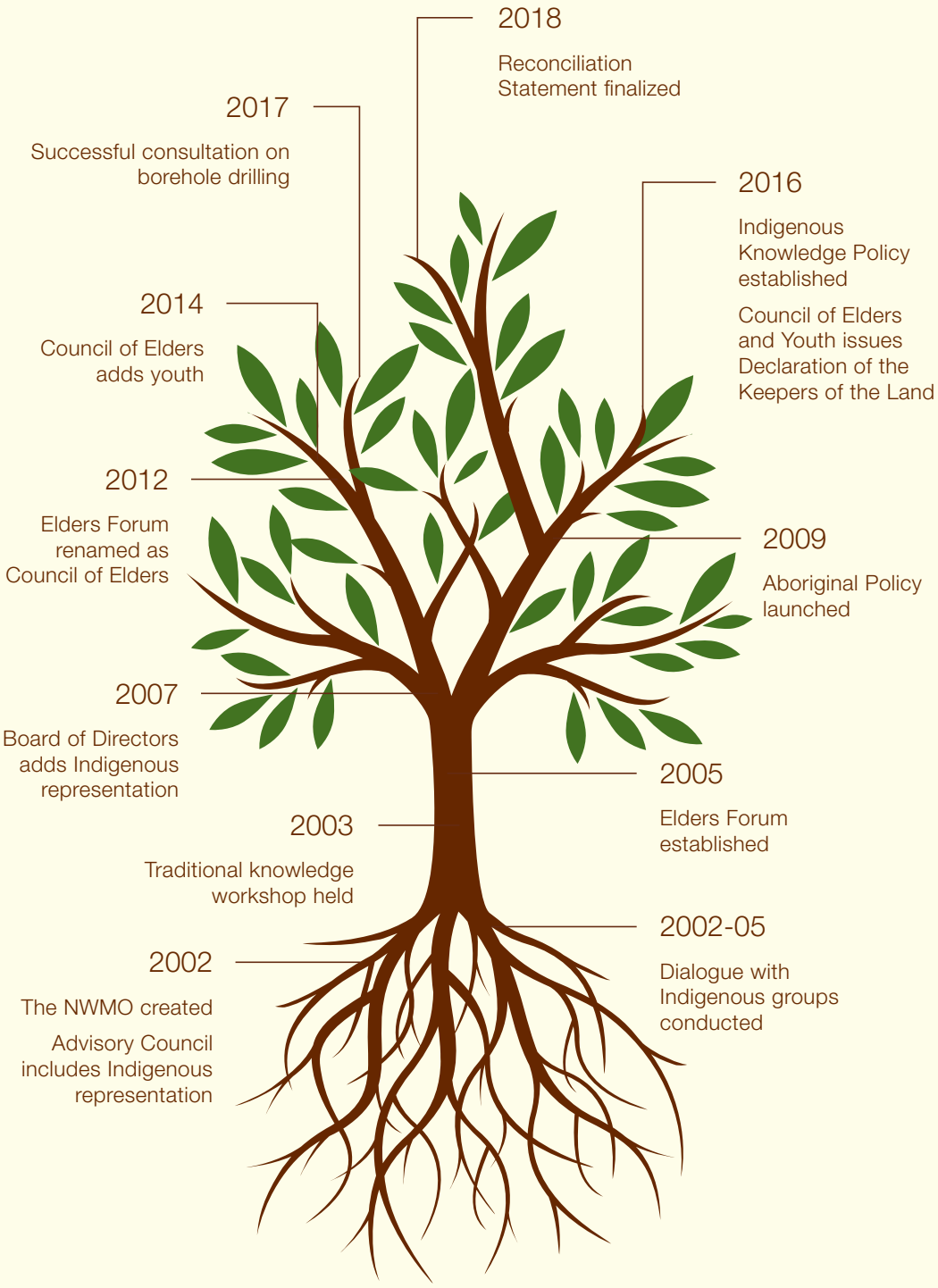
Building on this track record, 2018 saw significant steps forward in two vital imperatives:

- Contributing to reconciliation in a meaningful way; and
- Taking action to interweave Indigenous Knowledge with western science in decision-making.

Elder Debbie Plain performs a smudge at the ceremony to bless the Reconciliation Statement.

Elder Billie Schibler (foreground, left) and Elder Diane Longboat (foreground, right) sign the Reconciliation Statement.

NWMO MILESTONES
in Indigenous Relations



3 Understanding and honouring Indigenous perspectives

Reconciliation

In July 2018, we made a significant step towards reconciliation by acknowledging historical wrongs in Canada's past and the need to create a better future by addressing the challenges of today.

This is our initial response to calls to action of the Truth and Reconciliation Commission of Canada in 2015. Call to action number 92 calls upon the corporate sector to build respectful relationships with Indigenous peoples, and provide education for management and staff on the history of Indigenous peoples, including the history and legacy of residential schools.

The acknowledgment of historical wrongs forms part of the NWMO's Reconciliation Statement, which was finalized through an Indigenous ceremony in July. Members of the Council of Elders and Youth, the Board of Directors and senior leadership of the NWMO took part in a Pipe Ceremony and traditional gift exchange.

The statement recognizes the NWMO's ongoing involvement, collaboration, and discussions with Indigenous communities and all those involved with implementing Canada's plan for the long-term management of used nuclear fuel.

Building on the statement, the NWMO is now working on a Reconciliation Policy to be launched in 2019. The policy will include an implementation strategy to measure annually the organization's progress and commitment to Indigenous peoples and their history and future.

The NWMO's Reconciliation Statement

In the context of reconciliation, the Nuclear Waste Management Organization (NWMO) recognizes historical wrongs in Canada's past and the need to create a better future by addressing the challenges of today. The NWMO Council of Elders and Youth speaks of this journey as a new era for humanity – a time of reconciliation with First Nation, Métis and Inuit peoples.

The NWMO is committed to contribute to reconciliation in all its work by co-creating a shared future built on rights, equity and well-being. In addition, the NWMO will establish a Reconciliation Policy with an implementation strategy that will be measured annually and publicly reported to contribute to the Truth and Reconciliation Commission's calls to action.

Building towards a reconciliation culture

In 2018, the NWMO established a multi-pronged reconciliation program. Initiatives throughout the year included opening major seminars, workshops and meetings – including several international meetings we hosted – with traditional Indigenous ceremony; providing Indigenous cultural awareness training for not only staff, but also the Advisory Council and municipalities; incorporating some Indigenous Knowledge protocols into our internal Code of Conduct policy; incorporating land recognition statements as part of meeting practices; and arranging staff activities to raise awareness of Indigenous history and stories to encourage meaningful discussion – which included celebrating National Indigenous Peoples Day and participating in Orange Shirt Day. The diagram on the next page provides a glimpse of upcoming goals for the reconciliation program.

WHAT WAS SAID

on reconcilitation

Diane Longboat, Turtle Clan, Kanienkehaka (Mohawk) Nation at Six Nations Grand River Territory, is a member of the NWMO Council of Elders and Youth, and an Indigenous Education Advisor to the Premier of Ontario and to the Minister of Education.

"The NWMO is demonstrating leadership by interweaving First Nation and Métis voices and Indigenous Knowledge systems into its ongoing work. Taking an active role in reconciliation and responding to the recommendations of the Truth and Reconciliation Commission will serve the NWMO well as it works to build meaningful relationships founded on mutual trust and collaboration with First Nation and Métis peoples, their organizations and communities."

– Elder Diane Longboat

NWMO RECONCILIATION STRATEGY

The NWMO will establish a Reconciliation Policy to contribute to the Truth and Reconciliation Commission of Canada's calls to action. It will have an implementation strategy that will be measured annually and reported publicly.

As defined in the Truth and Reconciliation Commission of Canada's final report, reconciliation is an ongoing process of establishing and maintaining respectful relationships.

2018

85 per cent of NWMO staff received cultural awareness training

Reconciliation Statement finalized through Indigenous ceremony

2019

Publish Reconciliation Policy

Develop and deliver reconciliation training program

Develop a corporate reconciliation baseline assessment tool

Enhance sponsorships and donations program to include a focus on reconciliation

Continue to communicate the NWMO's reconciliation program with communities involved in the site selection process

Begin assessment of the NWMO's policies and procedures against reconciliation assessment tool

2020 and beyond

Assess corporate reconciliation baseline and develop additional activities

Enhance human resources practices and procedures to address reconciliation

Develop an Indigenous youth strategy to include a scholarship program and recruitment strategy

Enhance procurement program to include an Indigenous strategy

Interweaving Indigenous Knowledge with modern science

In August 2018, the NWMO held the first workshop to bring together Indigenous Knowledge keepers and scientists, and explore ways of working together to implement Canada's plan for used nuclear fuel. Attendees focused on elements of the multiple-barrier system – copper, clay and rock – that is planned to contain and isolate used nuclear fuel in the deep geological repository.

The two-day workshop featured Indigenous Elders and community members, advisors to the NWMO, experts in traditional knowledge, leaders and staff at the NWMO, as well as academics and professors from Canada, the United States and South Africa.

They shared information and perspectives on how Indigenous Knowledge and western science can be interwoven into research applications. For instance, Indigenous Knowledge that includes advice and guidance received through ceremony can be combined with digital data collection and laboratory analysis to understand an area of land from multiple dimensions.

The NWMO will continue to explore new opportunities for Indigenous Knowledge holders and scientists to work together and inform research on the long-term performance of the multiple-barrier system in a deep geological repository.

Describing the journey of water

Water is a subject of vital importance to people. Several communities in our site selection process, particularly Indigenous communities, asked us to provide more information about how our project will protect water.

We have been working closely with these communities to tell the story of water's journey deep underground, one of many factors that is important in planning a deep geological repository. In 2018, the NWMO and communities developed a second iteration of the story, which highlights the special relationship between clay and water, and how this applies to our project.

We continue to reach out to Indigenous peoples to gather their views and questions on water, rock, clay, and other subjects. This ongoing feedback is crucial as Indigenous and other communities consider the project in the context of their long-term interests and well-being.

POWERED BY PEOPLE

Bob Watts, Vice-President, Indigenous Relations, is an integral part of the NWMO's journey towards reconciliation.

Bob has Mohawk and Ojibway ancestry, and is a member of the Six Nations of the Grand River. He is a graduate of Harvard University, and an adjunct professor and distinguished fellow in the School of Policy Studies at Queen's University.

Bob wants the future for Indigenous peoples to be good. While he has witnessed the impact of "the worst parts of colonization" on his family and community – and is certainly no stranger to blockades, street protests and rallies – this father of three and grandfather of seven chooses to channel his passion for change in a more macro direction.

His distinguished career includes being former Chief Executive Officer of the Assembly of First Nations (AFN) and former Assistant Deputy Minister for the Government of Canada. He also helped to establish Canada's Truth and Reconciliation Commission.

"I do not want to be stuck in a negative spot," he says. "I am a strong believer that change is possible. I believe that we can create a different future."

Working at the NWMO is a good fit for him, he says, because of the organization's focus on Indigenous engagement, partnership, respectful relations, and reconciliation. The NWMO, he says, is among only a handful of corporations across the country leading the way in this regard. He is confident it will continue to do so.

"We are really fortunate that we have a Board that has trusted us enough to take risks, an Advisory Council that guides us in how to do it, the wisdom of the Council of Elders and Youth on how and why we do it, and communities pushing us saying we have to do it. We have our own leaders moving it forward, making it part of the everyday conversation," he says.

Bob finds the NWMO's focus on Indigenous relations exciting, inspiring and a little unexpected. "Who would have thought all these amazing things would be happening in a nuclear waste organization?
Go figure!" he exclaims.

In November 2018, in addition to his role at the NWMO, Bob began a one-year secondment to the AFN in the role of Chief of Staff to National Chief Perry Bellegarde.

Duty to consult: Ignace boreholes number two and three

A key activity of our Indigenous engagement team in 2018 was undertaking consultation activities with five First Nation communities and the Métis Nation of Ontario regarding plans to drill our second and third boreholes in the Ignace area. We have also been working collaboratively with a nearby Indigenous community, which has provided guides to help with fieldwork.

The community has also conducted cultural verification studies of the proposed sites and access routes.

Drilling is expected to get underway in 2019.

John Harrison and other Indigenous guides work with the NWMO out in the field.

4 2018 achievements and milestones

Activities in 2018 were centred around ensuring technical aspects of the project are effective and safe, engaging with communities, studying in greater depth the potential suitability of the five areas in the site selection process, and developing safe, secure, and socially acceptable transportation plans.

The following chapter outlines the key achievements and milestones in 2018.

Technical

Ensuring technical aspects of the project are effective and safe

Engineering work in 2018 focused on preparing for serial production of the copper-coated used fuel container, and emplacement of bentonite clay buffer boxes into mock underground rooms.

Raw pipes that will be used for 2019 serial manufacturing of the used fuel container.

Engineering

The NWMO's engineering program is focused on testing components of the engineered-barrier system to demonstrate that they meet safety requirements, and can be produced effectively and efficiently.

Components of the system include the copper-coated used fuel containers, the highly compacted bentonite clay buffer boxes in which they will be encased, as well as the underground rooms where the buffer boxes will be placed. Together, these barriers will work inside the deep geological repository to contain and isolate used nuclear fuel from people and the environment.

In 2018, our technical specialists focused on the work involved in preparing for two major engineering activities that will begin in 2019: serial production of copper-coated used fuel containers, and trials for full-scale placement of the buffer boxes into a mock emplacement room.

Preparations included the design, fabrication, installation, and commissioning of equipment needed for processes such as welding, copper coating, and non-destructive examination. We developed reference procedures and procured raw materials, meeting strict quality assurance requirements.

4 2018 achievements and milestones

Technical:
Ensuring technical aspects of the project are effective and safe

Also in 2018, we designed, manufactured and installed a humidity-controlled storage area for highly compacted bentonite clay buffer boxes in support of future full-scale emplacement trials.

The engineering group also began work on site-specific conceptual designs of the underground repository layout for the Ignace/Wabigoon Lake Ojibway Nation area based on the latest information from geoscience assessments and initial borehole drilling. While this will be an iterative process, work in 2018 will be used to develop preliminary site-specific safety assessments and potential project configurations for underground and surface facilities. Site-specific designs for other areas involved in the site selection process will follow.

The team also hosted 32 tours at the Oakville proof test facility in 2018. These tours were provided to interested groups from the communities in which we work, industry events, school groups, and other stakeholders. These tours provide an opportunity for people to see the physical prototypes being developed, speak with the technical experts conducting the work, and better understand how the engineered-barrier system will function within the repository.

This specialized machine is designed for the emplacement of bentonite buffer boxes into emplacement rooms.

Humidity-controlled storage room at our proof test facility in Oakville, Ont.

Safety and technical research

Safety assessment

Keeping people and the environment safe is of paramount importance in designing the components of the repository. To ensure safety, the NWMO develops detailed safety assessments, called case studies, to demonstrate that the regulatory requirements for safety will be met, both in the near term (during operations of the facility), and the long term (postclosure – after the repository has been filled, sealed off and closed).

Postclosure safety assessments are simulations that calculate repository performance for one million years or longer; they will be submitted in support of a licence application once a site is selected.

In 2018, the NWMO completed the analyses that will be reflected in the next case study. This safety assessment, the seventh in a series, analyzes in detail the long-term performance and safety of the repository system within a hypothetical sedimentary rock setting.

It incorporates the hypothetical site's geology, the properties of the waste material, and the latest engineered-barrier system and underground repository layout. The study provides quantitative insight into long-term performance by considering a range of scenarios that could take place over hundreds of thousands of years.

A full, location-specific safety case will be prepared once a site is selected.

Fuel and radionuclide inventory

The NWMO also continued to update our used fuel and radionuclide inventory database.

This work included the first detailed measurements of the radionuclide content of the Zircaloy structure on an irradiated fuel bundle. Fuel bundles contain tubular fuel elements that are made of Zircaloy, a strong, corrosion-resistant metal.

We also reviewed the historical records for CANDU fuel produced by Canadian nuclear power reactors to assess all available information on the bundle inventory and bundle burn-up. Burn-up tells us how much power has been extracted from the fuel, an indicator of its radioactivity.

The measured values arising from these analyses will be used in our safety cases.

Technical:
Ensuring technical aspects of the project are effective and safe

Research and development

The key objective of the NWMO's research and development program is to advance our understanding of and continuously improve technical elements of our project. This body of knowledge will be used to develop the full safety case for a deep geological repository.

In 2018, the NWMO reorganized our technical research activities within the safety and technical research group, with the establishment of an internal Technical Research Review Committee. This committee provides a forum for information sharing between the various technical groups at the NWMO, ensures that technical research developments and findings are considered in our designs, and helps to identify new research and development activities.

We also initiated the development of an integrated research and development plan. The plan will describe how current research and development activities support our technical understanding of repository performance and safety, and identify future research and development activities. Future research will focus on detailed characterization of the selected site for the repository, as well as construction, operations, and post-operational phases of the Adaptive Phased Management project.

WHAT WAS SAID
on technology development

Dr. von Berlepsch recently visited the NWMO's Toronto headquarters and Oakville proof test facility.

"Internationally, we know used nuclear fuel can be safely stored for hundreds of thousands of years in a deep geological repository. Your engineers showed me what they are doing in terms of technology development, and it looks like Canada has a very strong technical program that is in line with international best practices. I am also impressed that the NWMO is involving people in a positive way."

– Dr. Thilo von Berlepsch, Managing Director of BGE Technology GmbH, the technology subsidiary of Germany's federal company for radioactive waste disposal.

Canadian university research

In 2018, the NWMO supported research at 15 universities, a majority of which were in Canada. Research partnerships with universities play an important role in ensuring we understand how the system of engineered and natural barriers will work together to help isolate used nuclear fuel from the surrounding environment over the very long term.

Along with some of our academic partners, we were awarded a $4-million Ontario Research Fund research excellence grant to support the next five years of used fuel container integrity research. The NWMO is collaborating as the industrial partner with four Ontario universities: Western University, the University of Toronto, the University of Waterloo, and York University.

The project brings together nine academic researchers with diverse expertise – in metallurgy, electrochemistry, corrosion science, thermodynamics, hydrogeology, mineralogy, microbiology, synthetic chemistry, and computer modelling – to understand the complex interactions that will take place in the repository over hundreds of thousands of years.

Our scientists continued to publish technical reports, peer-reviewed journal articles and abstracts for presentation at national and international conferences on radioactive waste management.

Scientists from the NWMO and Western University visit a national research facility where coatings are made and applied to prototype used fuel containers.

POWERED BY PEOPLE

Dave Doyle, Manager, Used Fuel Container Design, leads a multidisciplinary team of engineers.

Dave has a highly specialized and fast-paced job. As a metallurgical engineer, he contributes to and manages a group of NWMO engineers working on the used fuel container (UFC).

Since he started at the NWMO in 2011, the program has progressed dramatically. “Our program moved from concept to small-scale development trials of processing technology, to container prototype, and now to proof testing and serial production,” says Dave. “It is exciting to take an R&D concept and mature it into reality.”

The UFC is a unique, Canadian-made solution specifically designed for used CANDU fuel. Made of carbon steel and coated with non-corroding copper, it is a key component of the engineered-barrier system that will keep used nuclear fuel isolated from people and the environment in a deep geological repository.

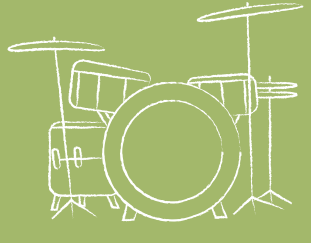
The UFC has the mechanical strength to withstand the pressure of overlying rock, as well as loading from glaciers during future ice ages.

“I am proud of working on this project,” says Dave. “It is great to contribute to an international organization with a real engineering solution.”

Along with Dave’s background in metallurgical engineering, his team has expertise in structural analysis, copper coating, welding, non-destructive examination, project engineering, and testing. “Everybody is cross-functional, so we all work together.”

The first serial production of UFCs will occur in 2019, with more containers to be produced in 2020 and 2021. “This is very advanced work, which we are doing on an aggressive schedule while adhering to stringent quality requirements,” says Dave.

When not working hard, Dave is playing hard. This father of two hockey-playing teenagers (a girl and a boy) can be found running marathons, kayaking, doing hot yoga, learning indoor rock climbing, and looking to return to his roots as a rock and roll drummer.



Social

Engaging with communities every step of the way

Melissa Mayhew, Senior Environmental Scientist at the NWMO, conducts a science experiment with students from Constance Lake First Nation.

Since we were created in 2002, the NWMO has been building sustainable, long-term relationships with many people and groups. Among them are communities that stepped forward to learn more about Adaptive Phased Management (APM), First Nation and Métis communities and organizations, a wide range of municipal associations and organizations, federal and provincial governments and agencies, and youth.

These relationships are profoundly important to the success of the APM project. They are our compass, helping us set the direction of each step.

Engaging with municipalities

In 2018, our engagement program was focused on five remaining areas in the site selection process. They are:

- Hornepayne and area;
- Huron-Kinloss;
- Ignace and area;
- Manitouwadge and area; and
- South Bruce.

The NWMO is very involved in these communities. We have Learn More Centres and staff in each of them. Our team attends regular meetings of community liaison committees, and hosts information sessions, open houses, and workshops.

In 2018, we continued to participate in learning and sharing gatherings, trade shows, meetings, tours, exhibits at community events, one-on-one conversations, science classes, barbecues, information nights, Indigenous ceremonies, sharing circles, and walking-the-land activities. We shared information about our project and NWMO-sponsored events through direct mail, email, social media channels, media interviews, and advertising in local newspapers and radio.

As the site selection process advances, there is a deepening of understanding about the project.

Social:
Engaging with communities every step of the way

Engaging First Nation and Métis communities

In 2018, the NWMO continued to build and sustain relationships with Indigenous peoples in and near the study areas, and maintain a high level of engagement with national, provincial, and treaty organizations.

We participated in a wide range of First Nation and Métis cultural awareness activities, conferences, general assemblies, and community events. We facilitated many activities, including learning tours of used nuclear fuel dry storage facilities, cultural verification studies, meetings with Chiefs and Councils, the publication of articles in First Nation and Métis periodicals, and presentations on water protection and borehole drilling.

Funding from the NWMO supported events that were chosen by Indigenous communities, such as carnivals, career fairs, rangers' programs, wellness camps, powwows, and hockey tournaments.

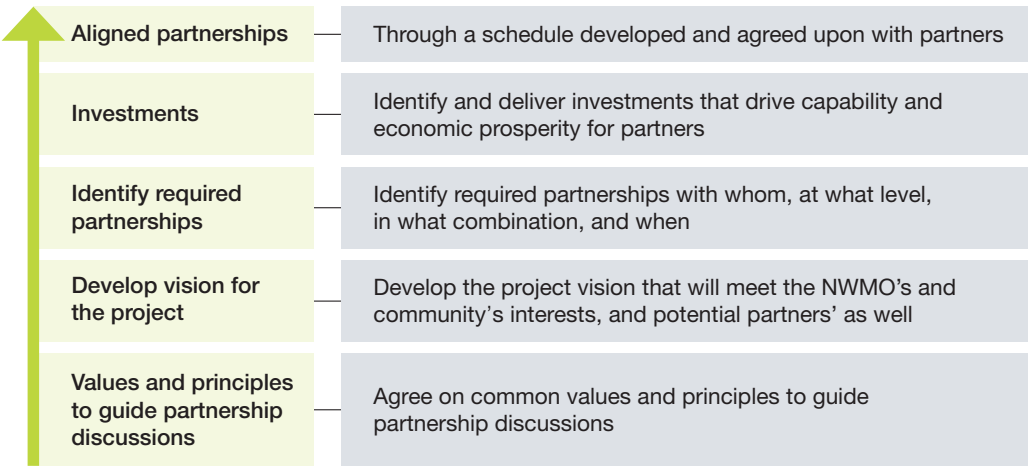
Sharon Cadeau (left) and Theresa Stenlund (right) from the Métis Nation of Ontario (MNO), with Laurie Swami (middle), at the MNO's 25th Annual General Assembly.

Conversations about partnership and fostering community well-being

The NWMO's engagement activities are increasingly becoming focused on partnership and how the project could foster community well-being.

Late in 2017 and early in 2018, we shared our "partnership road map" with communities in the siting process. The first step in the road map involves communities identifying their values and principles to guide more detailed conversations about the project. Each community completed a draft set of values and principles in 2018. Part of this process was considering the question: What would it mean if the APM project were implemented in your area?

Road map to partnership (2017-22)



Starting from the bottom and moving upwards, the road map guides our discussions about partnership.

Among municipalities, safety emerged as a pre-eminent principle. Commonly held values included working together, transparency, honouring commitments, mutual accountability, and respect for diversity. The importance of working regionally with other municipalities and Indigenous communities was recognized in these discussions.

Among Indigenous communities, introducing the subject of partnership into conversations led to discussions about language and the various connotations and meanings associated with the word partnership. For some, the term suggests an advanced stage in a relationship that has not been achieved yet.

In one Indigenous community, the word partnership was subsequently replaced with an Ojibway word – *Gakinamottiimin* – which means "learning and sharing together."

Social:
Engaging with communities every step of the way

Engaging youth

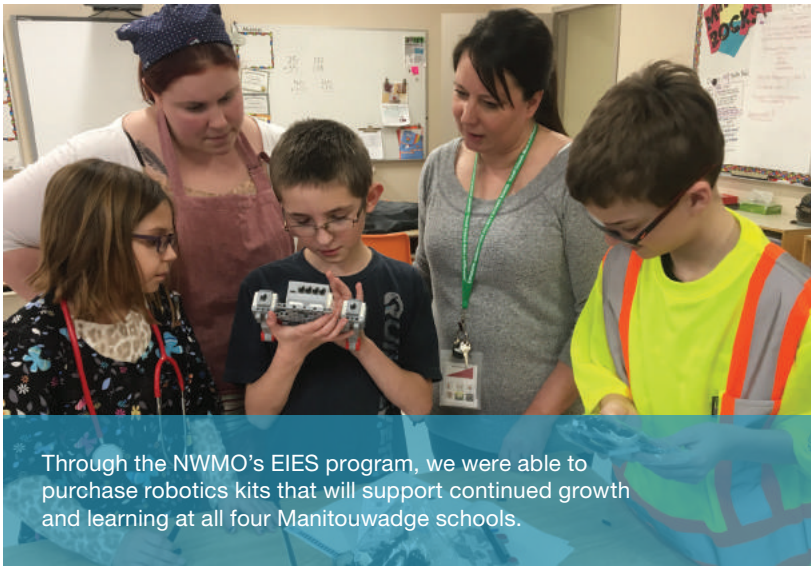
Because the APM project will span multiple decades and involve many generations, it is vital that we reach out to young people to inform them of Canada's plan for used nuclear fuel.

Our youth engagement program is multi-pronged. It is designed to promote awareness of APM, encourage involvement in activities related to the project, and more broadly, inspire excitement about science.

In 2018, we continued to fund communities to encourage youth learning about APM. Young people engaged with us by visiting local Learn More Centres, our Toronto headquarters, interim storage facilities, events where our displays were featured, and open houses.

We work with municipal, First Nation and Métis communities to provide transferable skills that can be applied to APM and other projects; we promote youth leadership development and well-being; and we support education and career pathways related to APM.

Kindergarten students at Ripley-Huron Community School in Huron-Kinloss, Ont., show NWMO President and CEO Laurie Swami how to program Bee-Bots.



Through the NWMO's EIES program, we were able to purchase robotics kits that will support continued growth and learning at all four Manitouwadge schools.

Supporting capacity building

Since meeting the rigorous technical quality standards of the APM project requires the know-how of scientific disciplines such as nuclear engineering, environmental science, and geology, the NWMO is especially committed to enhancing science, technology, engineering, and mathematics (STEM) learning in young people.

Our Early Investments in Education and Skills (EIES) program, launched last year, supports training, education, and other capacity-building activities for both youth and community members. This includes science initiatives to prepare young people for careers in APM and other scientific fields.

In 2018, 40 initiatives were supported through the EIES program, and of these, 20 had STEM and robotics content. For example, in May, more than 130 elementary and high-school students from Hornepayne and Manitouwadge gathered for a robotics learning fair. They spent the day at different coding centres before showing each other what they created with their robotics kits. The kits were supplied through the local community liaison committees in both Hornepayne and Manitouwadge and the NWMO's EIES program.

WHAT WAS SAID

on learning about science

A presenter from Scientists in School engages children in science exploration using a candle-powered putt putt boat.

"I really do not know how much to thank you for this very fun experience. It was super fun. It was awesome. The scientist was the best. I just have to say, *this was the third most amazing thing I have done*. The only two things that were more awesome were going to Disney World and Canada's Wonderland. I really hope that you can come back to teach some more. I am more of a math guy myself, but this was amazing."

– Grade 7 student, in a letter to Scientists in School, thanking them for the hands-on science workshop that was supported by the NWMO.

4 2018 achievements and milestones

Social:
Engaging with communities every step of the way

Giving back through sponsorships

We believe in giving back to the communities in which we are working.

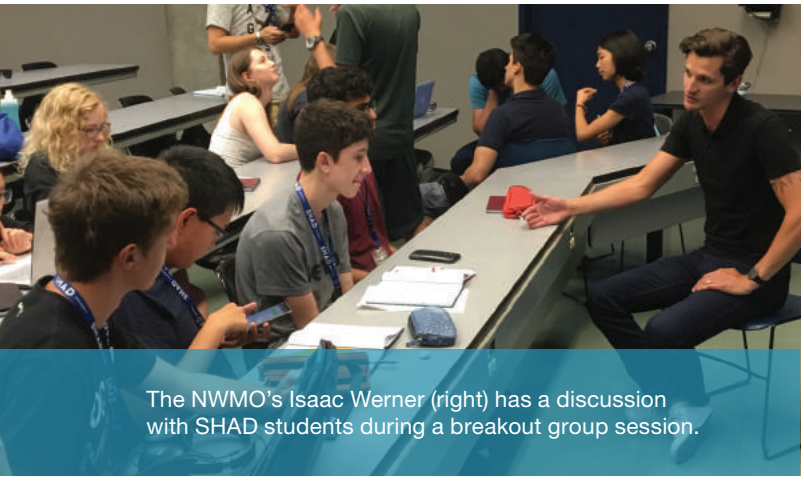
Through our sponsorship and donation program, we support a variety of youth-related initiatives, including SHAD, Science North and Scientists in School.

SHAD is a four-week summer enrichment program for high-achieving high-school students. It takes place at university campuses, and focuses on science, technology, engineering, the arts, and mathematics.

In 2018, through the SHAD program, the NWMO reached more than 650 students from all across the country. Our specialists conducted interactive presentations and workshops at Carleton, Lakehead, McGill, McMaster, Mount Allison, Queen's, Ryerson, New Brunswick, Prince Edward Island, Waterloo, and Western universities.

Science North is a fun and interactive science program for elementary students in northern Ontario. In the 2017-18 school year, Science North reached more than 3,700 students in 12 northern communities through the NWMO's support.

Scientists in School is a charity providing hands-on science workshops for students in kindergarten to Grade 8, encouraging them to connect with science and see it in the world around them. In the 2017-18 school year, Scientists in School delivered 80 workshops to 2,160 students in southwestern Ontario, thanks to the NWMO's support.



The NWMO's Isaac Werner (right) has a discussion with SHAD students during a breakout group session.

In 2018, Science North ran a science camp in Ignace, Ont., for the first time.

Strengthening relationships with governments

In 2018, the NWMO's staff continued to provide representatives of federal and provincial governments with information about the project and our progress in implementing it. We also stayed connected on topics of shared interest such as transportation, fieldwork, the duty to consult Indigenous peoples, and access to Crown land. The NWMO works with lead ministries within the federal and provincial governments as our primary points of contact.

MP Kim Rudd (left), who was Parliamentary Secretary to Canada's then-Minister of Natural Resources, the Honourable James Gordon Carr, visited our Oakville proof test facility in May 2018 with NWMO President and CEO Laurie Swami.

POWERED BY PEOPLE

As Manager of Community Well-Being and Partnerships, John Connolly's planning experience helps support partnership discussions.

The son of Irish and English immigrants, John is a friendly, exuberant family man. He was born in Montreal, and grew up with his older brother and sister in Maple, Ont., in a family where their parents were active in the areas of municipal politics, environmental protection, and local community causes. It is not surprising then that John became a professional planner with a passion for community building and economic development.

He joined the NWMO in June 2018, after working with the Region of Durham in a number of management roles. His background is in urban planning, environmental resource management, and alternate dispute resolution, and he has worked at all three levels of government. John also has extensive experience serving on a number of boards in the energy, not-for-profit and health-care sectors.

"My experience is essentially in working with people, building sustainable communities and exploring ways to make them better," he says. Community well-being is a vital component of the NWMO's site selection process. John and others on the site selection team are working towards building partnership agreements, and ultimately, hosting agreements that align with communities' values and principles.

"APM is a massive, multi-billion-dollar infrastructure project that will be operating over the better part of a century and many generations. There are a lot of benefits for core and adjacent communities. So we will bring people together and see what is at the heart of decision-making in order to find out what well-being looks like for them."

John's own well-being is tied to his surroundings – he lives on beautiful Chemong Lake near Peterborough, Ont., where he enjoys canoeing, hiking, outdoor activities, and undertaking various home renovations and projects. He and his wife have one son and two daughters who are all in their 20s.

Site assessment

Supporting site selection through geoscientific evaluations and engagement activities

Drone view of activities at the site of the first borehole, near Ignace and Wabigoon Lake Ojibway Nation, Ont.

Laurie Swami (left), NWMO President and CEO, examines a core sample from the first borehole near Ignace, Ont.

We are now within five years of identifying one preferred site for the Adaptive Phased Management (APM) deep geological repository. The five areas remaining in the process are being evaluated through a site selection process that is community-focused, and driven by collaboration, fairness, and shared decision-making.

Technical and social considerations are crucial to the process. Prerequisites include demonstrating that the site is physically appropriate to safely contain and isolate used nuclear fuel, and that hosting the project in the area can foster the well-being of the local community and region, as defined by them.

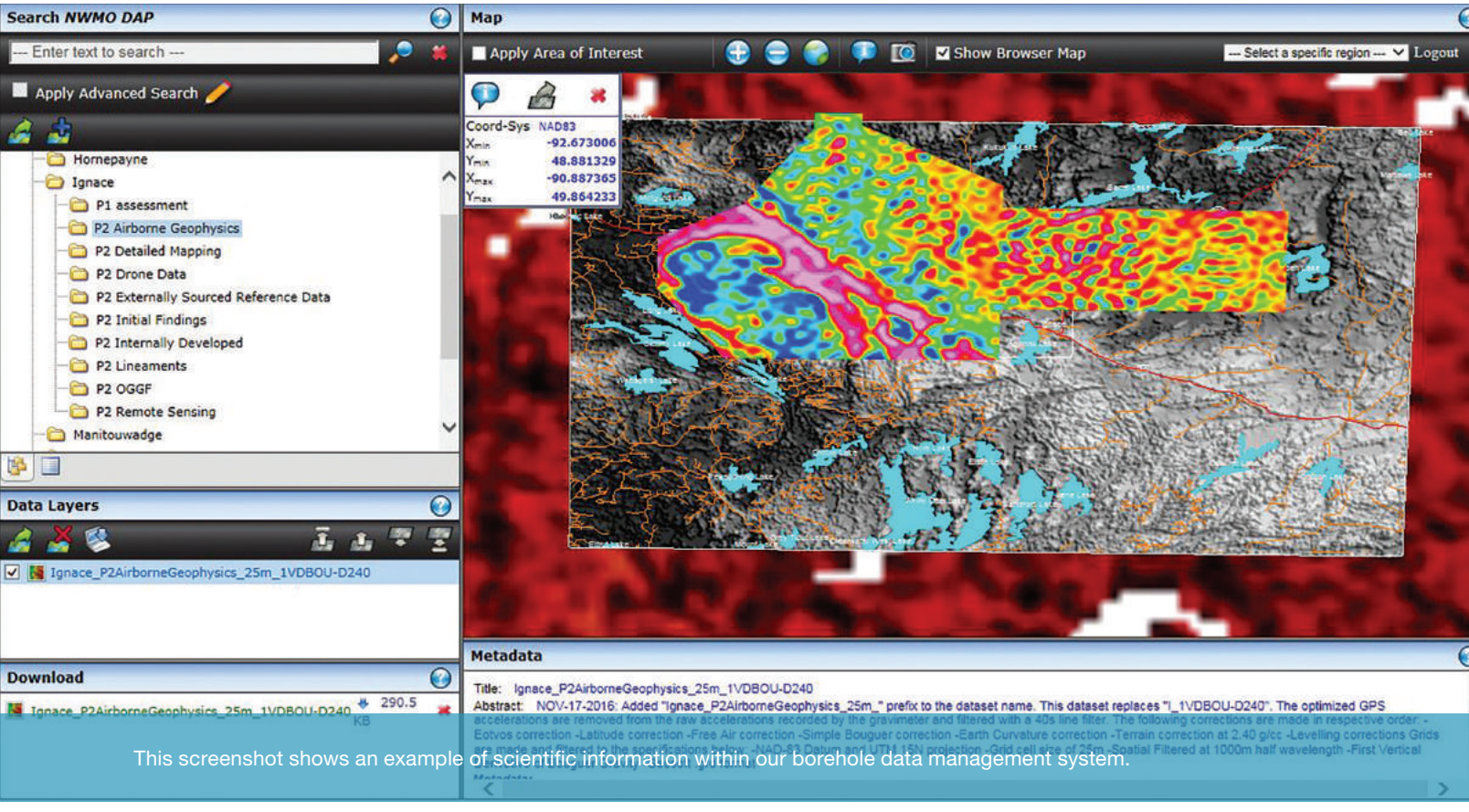
Site assessment:
Supporting site selection through geoscientific evaluations and engagement activities

Technical aspects of site assessment

Technical work is underway to better understand the geological conditions at potential repository sites and further explore the ability to meet the robust safety requirements for the safe, long-term management of used nuclear fuel.

In early 2018, the NWMO completed drilling and down-the-hole testing and instrumentation of our first deep borehole for the APM project. The borehole is located between Wabigoon Lake Ojibway Nation and Ignace, Ont., in a rock formation known as the Revell Batholith. More boreholes are planned in this and other study areas.

Borehole drilling represents a key milestone in the NWMO's ongoing process to identify a site. The drilling provides valuable geological information down to depths as low as 1,000 metres, which can be added to social, cultural, environmental, and transportation considerations.



This screenshot shows an example of scientific information within our borehole data management system.

Also in 2018, staff worked closely with industry and academic partners to complete analysis and laboratory testing of the information and samples retrieved from the borehole, such as core and porewater samples. This information was interpreted by the NWMO's technical experts and reviewed with the APM Geoscientific Review Group (APM-GRG).

In late 2018, the NWMO began site preparation work for additional boreholes in the Ignace/Wabigoon area, which includes the construction of temporary roads to gain access to the borehole locations. Work included surveying the road network and clearing trees as required along the route. Construction of the roads will commence in spring 2019. Similar planning is also underway for the other siting areas in which the NWMO works.

The geoscience team also continued to develop plans and tools required to support the future integration and geoscientific interpretation of data as additional boreholes are drilled. We acquired geoscientific remote sensing (LiDAR) data, developed in-house 3D geological models of the sites, and trained staff to undertake this modelling.

WHAT WAS SAID

on combining Indigenous Knowledge with western science

Dr. Gautschi is former Division Head of Geology and Safety, and Chief Geoscientific Advisor at the Swiss National Cooperative for the Disposal of Radioactive Waste.

"Mutual respect and interest in others' way of seeing things is very important. For good communication between scientists and Indigenous peoples, we have to learn a lot from each other, step by step, over a long time period."

– Swiss Geoscience Consultant Dr. Andreas Gautschi, a member of the APM-GRG. As part of learning about the NWMO's activities and reviewing geoscience siting plans and findings, members of the APM-GRG have visited a First Nation community, toured the NWMO's proof test facility, and attended the annual Geoscience Seminar.

Site assessment:
Supporting site selection through geoscientific evaluations and engagement activities

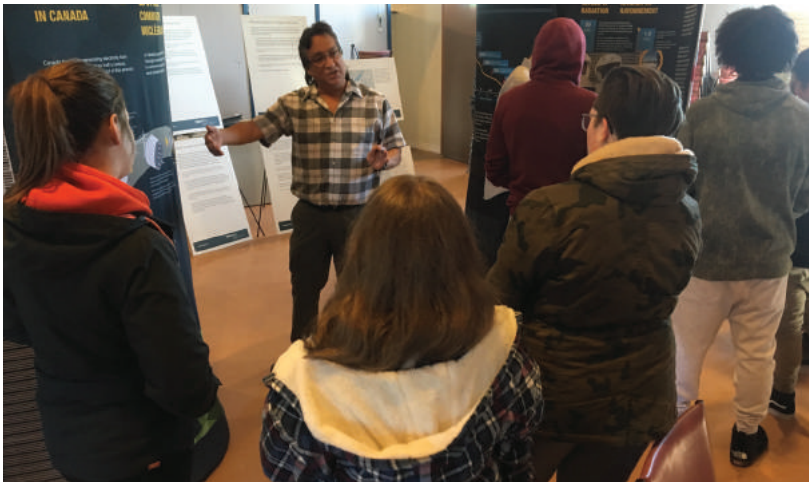
Social aspects of site selection

A core principle of the APM project is that it will only proceed with the involvement of the interested community, First Nation and Métis communities in the area, and surrounding communities working together to implement it.

Continued input from community and area residents helps refine and strengthen our plans.

In 2018, engagement activities in municipal offices and Indigenous communities provided opportunities for citizens to learn about plans for borehole drilling and other scientific studies, and to help guide these assessments.

As part of the site selection process, community members are working to understand the project in detail, to appreciate the benefits and risks of accepting the project, and to chart a plan for how the project can be configured to fit with local priorities and objectives.



Open house events in siting areas, like South Bruce (left) and Hornepayne (right), provide opportunities for citizens to learn about and guide site assessments.

We introduced a community well-being investment program for communities in the immediate vicinity of the areas where borehole drilling activities are planned. These community investments complement existing Learn More resource programs, which provide funding to interested communities in siting areas, including both municipal and Indigenous communities, to advance learning, discussion, and reflection about the project.

The NWMO is committed to ensuring that those exploring the project, including Indigenous communities, are not out-of-pocket for working to advance Canada's plan for the long-term management of used nuclear fuel.

POWERED BY PEOPLE

The Geoscientific Data Management System (GDMS) team, led by Dr. Alec Blyth, is helping to answer the question: What is the rock telling us?

As the NWMO drills our first few boreholes, it is of paramount importance that the information coming to the surface from deep underground is managed with utmost consistency, security and quality assurance.

Enter members of the NWMO's GDMS team and the sophisticated software they use to manage the information.

These scientists have spent the past few years setting up the GDMS to store and process massive amounts of detail, some of it historical, and some fresh from the field. These include geoscientific data – the rock type, features, strength, permeability, fracture patterns of the rock, and the chemistry of water at every depth – layered upon information about geographical features, roads, rivers, lakes, and forests, as well as results from airborne geophysics assessments.

Before being entered into the system, data passes through a rigorous assessment process in which it is reviewed and approved by subject matter experts for quality, consistency and completeness.

"We have created a framework for describing the data that is very controlled and ensures the pedigree of the information," says Alec, Section Manager of Geoscientific Site Evaluations and GDMS Manager. "This is a legacy issue. We are securing our data assets, which are fundamental in decision-making, and also preserving them for future generations."

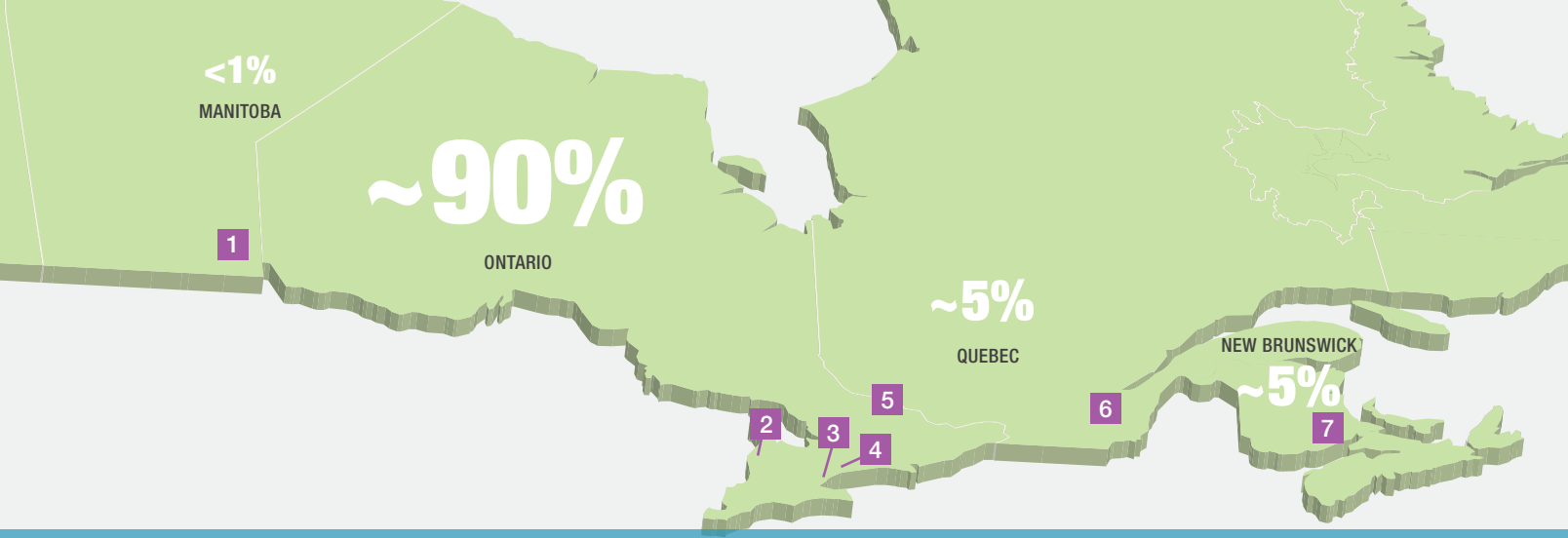
Other members of the GDMS team are Jim McLay, Senior Scientist, Christiaan Piller, Database Admin/Geographic Information Systems Analyst, and Andre Vorauer, Senior Technical Specialist.

Members of the GDMS team (left to right): Jim McLay, Andre Vorauer, Christiaan Piller, and Alec Blyth.

Transportation

Developing transportation plans

There are 32 bolts that hold in place the lid of the Used Fuel Transportation Package that could be used to transport the used nuclear fuel from the interim storage facilities to the deep geological repository.



Canada's used nuclear fuel is safely stored on an interim basis at seven licensed facilities.

Canada's used nuclear fuel, which is safely stored on an interim basis at seven licensed facilities at or near where it is produced, will eventually be transported to the selected repository site.

Ensuring this activity is conducted safely and securely is the responsibility of the NWMO.

Current locations include four in Ontario (Bruce, Pickering, and Darlington Nuclear Generating Stations, as well as Chalk River Laboratories), and one in each of Manitoba (Whiteshell Laboratories), Quebec (Gentilly Nuclear Generating Station), and New Brunswick (Point Lepreau Nuclear Generating Station).

We are studying road and rail as transportation modes.

While transportation is not expected to begin until at least 2040, work is underway to ensure used fuel transportation will be safe and secure, with a plan that reflects public priorities and concerns. In 2018, our technical and engagement staff continued to work closely together to ensure all aspects of transportation planning are integrated.

Transportation:
Developing transportation plans

Social aspects of the transportation plan

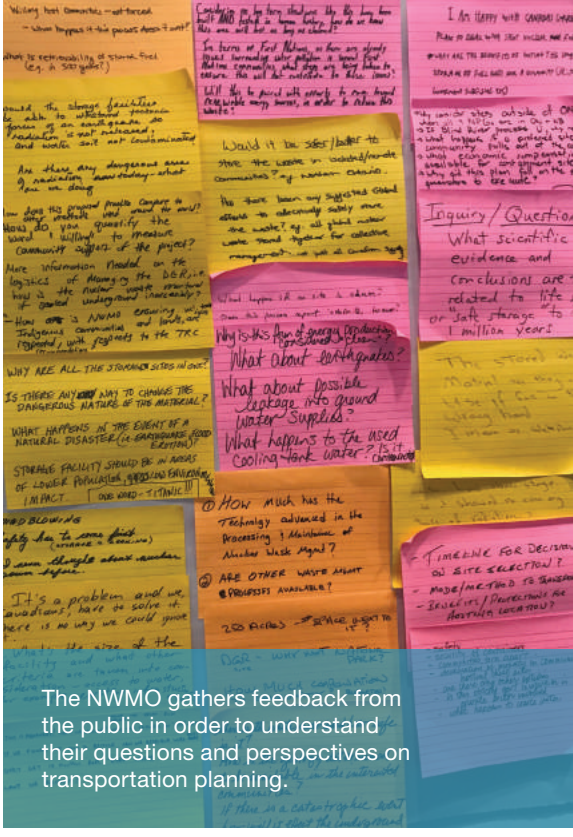
The NWMO's transportation engagement program follows the well-established principles and values of the overall Adaptive Phased Management (APM) social program. For both the larger project and for the transportation portion, understanding and addressing people's priorities, questions and concerns is a crucial element of planning.

Conversations about transporting used nuclear fuel take place in many different venues, both within municipalities and Indigenous communities, and also at trade shows, conferences, forums, and the NWMO's offices. We also facilitate learning and dialogue through attendance at the Ontario Good Roads Association and the Association of Ontario Road Supervisors conferences, where we reach municipal and county road staff and first responders.

In 2018, the NWMO's engagement team conducted in-depth public attitude research sessions on transportation, building on research that was done last year. The basis of these conversations was a discussion document the NWMO prepared in 2016 that explores key themes raised by communities.

Senior Transportation Engineer Ulf Stahmer (right) talks to a guest at our proof test facility in Oakville, Ont., about transportation of used nuclear fuel.

Jo-Ann Facella, NWMO Director of Community Well-Being, Assessment and Dialogue, presented at a group dialogue session about transportation planning in November 2018.



The NWMO gathers feedback from the public in order to understand their questions and perspectives on transportation planning.

Fourteen focus groups, including two Indigenous groups, were held in October 2018, followed by one larger group dialogue in November with 42 participants.

Results of the public attitude research will be used in a draft transportation planning framework, which is to be completed in 2019. Once the draft is ready, we will take it out to communities for broader engagement and refinement. This will help guide development of a socially acceptable transportation plan.

Meanwhile, we are mapping the various potential routes and developing engagement plans that will be responsive to people along the way.

In December, we published a summary of the year's work in *Transportation themes 2014 to 2018: What we heard about transportation planning*. This document is available on our website at www.nwmo.ca.

Transportation:
Developing transportation plans

Technical aspects of the transportation plan

Over the last year, transportation technical work was focused on ongoing comprehensive assessments of transportation modes and routing logistics for the five remaining areas in the site selection process.

The work considers various transportation packages, including the NWMO's Used Fuel Transportation Package (UFTP), the dry fuel storage container used by Ontario Power Generation, and the basket transportation package for used nuclear fuel from Hydro-Québec, New Brunswick Power, and Atomic Energy of Canada Limited.

WHAT WAS SAID

on transporting used nuclear fuel

"The past two days have been simply amazing. The depth of work done and the depth of the passion behind that work by the NWMO team is obvious. Before I came to hear Ulf Stahmer and others, I did not support the idea of transporting used nuclear fuel, which may come through my territory. These sessions have relieved a lot of my concerns. I did not ask a lot of questions because Ulf answered them all in his presentation! I have more vigour now to get this information into the hands of our community, so they can become informed."

– Peggy Domingue, Health Care Coordinator, Chapleau Cree First Nation Health Services.

Representatives from several municipalities and First Nation communities came to the NWMO's Toronto headquarters in October 2018 to learn about many of the disciplines involved in the APM project. Among the presenters from the NWMO team was Senior Transportation Engineer Ulf Stahmer, whose expertise is in the technical and safety aspects of transporting used nuclear fuel.

These transportation packages, which are engineered to withstand extreme conditions without releasing their contents, must meet strict safety requirements before being used. The design must be certified by the Canadian Nuclear Safety Commission (CNSC).

In 2018, the NWMO re-certified our UFTP with the CNSC. Certification includes meeting a number of requirements and tests to show that the package can withstand severe impact, fire and immersion.

The re-certification demonstrated that the package meets the applicable requirements of the *Packaging and Transport of Nuclear Substances Regulations* (2015), and the applicable requirements of the International Atomic Energy Agency *Regulations for the Safe Transport of Radioactive Material* (SSR-6, 2012 Edition).

POWERED BY PEOPLE

Caitlin Burley, Manager of Transportation Engagement, ensures that transportation plans are shaped by dialogue with communities.

At the NWMO, work is underway to ensure the transportation plan will meet two major objectives: it will be technically safe and secure, and it will reflect public priorities and concerns.

As Manager of Transportation Engagement, Caitlin's focus is the latter half of that equation. Put simply: "We provide information to people; we get feedback; we provide more information; we get more feedback. That is how it should be done – engagement is an iterative process," she says.

She joined the NWMO in May 2018, bringing "a passion for science and people," as well as educational credentials custom-made for the role. She has a Bachelor of Science and a Master of Applied Science in Environment and Management, and accreditation from the International Association for Public Participation on consultation and dialogue.

Her experience is in stakeholder and Indigenous engagement on large infrastructure projects, several of them in the north. She lives in Ignace, Ont., and travels to Kenora on the weekends to spend time with her husband and three-year-old son. Her husband is a criminal defence lawyer who does legal aid work in remote Indigenous communities, so travelling is a way of life for the family.

"I do spend a lot of time on the road, but I enjoy it because I meet a lot of great people," she says. She is excited by her new role, and impressed by the professionalism of her team and the high quality of engagement that is already underway.

"What I like about this job is that we have the time to really find out what people want to know. We can listen to their concerns and questions. And we have the time to be responsive to them," she says.

5 Collaborating internationally for a safe future

Collaborative work

As it makes steady progress in implementing Canada's plan, the NWMO is proud to be sharing Canadian research and innovation with the rest of the world, and learning from the experiences and knowledge of other countries.

Activities in 2018 included continuing to contribute to the safe management of used nuclear fuel on a global scale, to exchange technical knowledge with other countries, to share information on aspects of social acceptance, and to seek new perspectives and understanding.

Signing agreements with international counterparts

In May 2018, the NWMO hosted the EDRAM annual meeting in Toronto. EDRAM is the International Association for Environmentally Safe Disposal of Radioactive Materials, an organization that promotes the exchange of knowledge among member countries.

International delegates took part in two days of meetings, concluding with a tour of the NWMO's proof test facility in Oakville, where they saw first-hand some of the Canadian technology development and research underway.

The NWMO signed or renewed co-operation agreements with counterparts from five countries: Belgium, France, Sweden, Switzerland, and the United Kingdom.

These agreements are in addition to accords already in place with nuclear waste organizations in Finland, South Korea and Japan. The agreements help to ensure we are applying the best international practices to Canada's plan, and sharing our experience with global counterparts.

Members of Canada's delegation at the IAEA's Joint Convention in Vienna.

Contributing to the Joint Convention

Also in May, the NWMO played a key role in Canada's delegation to the International Atomic Energy Agency (IAEA)'s Sixth Review Meeting of the Joint Convention.

The Joint Convention – the full name of which is the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management – is a legal instrument that was established in 2001 to address the safe management of spent fuel and radioactive waste on a global scale. International peer review meetings are held every three years.

The Joint Convention commits all 78 ratifying countries, including Canada, to demonstrate that they are safely managing radioactive waste and used nuclear fuel. It also promotes open discussions on the safety of waste management programs, with the goal of identifying and sharing best practices.

As part of Canada's presentation, Dr. Mahrez Ben Belfadhel, Vice-President of Site Selection at the NWMO, provided an update to information shared at the Fifth Review Meeting in 2015 about the long-term management of the country's used nuclear fuel. He discussed progress made in the site selection process, in applying Indigenous Knowledge to decision-making, and in continuing to develop and test technical aspects of the project.

WHAT WAS SAID

on international collaboration

MP Kim Rudd addresses the 2018 EDRAM meeting, hosted by the NWMO in Toronto.

"As it makes steady progress in implementing Canada's plan, I am pleased that the NWMO is sharing Canadian research and innovation with the rest of the world, and learning from the experiences and knowledge of other countries. Collaboration of this sort is vital in the global imperative to safely manage used nuclear fuel to protect people and the environment."

– MP Kim Rudd, who was Parliamentary Secretary to Canada's then-Minister of Natural Resources, the Honourable James Gordon Carr. (As of July 18, 2018, the Minister is the Honourable Amarjeet Sohi.)

5 Collaborating internationally for a safe future

Sharing technical knowledge with other countries

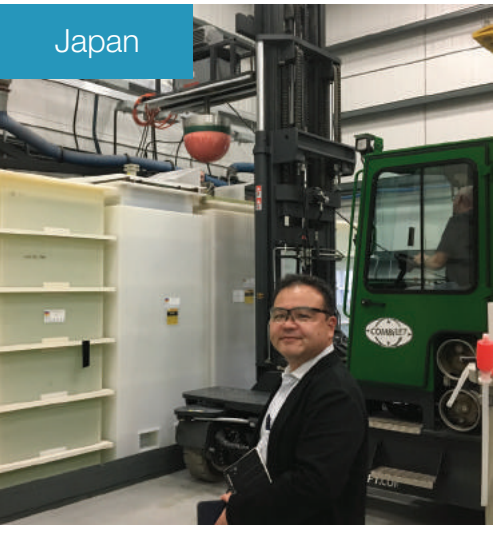
In 2018, the NWMO participated, with other countries, in underground research laboratory experiments at the Mont Terri Project and the Grimsel Test Site in Switzerland. Projects include studies of corrosion and sealing system performance under natural underground conditions.

We also participated in the first year of Posiva's Full-Scale In-Situ System Test, a multi-year project at Posiva's ONKALO facility in Finland. This is one of many tests underway to provide more information about the safety and effectiveness of Finland's plan for a deep geological repository.

Staff of the NWMO also took part in progress meetings for international projects, including the Effective Rock Properties and the POST Projects (with SKB of Sweden), the Nuclear Energy Agency (NEA) Clay Club annual meeting and Integration Group for the Safety Case annual meeting, as well as DECOVALEX modelling workshops.

Below is a glimpse at some of our international knowledge-sharing activities in 2018.

Japan



Japan

Taiwan

South Korea

Top left: Saturo Suzuki from Japan's Nuclear Waste Management Organization (NUMO) observes Canada's copper-coating technology in action. In the background is the hemispherical head of the used fuel container, coated in copper.

Top middle: Peter Keech, Manager of the NWMO's Engineered-Barrier Science, is pictured at the Horonobe visitor centre, before he toured the Underground Research Laboratory, in northern Hokkaido, Japan.

Top right: NWMO Manager of Geoscience Sarah Hirschorn shares geoscientific aspects of Canada's plan with staff from the Institute of Nuclear Energy Research in Taiwan.

Right: NWMO Senior Scientist Mark Gobien gives a speech on behalf of fellows at the closing ceremony of the World Nuclear University Summer Institute in Busan and Gyeongju, South Korea.

Sharing our engagement experience

As Canada stands on the cusp of identifying a site where the country's used nuclear fuel can be safely managed in the long term – and where communities are willing hosts and partners – our engagement activities are increasingly regarded as exemplars internationally.

We are regularly asked to participate in international forums to share our experience in engaging with communities, including Indigenous communities. Recent examples include presenting at the NEA's Forum on Stakeholder Confidence in Paris, at one of the topical sessions of the IAEA's Sixth Review Meeting of the Joint Convention in Vienna, and at the NEA's International Workshop on Deepening Comprehension on Safety Case on Deep Geological Repository and Public Confidence in Tokyo.

POWERED BY PEOPLE

Mihaela Ion, Manager of Nuclear Safety and Advanced Fuels, has an important role in ensuring Canada safely manages used nuclear fuel over the long term, and also has responsibilities on the world stage.

Mihaela has come a long way since her days as a student in Romania. Back then, her world view, her career path and her knowledge of the English language were yet to be established.

Two major turning points led her to where she is now. In 2018, she played an important role at the IAEA's Joint Convention in Vienna, not only representing Canada, but also ensuring other countries around the world meet their commitment to managing used nuclear fuel and radioactive waste safely.

The first pivotal moment for Mihaela was the Chernobyl accident in 1986. "When that happened," she says, "I decided it was time to learn more about nuclear science and what you can do to protect those around you." She obtained a bachelor's and master's degree in Power Engineering in Bucharest, Romania.

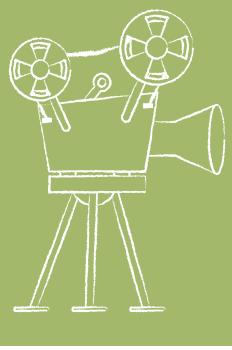
The second turning point occurred in 1996 when Mihaela won a United Kingdom scholarship to study more about environmental protection in the nuclear field, and English. "This opportunity became my window on the world and a chance to learn my fourth language. Up until then, the only English I knew was from watching American movies!" she says.

Mihaela went on to obtain a master's degree and PhD in Nuclear Engineering in the United States and has been dedicated to nuclear safety for more than 25 years.

At the NWMO since 2009, she has embraced her role in ensuring Canada safely manages used nuclear fuel over the long term, as well as her responsibilities on the world stage.

In 2018, she supported Canada's national report to the Joint Convention and participated in the meeting as a Review Officer. The convention promotes open discussions on the safety of waste management programs, with the goal of identifying and sharing best practices.

"It is such a great honour to be able to help in protecting people and the environment."



6 Organizational readiness: Preparing for the future

In 2018, a number of the NWMO's activities were focused on preparing for phases of the Adaptive Phased Management (APM) project that will begin once a site is selected.

Building a stronger safety culture

As future operations come into closer view, we are deepening our safety culture, progressing to a nuclear safety culture. Safety is a core value. All aspects of public and employee safety are first and foremost in everything we do. In 2018, we hired a health and safety human resources manager to amplify our safety culture and further embed it in operations. Ensuring the long-term safety of people and the environment is an ongoing commitment at all levels of the organization.

Human resources

2018 was a year of growth for the NWMO. As our work continues to evolve, we need to continually ensure the right people are in the right jobs at the right time, supported by the right technology.

Our human resources team partners with the many diverse departments within the organization to understand the business, bring in talent, and prepare for future needs.

We are also investing in internal systems to make us more effective and efficient. The first phase of our new Enterprise Resource Planning System was implemented in 2018 to improve workflow processes and integrate electronic systems. This is especially important as a percentage of our staff work outside the Toronto headquarters.

Rakesh Patel (right) is our new Health and Safety Human Resources Manager, working on building a stronger safety culture within the organization.

Preparing for licensing applications

In 2018, planning was in full swing for initiating the regulatory phase of APM, to begin after site selection. This will involve conducting detailed analyses of the environmental impact of the project, completing a formal impact assessment, submitting an application for a licence to prepare the site, and applying for a construction licence. The box titled *Nuclear regulatory oversight* provides more details on this process.

We are working with communities, both Indigenous and non-Indigenous, on designing environmental assessment methods that we can use when it comes time to formally launch our impact assessment. Baseline environmental monitoring in potential siting areas is underway, in close collaboration with community members, as well as Indigenous Knowledge keepers. This will help us make good environmental decisions as we go forward.

The NWMO continues to interact with the Canadian Nuclear Safety Commission (CNSC), consistent with the terms of a special project arrangement prior to submission of a licence application. These activities include providing briefings to the CNSC on the progress of APM implementation.

Baseline environmental monitoring in potential siting areas helps identify sensitive areas. Left to right: an environmental engineer sets up a motion-detector camera; an American black bear finds sustenance; a possible bat-roosting tree is marked.

Nuclear regulatory oversight

Implementation of a deep geological repository falls within federal jurisdiction and will be regulated under the *Nuclear Safety and Control Act* (*NSCA*) and its associated regulations. The CNSC, as Canada's independent regulatory authority, regulates the use of nuclear energy and materials to protect the health, safety, and security of Canadians and the environment; and to implement Canada's international commitments on the peaceful use of nuclear energy. The CNSC's mandate also includes the dissemination of objective scientific, technical and regulatory information to the public.

Under section 26 of the *NSCA*, activities associated with a nuclear facility can occur only in accordance with a licence issued by the CNSC. The repository for Canada's used nuclear fuel will be subject to the CNSC's comprehensive licensing system, which covers the entire life cycle of the repository, from site preparation to construction, operation, decommissioning (closure and postclosure), and abandonment (release from CNSC licensing).

This stepwise approach will require a licence for each phase of the repository life cycle. The process for obtaining a "site preparation" licence will be initiated by the NWMO. The NWMO would submit an application for a Licence to Prepare Site (and possibly construct) to the CNSC. A licensing decision by the CNSC on a repository can be taken only after the successful completion of the environmental assessment, following the process established under the *Canadian Environmental Assessment Act* (currently under review). More information about the CNSC's licensing process is available at www.nuclearsafety.gc.ca.

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

Although the CNSC is the main licensing authority, it administers its licensing system in co-operation with other federal and provincial government departments and agencies in areas such as health, environment, transport, and labour.

Monitoring new nuclear technologies

There is an active research sector in Canada exploring new technologies such as small modular reactors (SMRs), fuel reprocessing and other types of advanced reactors. SMRs are expected to generate high-level waste requiring safe, long-term management.

A fundamental tenet of APM is that we will adapt our plans in response to technical advances and new knowledge. We are encouraging organizations developing new concepts to work with us to identify the types of fuel waste that may result. Once we have sufficient information about new types of fuel to be managed, we will determine potential impacts to repository designs and how our funding formulas can be adapted to include new entrants. We acknowledge it is important to monitor the development of new reactors and new owners of used nuclear fuel, so that all Canada's used nuclear fuel can be safely managed.

Visibility at industry events helps us connect with stakeholders.

Managing risk

Good corporate governance requires that risks be considered and managed in a manner that is consistent across the organization and appropriate to their severity. As the NWMO looks ahead to selecting a site, conducting additional borehole drilling, and preparing for impact assessment, it is prudent to increase the scope of risk management. In 2018, we created the role of Chief Risk Officer to manage operational, political, financial, procurement, social, technical, and legal risks.

Identifying events that may affect the organization, assessing their likelihood, implementing mitigation strategies, and managing any resulting risks help to assure that we meet our objectives.

Managing our profile

We have an active presence on Facebook, LinkedIn, Twitter, and Instagram.

Transparency is a core value for the NWMO. It is important that we inform and involve a diverse audience about our progress as we implement the APM project.

Building on the presence we have established on Facebook and LinkedIn, we launched our Instagram account (@NWMOCanada) in summer 2018 and our Twitter account in December.

We also continued to provide a steady stream of user-friendly, plain language materials and audiovisual media to communicate that Canada has a plan, and it is on track.

We are also improving awareness of our work to implement Canada's plan by expanding our presence at industry events.

Planning priorities

IDENTIFY A PREFERRED SITE

Single site for deep geological repository

ENGINEERING

- Design and manufacture prototypes, and demonstrate performance of engineered-barrier system
- Develop site-specific facility designs, update lifecycle cost estimate, and confirm performance of engineered-barrier system

SITE ASSESSMENT

- Complete deep borehole testing and preliminary environmental baseline monitoring at preferred repository locations
- Develop integrated site assessments considering repository engineering, geoscience, environment, and safety assessments to support site evaluation

SAFETY

- Develop preliminary site-specific safety cases
- Maintain collaboration agreements and participate in joint international efforts as appropriate

MOBILIZATION

- Develop human resources strategy, manage gradual increase in public profile, and implement IT systems and other support infrastructure
- Advance planning for the Centre of Expertise

LICENSING

- Develop and implement licensing and regulatory approval strategy
- Conduct studies to determine changes to the natural environment, health and social well-being to support sustainability

ENGAGEMENT

- Advance engagement and field studies to narrow down the number of study areas
- Establish partnership agreements with communities
- Engage key stakeholders to seek alignment of priorities

TRANSPORTATION

- Advance engagement with stakeholders and conduct technical work to build confidence

These are our planning priorities as we progress towards site selection.

Every year, at the same time as we publish our annual reports, we publish a forward-looking document, our implementation plan, which outlines our work plans for the next five years. (*Implementing Adaptive Phased Management 2019 to 2023*, which is – as always – shaped by public engagement and feedback, is available on our website at www.nwmo.ca/implementation.)

Our current five-year planning period is significant because it reaches forward into the year 2023, when we expect to select a single site for the deep geological repository.

As we steer towards this important milestone, our work is organized around seven distinct, but integrated, priorities.

On the previous page are the priorities around which we describe upcoming work in our implementation plan. And these are the engines powering us towards 2023 and beyond.

POWERED BY PEOPLE

Melissa Mayhew, Senior Environmental Scientist, is working to ensure the APM project protects the environment.

It seems counterintuitive that a project to manage used nuclear fuel would focus heavily on protecting the environment. But it is so. "This is fundamentally an environmental project," says Melissa, a master-level scientist and member of the International Association for Impact Assessment, who works on the NWMO's environmental team. "There is a great deal of scope for conservation. We avoid effects if we can. We mitigate and restore. Ultimately, we are aiming for no net loss of biodiversity."

In order to minimize the effects of APM on the environment, Melissa and colleagues are studying ecosystems to understand how activities associated with APM could interact with the functioning of those systems and how that might change over time. Careful analysis of vegetation, soil, water, and animal habitats is one of the many components of the NWMO's process to identify a site for the long-term management of Canada's used nuclear fuel.

Land and water studies, known as environmental characterization, can help identify sensitive areas, such as those supporting a rare form of plant life, a bald eagle's nest, a critical wetland, or the habitat of an endangered species.

At the NWMO since 2010, Melissa lives as she works – always focused on exploration and conservation. "I love travelling in the world's biodiversity hot spots – to places in the world that have a huge range of plants and animals, with a high percentage of endemic species." She has been to more than 50 countries, and has scuba dived in many of the world's seas.

One of the most gratifying parts of Melissa's job is interweaving her scientific knowledge with Indigenous Knowledge to better understand the natural environment. "As an ecologist, I am grateful for the opportunity to receive teachings from Indigenous peoples, who have a profound sense of stewardship of Mother Earth," she says.

She is inspired that "we can take hazardous material and make good things happen because of it. I truly believe that."

7 Governance and accountability: Continuously driving to excel

Canadians can trust that the organization responsible for managing the country's used nuclear fuel has a strong governance structure in place. The NWMO is federally mandated under the *Nuclear Fuel Waste Act* (*NFWA*). Our members are provincially owned Crown corporations that produce used nuclear fuel. We are governed by a nine-member Board of Directors and accountable to Canada's Minister of Natural Resources.

As a not-for-profit corporation, the NWMO falls under the *Canada Not-for-Profit Corporations Act*. We receive ongoing advice from the Advisory Council, an independent advisory body established under the *NFWA*. We also receive guidance and review on technical, social and Indigenous matters through other independent expert bodies, assuring the organization is continuously driving to excel.

The NWMO's integrated management system ensures we are well equipped to implement our vision while safeguarding people and the environment.

The NWMO's executive committee works collaboratively to safely implement Canada's plan.

The NWMO's executive committee is a diverse group of professionals from a variety of backgrounds, leading our organization.

Annual reporting to Minister

The annual report to the Minister of Natural Resources is required by the *NFWA*. It is made public, tabled in Parliament, and the Minister issues a statement on it each year. The Minister's full statement can be viewed online at www.nrcan.gc.ca. Every third year, an expanded version of the annual report, which reports on the three previous years and includes comments of the Advisory Council, is required under the *NFWA*. The triennial report was last published in March 2017, and the next one will be published in March 2020.

Reporting to member organizations

Ontario Power Generation (OPG), New Brunswick Power Corporation and Hydro-Québec are the founding members of the NWMO. The Membership Agreement and bylaws set out member roles and responsibilities in supporting the objectives of the *NFWA* and the NWMO's implementation mandate. The NWMO regularly briefs our member organizations.

7 Governance and accountability: Continuously driving to excel

Board of Directors

Chair of the Board: Wayne Robbins

President and CEO: Laurie Swami

Directors: Mark Elliott, Lesley Gallinger, Ronald L. Jamieson, Darren Murphy, Josée Pilon, Janet Rieksts-Alderman, and Carlo Crozzoli (until Nov. 30, 2018 – his work on the Audit, Finance and Risk committee, Human Resources, Compensation and Governance committee, and Technical committee also ceased at the same time)

The Board of Directors is responsible for oversight and taking a leadership role in developing the corporation's strategic direction. The Board is elected by member organizations, and represents a range of perspectives from both within and outside the nuclear industry, including capabilities in Indigenous culture and financial management.

In 2018, in addition to five regular meetings, the Board held a strategy session in the summer with the NWMO's executive team to consider long-term challenges and opportunities as the siting process continues to progress. Discussions focused on strategic oversight of the NWMO's work to reach site selection while maintaining high performance in delivering on strategic goals.

The Board met with the Council of Elders and Youth to exchange ideas and understand decision-making that reflects upon and respects the traditions, customs and values of Indigenous peoples. In July, the Board participated, along with senior management of the NWMO and the Council of Elders and Youth, in an Indigenous ceremony to finalize the NWMO's Reconciliation Statement.

The Board receives regular reports from the Advisory Council and also held its annual meeting with the Council to discuss relevant topics of importance.

Board of Directors

Wayne
Robbins

Laurie
Swami

Carlo
Crozzoli

Mark
Elliott

Lesley
Gallinger

Ronald L.
Jamieson

Darren
Murphy

Josée
Pilon

Janet
Rieksts-Alderman

7 Governance and accountability: Continuously driving to excel

Committees of the Board

Audit, Finance and Risk committee

Siting committee

Human Resources, Compensation and Governance committee

Technical committee

Audit, Finance and Risk (AFR) committee

The AFR committee is responsible for monitoring the integrity of the NWMO's internal control and management information systems, approving annual financial plans, ensuring the integrity of the NWMO's reported financial performance, and providing oversight of the NWMO's pension fund. The AFR committee met five times in 2018, plus one joint AFR-Human Resources, Compensation and Governance (HRCG) committee meeting.

As of Dec. 31, 2018, the committee had four directors: Lesley Gallinger (Chair), Ronald L. Jamieson, Josée Pilon, and Wayne Robbins.

Human Resources, Compensation and Governance (HRCG) committee

The HRCG committee is responsible for overseeing the NWMO's governance and human resources functions, including compensation practices, human resources policy, organization design, labour relations, and the pension plan. The HRCG committee met four times in 2018, plus one joint AFR-HRCG committee meeting. In 2018, the committee added governance to its mandate.

As of Dec. 31, 2018, the committee had four directors: Janet Rieksts-Alderman (Chair), Darren Murphy, Josée Pilon, and Wayne Robbins.

Siting committee

Through the Siting committee, the Board maintains oversight of the site selection process and manages risks associated with its execution. The committee met four times in 2018.

As of Dec. 31, 2018, the committee had five directors: Ronald L. Jamieson (Chair), Janet Rieksts-Alderman, Mark Elliott, Darren Murphy, and Wayne Robbins.

Technical committee

The Low- and Intermediate-Level Waste Deep Geologic Repository Oversight (L&ILW DGR) committee evolved in 2018 to become the broader Technical committee. The committee has oversight responsibilities for the NWMO's technical program as it relates to the implementation of Adaptive Phased Management (APM) and technical support to OPG's L&ILW DGR. It is responsible for monitoring to ensure the NWMO has a robust technical program to support our objectives and meet regulatory requirements, has an appropriate research and development program, and has appropriate technical staff and governance capabilities. The committee met four times in 2018.

As of Dec. 31, 2018, the committee had six members: Mark Elliott (Chair), Lesley Gallinger, Laurie Swami, and Josée Pilon (as of Feb. 14, 2018). As of Jan. 1, 2018, Brad Curle (non-director) and Lawrence Johnson (non-director) joined the committee.

Officers

Chair of the Board:	Wayne Robbins
President and CEO:	Laurie Swami
Vice-President, Site Selection:	Mahrez Ben Belfadhel
Vice-President, Stakeholder Relations:	Lisa Frizzell
Chief Risk Officer and Vice-President of Strategic Initiatives:	Michael Hung
Chief Financial Officer:	Georgina Kossivas
Vice-President, Human Resources, and Chief Ethics Officer:	Jennifer Spragge
Vice-President and General Counsel:	Doug Taylor
Vice-President, Indigenous Relations:	Bob Watts
Chief Engineer and Vice-President, Contract Management:	Derek Wilson
Board Secretary:	Gillian Morris

Members of the NWMO's executive committee (left to right): Mahrez Ben Belfadhel, Lisa Frizzell, Michael Hung, Georgina Kossivas, Jennifer Spragge, Laurie Swami, Doug Taylor, Bob Watts, and Derek Wilson.

7 Governance and accountability: Continuously driving to excel

Advisory Council

The Advisory Council reviews and comments on the NWMO's work, as a requirement of the *NFWA*. The Council's reports appear in the NWMO's triennial reports, which are published every three years.

There are 10 Advisory Council members. Expertise reflected in the members includes nuclear engineering, geotechnical engineering, nuclear waste management, engagement, public affairs, nuclear community relations, environment, sustainable development, political science, municipal affairs and government relations, financial management, Indigenous Knowledge, Indigenous relations, and community-based research.

The full Advisory Council membership is profiled online at www.nwmo.ca/advisory.

In 2018, the Advisory Council focused on providing the NWMO with advice in these key areas:

- Site assessment activities;
- Municipal, Indigenous and youth engagement;
- Plans for narrowing down the number of communities in the siting process;
- Ethical and Social Framework;
- Road map for building partnerships with communities and community well-being funding;
- A fair and ethical plan for recognition of communities exiting the siting process;
- Topics related to used fuel transportation;
- Technical matters related to long-term safety;
- Risks related to the siting process; and
- Plans for knowledge management.

Advisory Council

David R.
Cameron

Donald
Obonsawin

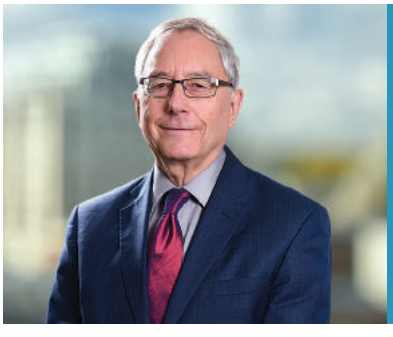
Joseph
Cavalancia

Monica
Gattinger

Sue
Hartwig

Dean
Jacobs

Diane M.
Kelly



Derek H.
Lister

Dougal
McCreath

Linda
Thompson

Peer reviews

The NWMO continues to co-ordinate peer review of technical work and to invite independent comment. Such external reviews help ensure high technical standards are being met, as well as consistency with international practice.

Our copper coating program, microbial research program and emplacement processes are reviewed by external technical reviewers.

We also routinely request peer review of key technical reports. External reviewers provide detailed comments on our safety case study reports, and external experts in sedimentary and crystalline rock settings provide reviews on key geoscience reports.

We also publish regularly in peer-reviewed journals in our technical fields.

WHAT WAS SAID

on respect for people's viewpoints

"The Advisory Council provides ongoing counsel and advice on the NWMO's plans and activities. The Council is supportive of the work the NWMO is doing in advancing the site selection process in a respectful and transparent manner. Strong relationships with communities and respect for people's viewpoints, both Indigenous and non-Indigenous, are foundational to planning and decision-making activities."

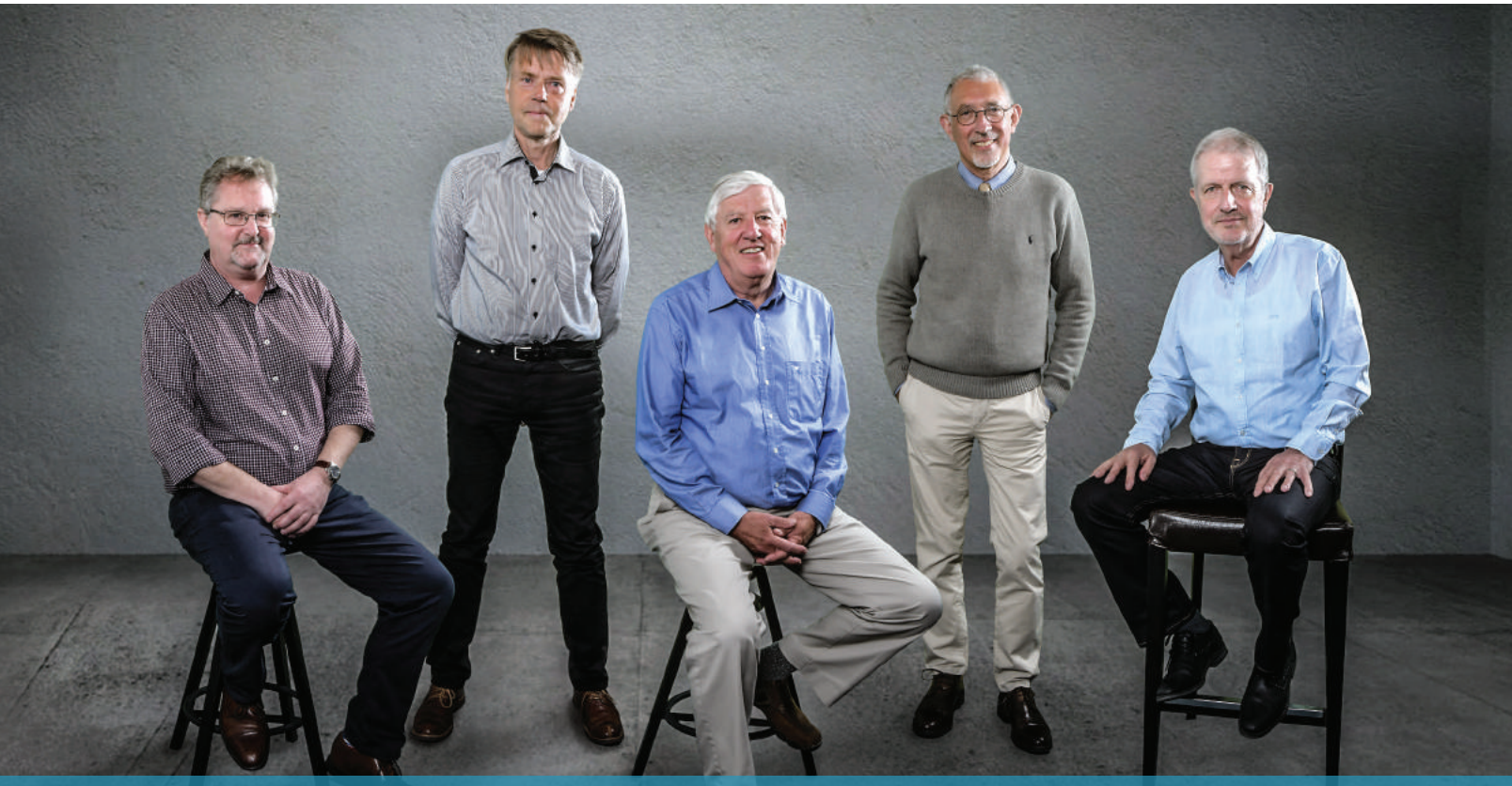
– Donald Obonsawin is an independent consultant who provides policy, management, operational, and strategic planning services. He is Vice-Chair of the Advisory Council of the NWMO, and has held senior positions in business and in both the Ontario and federal governments. Mr. Obonsawin is a member of the Abenaki First Nation of Odanak.

Adaptive Phased Management Geoscientific Review Group (APM-GRG)

The APM-GRG is a group of internationally recognized experts in geoscience disciplines that reviews the NWMO's geoscience siting plans and findings. The group plays an important role in ensuring the NWMO's technical work consistently meets or exceeds international best practices.

In 2018, the APM-GRG reviewed the NWMO's geoscience work, including plans for geological fieldwork, modelling and interpretation of data from the Revell Batholith. The Revell Batholith is an area in the Ignace/Wabigoon Lake Ojibway Nation region where, in early 2018, the NWMO completed drilling our first borehole.

The APM-GRG also visited the NWMO's proof test facility and attended our annual Geoscience Seminar. "Indigenous Knowledge meets western science" was a new presentation topic at this year's seminar, and the APM-GRG heard about steps the NWMO is taking to ensure the APM project is incorporating Indigenous Knowledge in decision-making.



APM-GRG members (from left to right): Dr. Sandy (Alexander) Cruden, Mr. Anders Ström, Dr. Peter Kaiser (APM-GRG Chairman), Dr. Michael Stephens, and Dr. Andreas Gautschi.

Council of Elders and Youth

The Council of Elders and Youth is an advisory body made up of First Nation and Métis Elders and youth. It meets regularly throughout the year and provides counsel to the NWMO on how to apply Indigenous Knowledge in implementing APM.

In 2018, the Council met three times with the NWMO. Two significant themes of discussion were finalizing the Reconciliation Statement and providing input towards a reconciliation policy and strategy that have measurable outcomes. Members of the Council also engaged with people in communities that may be impacted by APM, attending open houses, trade shows and cultural events, as well as First Nation and Métis community meetings. These activities were well-received by communities.

Municipal Forum

The Municipal Forum provides advice on municipal perspectives and processes to help guide the NWMO's engagement and outreach.

The forum is an assembly of municipal association representatives with experience and expertise on municipal issues and challenges. It helps the NWMO to incorporate best practices when communicating with local governments and associations, and understand the needs and practices of municipalities that are considering hosting the project.

The Council of Elders and Youth forms a circle with members of the NWMO's senior leadership team and Board of Directors.

Quality management system

The NWMO operates our integrated management system for activities supporting the long-term management of nuclear waste. As part of our plan to ensure excellence and accountability in governance, the organization maintains certifications to ISO 9001:2015 for quality, ISO 14001:2015 for environment, and CSA Z1000:2014 for health and safety management.

In addition to maintaining conformance to these standards, the NWMO's management system is augmented to meet CSA N286-12 Management System Requirements for Nuclear Facilities, which includes nuclear waste facilities. The NWMO's integrated management system ensures the organization is well equipped to implement our mission. The focus on safeguarding people is fully aligned with the CSA N286-12 management principle that safety is the paramount consideration guiding decisions and actions.

POWERED BY PEOPLE

Monica Kumar Dhoat, Executive Assistant (EA) to Laurie Swami, President and CEO of the NWMO, is dedicated to helping the organization run smoothly.

Monica came to the NWMO in May 2017 after spending seven years as a senior EA at the Law Society of Ontario. The same traits that defined her excellence there are advantageous here: attention to detail, good judgment, and a high degree of discretion.

"Above all, I need to understand what the business priorities are," says Monica, who supports President and CEO Laurie Swami on a day-to-day basis and has an important role in managing materials prior to the Board's quarterly meetings.

Monica works closely with other EAs at the NWMO to share best practices and improve efficiencies. "If it works, I say bring it in!" she says. "Let us work together to share expertise and make the organization greater!"

Feeling like she is adding value is a huge plus for Monica. "Laurie is an amazing boss. She makes me feel what I am doing is important. This keeps me motivated."

Outside work, Monica's biggest focus is her family. "I am consumed with being a daughter, a mother, a wife, and a sister," she says. Her parents are immigrants from northern India, and when they came to Canada, they instilled traditional family values in their five children.

Besides daily phone calls, one of the things that connects Monica's family is food. "We are big foodies," she laughs. "We get excited by what we eat, where we eat and how we eat it." While Monica herself is often busy cooking the staples of family weekday dinners – burritos, pastas and Shepherd's pie – her husband is an excellent creator of traditional Indian dishes.

When at work, Monica is happy to be contributing to the NWMO. "I knew nothing about nuclear waste when I arrived. Now, I am an ambassador, educating as many people as I can, including my 12-year-old son and 10-year-old daughter."

8 Ensuring funding is in place

Canadians expect that the money necessary to pay for the long-term care of used nuclear fuel will be available when needed. This expectation is being met.

The funders of this project are the major owners of used nuclear fuel in Canada: Ontario Power Generation (OPG), NB Power (NBP), Hydro-Québec (HQ), and Atomic Energy of Canada Limited (AECL); the amounts they pay are proportional to the number of fuel bundles produced by each company.

As required by the *Nuclear Fuel Waste Act* (*NFWA*), these companies make annual deposits to trust funds, to be accessed only after a construction licence for this project has been issued. The total value of these funds was $4.3 billion as of the end of 2018.

These companies also fund the NWMO's annual operating costs for the period prior to construction.

Responsibilities of the NWMO

The NWMO is responsible for determining what costs can reasonably be expected to arise over the life of the project, along with a contingency for unexpected events and for designing a system that collects the funds needed.

On an annual basis, we perform assessments of the factors that impact Adaptive Phased Management (APM) cost estimates and funding requirements. We then determine the trust fund contribution requirements for the following year, while ensuring resources are used prudently.

Oversight is provided by the federal government through the Minister of Natural Resources. Audited financial statements are submitted to the Minister as part of the NWMO annual report. In addition, audited financial statements of the trust funds established by the waste owners are required to be submitted to the Minister annually.

APM cost estimates include costs to develop, construct and operate a long-term facility, including a deep geological repository and Centre of Expertise, and to transport the used nuclear fuel to the repository.

Factors that influence cost

The eventual cost of the project is impacted by many factors. This includes the volume of used nuclear fuel to be managed, the location of the facility, the surrounding infrastructure, rock type and characteristics, the design of the repository, and the length of time allocated to monitoring the site following fuel placement.

The existing inventory of used nuclear fuel in Canada is approximately 2.9 million bundles. The eventual number of bundles to be managed is impacted by factors such as the longevity and productivity of nuclear reactors and decisions on refurbishments. If new reactors are built, the potential volume could rise to as many as 7.2 million bundles.

For planning purposes, our cost estimate is based on an expected volume of about 5.2 million fuel bundles.

Financial reporting requirements

The *NFWA* specifically addresses the future financial obligations expected for managing used fuel over the long term. The requirements of the *Act* are described in the box on the right. The following section of the annual report is structured to be consistent with requirements defined in subsection 16(2) of the *NFWA*.

Requirements of the *NFWA* (2002)

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

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

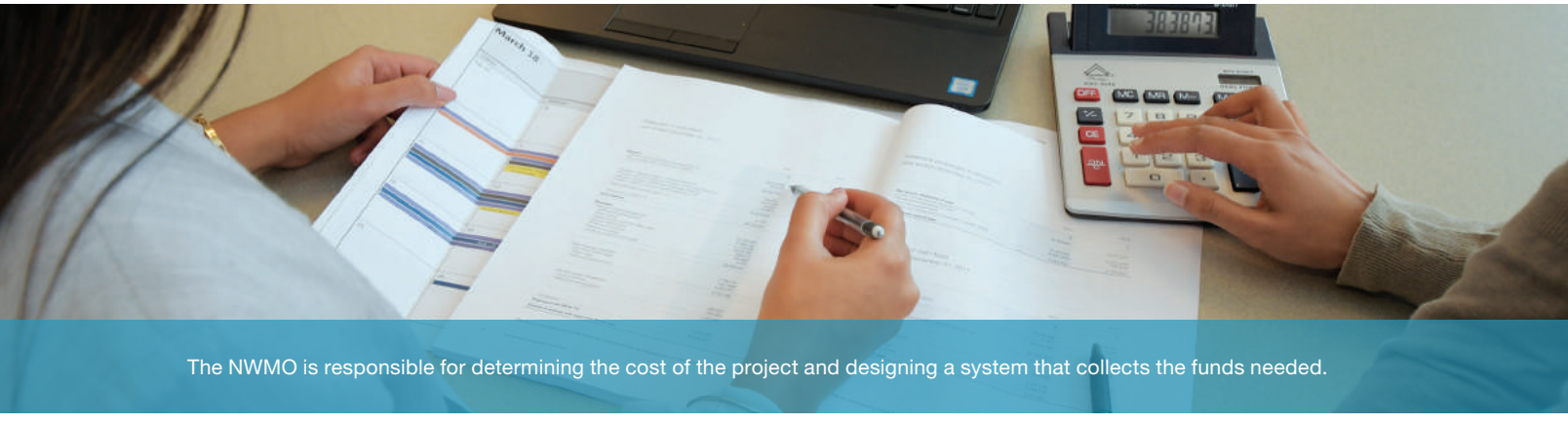
(a) the form and amount of any financial guarantees that have been provided during that fiscal year by the nuclear energy corporations and Atomic Energy of Canada Limited under the *Nuclear Safety and Control Act* and relate to implementing the approach that the Governor in Council selects under section 15 or approves under subsection 20(5);

(b) the updated estimated total cost of the management of nuclear fuel waste;

(c) the budget forecast for the next fiscal year;

(d) the proposed formula for the next fiscal year to calculate the amount required to finance the management of nuclear fuel waste and an explanation of the assumptions behind each term of the formula; and

(e) the amount of the deposit required to be paid during the next fiscal year by each of the nuclear energy corporations and Atomic Energy of Canada Limited, and the rationale by which those respective amounts were arrived at.



The NWMO is responsible for determining the cost of the project and designing a system that collects the funds needed.

8 Ensuring funding is in place

The *NFWA* requires the establishment of trust funds by each waste owner. The funds were established in 2002, and annual contributions have been made by each waste owner since. The total value of these funds, including investment income, was approximately $4.3 billion as of the end of 2018. This money is in addition to other segregated funds and financial guarantees the companies have set aside for nuclear waste management and decommissioning.

Owner	Trust fund balance ($ million) December 2018
OPG	3,973
HQ	153
NBP	166
AECL	51
Total	4,343

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*).

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.

Reporting of the Canadian Nuclear Safety Commission (CNSC) financial guarantees

Financial guarantees are required by the CNSC under the *NSCA* to cover the cost (in present value terms) associated with decommissioning, interim storage and long-term management of radioactive waste (including used nuclear fuel) produced to date.

These financial guarantees available for year 2019 total $19 billion. They are reviewed independently by the CNSC as part of the waste owner licence requirements. These financial guarantees are satisfied by segregated funds that are dedicated to nuclear waste management and decommissioning (totalling approximately $20 billion as of year-end 2018), and in the form of Provincial Guarantees.

Details of the status of these guarantees are presented in Attachment 1.

Total cost estimate

The NWMO completed a full update of the cost estimates for APM in 2016, with the next update planned for 2021. These estimates provide the basis for financial planning and trust fund deposits for future years.

On the basis of an expected volume of 5.2 million fuel bundles, the total lifecycle cost of APM – from the beginning of site selection in 2010 to the completion of the project – is approximately $23 billion (in 2015 dollars). This figure covers many decades of lifecycle activity.

It is also important to determine the amount that is required, in today's dollars, in order to have the necessary funds in place when needed in the future. We know that the funds in place today will grow based on continued additional payments from the funders of the project and through expected investment income that will also grow over time.

The funding required (using Jan. 1, 2019, present value) to manage 5.2 million fuel bundles from 2019 onwards is $9.2 billion.

Pre- and post-construction costs

Included in the $9.2 billion funding requirement is $2.8 billion to select a site for the repository, complete a detailed design, develop the Centre of Expertise, acquire the site, evaluate environmental impacts, and obtain a site preparation and construction licence from the CNSC. These pre-construction costs are paid for by the waste owners based on the annual budget as approved by the Board of Directors.

Also included is $6.4 billion to complete construction, transport the fuel to the repository, and operate, close, and monitor the repository. The *NFWA* requires that these post-construction costs must be funded through contributions to the *NFWA* Trust Funds established by OPG, HQ, NBP, and AECL. As of December 2018, the total value of these funds, including investment income, was approximately $4.3 billion.

The costs of interim storage at the reactor sites and retrieval of the used fuel from storage are not funded through the NWMO since they are the responsibility of the waste owners.

Budget forecast for 2019

For 2019, the NWMO Board of Directors approved a budget envelope of $114.8 million. Annual costs beyond 2019 are subject to further review. Sharing of these costs will be in accordance with the percentages defined in the Membership Agreement, as amended from time to time. The 2019 cost-sharing percentages among the waste owners are: OPG: 93.34%, HQ: 2.20%, NBP: 3.65%, and AECL: 0.81%.

Funding formula

The NWMO funding formula has been in place since its approval by the Minister of Natural Resources in April 2009. The formula, based partly on projections of used fuel to be generated by each waste owner, allocates liabilities and trust fund contribution requirements to each waste owner. Costs common to all waste owners are shared based on a cost-sharing percentage agreed to by the members. Costs specific to a nuclear fuel waste owner, such as special fuel and special transportation costs that are owner specific, are attributed to the owner.

Possible future reactors

Discussions have been 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:

- The principles used in the approved funding formula are reasonable and should also apply to new owners and new reactors.
- Fixed and variable costs and investments made to date need to be considered in any new funding formula for new owners and new reactors.
- The characteristics of new fuel types must be considered.
- The existing funding formula should be revised when specific circumstances are clear for new reactors and new owners.
- The changes in funding formula for new owners of new reactors may be different than the changes for an existing owner with new reactors.

The NWMO has proposed to apply the above principles to specific circumstances related to new owners and new reactors when they arise.

Trust fund deposits for 2019

Beginning in 2002, used nuclear fuel owners have been making annual contributions to the *NFWA* Trust Funds.

The 2019 *NFWA* Trust Fund deposit requirements stated herein have been developed based on the APM cost estimate completed in 2016. This estimate reflects an updated engineered-barrier system design and planning assumptions for the duration needed to select a single site.

Under the approved funding formula, the funding for the post-construction licence costs is divided into two parts:

1. Funding for historical used fuel bundles (committed liability); and
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 2043 in equal present value payments. The rationale for this amortization period is that 2043 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, while 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 2019 trust fund deposit requirements are shown in the table below.

Total trust fund deposits: Year 2019

Owner	Trust fund balance ($ million)	Deposits to trust funds (committed and future bundles) ($ million)*
	December 2018	2019
OPG	3,973	60.5
HQ	153	0
NBP	166	3.6
AECL	51	0.8
Total	4,343	64.9

* Annual trust fund deposits are required to be made within 30 days of the submission of the Annual Report. A deposit date of April 30 is assumed for illustrative purposes.

POWERED BY PEOPLE

Chief Financial Officer (CFO) Georgina Kossivas has responsibility for managing the NWMO's finances. She joined the NWMO as CFO in June 2018.

"I was attracted by this new challenge of contributing to a mandate with an important impact on Canadians," she says. "In the time I have been here, this has certainly proven to be true."

She was especially intrigued to learn about the organization's work in building community relationships, site selection, and engineering. She has enjoyed participating in Indigenous cultural awareness training and Indigenous ceremonies. "My understanding of Indigenous issues has expanded greatly since being here," she says.

Before joining the NWMO, Georgina was the CFO at Technical Standards and Safety Authority. She has held senior finance roles at a number of other companies, including AECL, TELUS, Bank of Montreal, and Canadian Tire Corporation.

Georgina has a CPA, CA (Chartered Professional Accountant, Chartered Accountant) designation, and holds a degree in Honours Business Administration from the Ivey Business School at Western University.

She has joined the NWMO at an interesting time, as the organization prepares for the next phases of work. "My working life has been focused on change management, including evolving CFO functions to bring value to business areas as a partner and advisor. I hope that I can bring my varied background in finance, as well as strategic planning and project management, to benefit the NWMO."

When not at work, Georgina loves to travel with her husband and two daughters. "We always prioritize day trips to see historic sites, natural settings and the local areas of interest," she says. Highlights include visiting the Ancient Mayan City of Chichén Itzá in Mexico, and spending time in the countryside in Cuba and Costa Rica.

Attachment 1

Financial guarantee status – Used fuel owners

Hydro-Québec (HQ)

The HQ *NFWA* Trust Fund contained $153 million as of Dec. 31, 2018, and the fair value is estimated at $167 million.

In addition to the trust fund, HQ has provided the CNSC with a Decommissioning Financial Guarantee of $685 million 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 guarantee is in the form of an expressed commitment of the Province of Quebec to HQ that provides a guarantee of payment.

The *NFWA* Trust Fund and the Financial Guarantee provided by the Province of Quebec covered the future financial obligations as follows:

- $496 million for decommissioning and long-term management of low- and intermediate-level radioactive waste; and
- $300 million for used fuel.

Ontario Power Generation (OPG)

In accordance with the *NSCA*, the CNSC requires OPG to have sufficient funds available to discharge its existing nuclear waste management and nuclear decommissioning obligations. The CNSC process requires the CNSC Financial Guarantee requirement to be updated once every five years, and OPG to provide an annual report to the CNSC on the assumptions, asset values, and resulting financial guarantee requirements. The CNSC Financial Guarantee requirement calculation takes into account nuclear waste expected to be generated to the end of each year.

The CNSC Financial Guarantee requirement continued to be satisfied, in part, by the forecast fair market value of the federally mandated Ontario *NFWA* Trust, and remainder by the two segregated funds governed by the *Ontario Nuclear Funds Agreement* (*ONFA*) between OPG and the Province of Ontario (collectively, the “Nuclear Funds”) without the requirement of a Provincial Guarantee for the 2019-22 period. As provided for by the terms of the *ONFA*, the province is committed to provide a Provincial Guarantee to the CNSC as required, on behalf of OPG, should there be a shortfall between the CNSC Financial Guarantee requirement and the fair market value of the Nuclear Funds during the 2019-22 period, as it has done in the past.

The CNSC Financial Guarantee requirement for 2019 is $17,133 million (Jan. 1, 2019, present value). This will be satisfied by the 2018 year-end fair market value of the Nuclear Funds of $18,992 million without the requirement of a Provincial Guarantee.

NB Power (NBP)

NBP has provided the CNSC with a Decommissioning Financial Guarantee that covers the 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 Financial Guarantee requirement is based on the present value of future costs to manage used fuel produced to the end of 2018 and present value of future estimated costs for station decommissioning.
- 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 Dec. 31, 2018, was approximately $731 million and was comprised of the following:
  - Used Fuel Fund – $207 million;
  - Station Decommissioning Fund – $358 million; and
  - *NFWA* Trust Fund – $166 million.

Atomic Energy of Canada Limited (AECL)

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 $51.3 million as of Dec. 31, 2018.

9 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 accounting standards for not-for-profit organizations set out in Part III of the Chartered Professional Accountants Canada Handbook. 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 13, 2019.

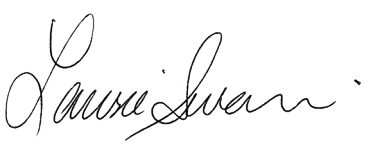
Management has a system of internal controls designed to provide reasonable assurance that the financial statements are accurate and complete in all material respects. The internal control system includes an established business conduct policy that applies to all employees. Management believes that the 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 our responsibilities for financial reporting, and is ultimately responsible for reviewing and approving the financial statements. The Board carries out this responsibility through its Audit, Finance and Risk Committee (the Committee).

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

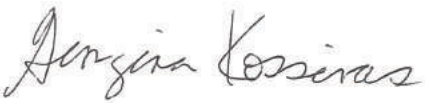
The financial statements have been audited by Deloitte LLP, the independent external auditor, in accordance with Canadian generally accepted auditing standards on behalf of the members.

February 13, 2019



Laurie Swami

President and CEO



Georgina Kossivas

Chief Financial Officer

Independent Auditor's Report

To the Members of Nuclear Waste Management Organization

Opinion

We have audited the financial statements of Nuclear Waste Management Organization (the "Organization"), which comprise the statement of financial position as at December 31, 2018, and the statements of operations, changes in net (deficiency) assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies (collectively referred to as the "financial statements").

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2018, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards ("Canadian GAAS"). Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of the Organization in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Organization's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Organization or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Organization's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian GAAS will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian GAAS, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit 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 Organization's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Organization's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Organization to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

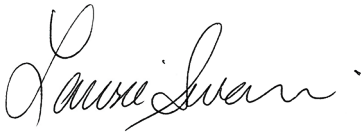
Deloitte LLP

Chartered Professional Accountants
Licensed Public Accountants
February 13, 2019
Vaughan, Ont.

Statement of financial position
as at December 31, 2018

	2018	2017
	$	$
Assets		
Current assets		
Cash	6,813,329	5,551,887
Member contributions receivable (Note 5a)	1,011,001	7,296,543
Other receivable from members	671,468	1,004,345
Prepaid expenses and deposits	977,407	1,098,315
	9,473,205	14,951,090
Capital assets (Note 3)	3,408,158	3,061,573
Accrued pension asset (Note 7)	33,840,455	43,026,314
	46,721,818	61,038,977
Liabilities		
Current liabilities		
Accounts payable and accrued liabilities (Note 12)	9,061,464	14,297,256
Deferred lease inducements (Note 8)	711,174	794,842
Deferred/payable member contributions (Note 5b)	150,567	308,992
	9,923,205	15,401,090
Deferred capital contribution (Note 6)	3,408,158	3,061,573
Deferred member contributions (Note 5c)	12,003,582	11,563,719
Other post-employment and pension benefits liability (Note 7)	23,225,919	24,647,641
	38,637,659	39,272,933
Net (deficiency) assets	(1,839,046)	6,364,954
	46,721,818	61,038,977

Approved by the Board of Directors, February 13, 2019



Laurie Swami

President and CEO
Toronto, Ont.

Lesley Gallinger

Chair – Audit, Finance and Risk Committee
Toronto, Ont.

The accompanying notes to the financial statements are an integral part of this financial statement.

Statement of operations
year ended December 31, 2018

	2018	2017
	$	$
Revenue		
Member contributions received (Note 4)	73,869,512	64,974,390
Non-member contributions received	486,240	618,109
	74,355,752	65,592,499
Change in deferred capital contributions (Note 6)	(346,585)	726,873
Change in long-term deferred member contributions (Note 5c)	(439,863)	(214,219)
Change in member contributions receivable (Note 5a)	(6,285,542)	16,628
Change in deferred/payable member contributions (Note 5b)	158,425	(140,981)
Total contribution revenue (Note 11)	67,442,187	65,980,800
Interest income (Note 11)	122,032	47,691
Total revenue	67,564,219	66,028,491
Expenses (Note 13)		
Adaptive Phased Management		
Staffing and administration	30,247,452	27,300,051
Engagement	13,877,617	12,090,643
Engineering	8,265,789	7,602,387
Site assessment	4,445,129	5,952,260
Stakeholder relations	2,639,221	2,457,057
Safety	2,576,049	2,230,997
Regulatory approvals	1,005,412	901,620
Transportation	923,954	1,118,432
Mobilization	49,493	6,000
	64,030,116	59,659,447
Deep Geologic Repository		
Staffing and administration	1,090,894	2,393,097
Safety assessment/waste characterization	763,945	750,890
Geoscience	395,845	471,036
Environmental assessment	321,535	1,138,143
	2,572,219	4,753,166
Lifecycle Liability Management		
Staffing and administration	-	339,325
Amortization of capital assets	961,884	1,276,553
Total expenses (Note 11)	67,564,219	66,028,491
Excess of revenue over expenses for the year	-	-

The accompanying notes to the financial statements are an integral part of this financial statement.

Statement of changes in net (deficiency) assets
year ended December 31, 2018

	2018	2017
	$	$
Net assets, beginning of year	6,364,954	5,163,954
Excess of revenue over expenses for the year	-	-
Remeasurements during the year:		
Accrued pension asset	(11,393,000)	4,122,000
Other post-employment and pension benefits liability	3,189,000	(2,921,000)
Net (deficiency) assets, end of year	(1,839,046)	6,364,954

Statement of cash flows
year ended December 31, 2018

	2018	2017
	$	$
Operating activities		
Cash received from contributions	74,355,752	65,592,499
Interest received	122,032	47,691
	74,477,784	65,640,190
Cash paid for salaries and benefits, materials and services	(71,772,938)	(61,881,864)
	2,704,846	3,758,325
Investing activity		
Purchase of capital assets (Note 3)	(1,443,404)	(550,558)
Net increase in cash	1,261,442	3,207,767
Cash, beginning of year	5,551,887	2,344,119
Cash, end of year	6,813,329	5,551,886

The accompanying notes to the financial statements are an integral part of these financial statements.

Notes to the financial statements
December 31, 2018

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* ("*NFWA*"), 2002, 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, New Brunswick Power Corporation, and Ontario Power Generation Inc. ("OPG") ("Members").

Pursuant to a Membership Agreement, cost sharing of APM costs in 2018 is based on the principles of projected total number of fuel bundles and the assumed timing of access to the long-term used fuel management facility. These cost sharing percentages are in effect since January 1, 2018.

The Lifecycle Liability Management ("LLM") Service Agreement for the provision of certain costing and accounting services with OPG was terminated in March 2017. The affected employees were transferred to OPG.

In late 2017, OPG advised that it was reviewing the level of NWMO support related to its Low and Intermediate Level Waste Deep Geologic Repository ("DGR") given the status of the regulatory approvals. As such, the NWMO's activities related to this program have been reduced in 2018, consistent with the 2018 work plan and transitioned the project management activities to OPG. As part of this transition, effective December 31, 2018, OPG has terminated its Engineering, Procurement and Construction Management Agreement with the NWMO. The NWMO will continue to offer limited support to OPG in 2019 under the existing DGR Services Agreement.

2. Significant accounting policies

Basis of presentation

The financial statements of the NWMO are the representations of management prepared in accordance with Canadian accounting standards for not-for-profit organizations set out in Part III of the Chartered Professional Accountants Canada ("CPA Canada") Handbook 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 the straight-line basis over their estimated useful lives as follows:

Office building	15 years
Furniture and office equipment	7 years
Transport and work equipment	7 years
Vehicles	5 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, they are not recognized as revenue until associated costs have been incurred. Any excess or shortfall of member contributions is recorded as deferred revenue or member contribution receivable, respectively.

Contributions used for the purchase of capital assets owned by the NWMO are deferred and amortized into revenue at the rate corresponding with the amortization rate of the related capital assets.

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 ("LTD") 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, supplementary pension plan, and other post-employment benefit ("OPEB") plans. The defined benefit obligation for pension is determined using the projected benefit method pro-rated on service and is measured based on the actuarial valuation prepared for funding purposes (but not one prepared using a solvency, wind up, or similar valuation basis). Under this method, the benefit costs are amortized over the average remaining service period of active employees as indicated in Note 7. For other unfunded plans such as supplementary pension plan and OPEB, a similar accrual method is used and the benefit obligations are measured based on the actuarial valuation for accounting purposes. Remeasurements and other items for the period are recorded through the statement of net (deficiency) assets.

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 rate used by the NWMO in determining projected benefit obligations and the costs for the NWMO's pension plan is based on the funding valuation on a going concern basis, while other employee benefit plans' discount rates are based on representative AA corporate bond yields in effect at the end of the year.

(iii) Pension fund assets are valued using market-related values for the purposes of determining actuarial gains or losses and the actual 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 as expenses in the year incurred.

Foreign currency translation

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

Financial instruments

Financial instruments include cash, member contributions receivable, other receivables from members, and accounts payable and accrued liabilities.

Financial assets and financial liabilities are initially recognized at fair value when the NWMO becomes a party to the contractual provisions of the financial instrument. Subsequently, all financial instruments are measured at amortized cost. Financial assets measured at amortized cost are assessed at each reporting date for indications of impairment. If such impairment exists, the asset is written down and the resulting impairment loss is recognized in the statement of operations.

Related party transactions

Related party transactions are recorded at the exchange amount.

Use of estimates

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosures of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Due to the inherent uncertainty in making estimates, actual results could differ from those estimates. Accounts requiring significant estimates include accrued pension asset, other post-employment and pension benefits liability, certain accrued liabilities and amortization which is based on the estimated useful life of the capital assets.

3. Capital assets

			2018	2017
	Cost	Accumulated amortization	Net book value	Net book value
	$	$	$	$
Land	10,000	-	10,000	10,000
Computer equipment and software	4,569,813	3,765,811	804,002	525,495
Furniture and office equipment	2,506,282	2,083,364	422,918	356,711
Leasehold improvements	2,234,099	2,234,099	-	-
Transport and work equipment	1,774,098	589,451	1,184,647	1,067,282
Office building	1,182,612	196,021	986,591	1,065,432
Vehicles	374,231	374,231	-	36,653
	12,651,135	9,242,977	3,408,158	3,061,573

Capital asset additions totalling $76,228 (2017 – $211,163) have been excluded from the statement of cash flows as they remain unpaid at year-end. During 2018, capital asset additions totalling $211,163 (2017 – $212,041) have been included in the statement of cash flows as they were accrued at December 31, 2017, and paid in 2018 (2017 – accrued at December 31, 2016, and paid in 2017).

4. Related party transactions and balances

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

			2018	2017
	APM	LLM/DGR	Total	Total
	$	$	$	$
Transactions during the year				
Member contributions received				
Ontario Power Generation Inc.	66,953,000	3,110,026	70,063,026	60,578,390
New Brunswick Power Corporation	2,561,000	-	2,561,000	2,101,000
Hydro-Québec	1,245,486	-	1,245,486	2,295,000
	70,759,486	3,110,026	73,869,512	64,974,390

5. 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. Information in this note includes amounts related to Atomic Energy of Canada Limited, as applicable.

(a) Member contributions receivable
Member contributions receivable are made up of the following:

	2018	2017
	$	$
Ontario Power Generation	896,089	7,089,277
New Brunswick Power Corporation	-	207,266
Hydro-Québec	114,912	-
	1,011,001	7,296,543

(b) Deferred/payable member contributions – current
Deferred/payable member contributions are made up of the following:

	2018	2017
	$	$
Atomic Energy of Canada Limited	140,361	224,978
New Brunswick Power Corporation	10,206	-
Hydro-Québec	-	84,014
	150,567	308,992

(c) Long-term deferred member contributions
Long-term deferred member contributions represent amounts received or receivable to fund various employee future benefits as follows:

	2018	2017
	$	$
Accrued pension asset	33,840,455	43,026,314
Other post-employment benefits	(23,225,919)	(24,647,641)
Pension and other post-employment benefit liabilities – short term (Note 7)	(450,000)	(450,000)
Remeasurements and other items in net (deficiency) assets	1,839,046	(6,364,954)
	12,003,582	11,563,719

(d) Continuity of deferred member contributions

The continuity of deferred member contributions is as follows:

	2018	2017
	$	$
Balance, beginning of year		
Deferred/payable member contributions – current	308,992	168,011
Deferred member contributions – long term	11,563,719	11,349,500
	11,872,711	11,517,511
Contributions received	74,355,752	65,592,499
Contributions receivable	1,011,001	7,296,543
Contribution revenue recognized	(67,442,187)	(65,980,800)
Amounts received previously recognized	(7,296,543)	(7,279,915)
Change related to deferred capital contributions	(346,585)	726,873
	12,154,149	11,872,711
Balance, end of year		
Deferred/payable member contributions – current	(150,567)	(308,992)
Deferred member contributions – long term	12,003,582	11,563,719

6. Deferred capital contributions

	2018	2017
	$	$
Balance, beginning of year	3,061,573	3,788,446
Contributions for the purchase of capital assets	1,308,469	549,680
Less amortization into revenue	(961,884)	(1,276,553)
Balance, end of year	3,408,158	3,061,573

7. 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 a third party. 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 benefit plans
These other post-employment benefit plans provide medical, dental, LTD, and group life insurance coverage for certain groups of full-time employees who have retired from the NWMO.

The most recent actuarial valuations in accordance with CPA Canada Handbook Section 3463 of the registered pension plan and other post-employment benefit plans were performed using data as at December 31, 2017, and the supplementary pension plan using data as at December 31, 2016. The liability as at December 31, 2018, is based on an extrapolation of the previous valuations.

A funding valuation, which was completed for the pension plan as of January 1, 2018, reported a surplus of $40.9 million on a going concern basis and a surplus of $4.8 million on a solvency basis.

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

	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2018	2017	2018	2017	2018	2017
	%	%	%	%	%	%
Discount rate at the beginning of the period	5.75	5.75	3.5	4.0	3.5	4.0
Salary schedule escalation rate	3	3	3	3	-	-
Rate of cost of living increase	2	2	2	2	-	-
Rate of increase in health-care cost trend	-	-	-	-	5.6	5.7
Discount rate at the end of the period	5.50	5.75	4.0	3.5	4.0	3.5
Average remaining service life for employees	13 years	13 years	13 years	13 years	12 years	12 years

Information for the NWMO's pension plans and post-employment benefits, including LTD is as follows:

	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2018	2017	2018	2017	2018	2017
	$	$	$	$	$	$
Changes in accrued benefit obligation						
Accrued benefit obligation, January 1	(62,459,000)	(58,646,000)	(6,792,077)	(5,354,700)	(18,305,564)	(14,980,168)
Current service cost	(2,157,000)	(2,027,000)	(261,000)	(331,000)	(1,145,000)	(885,000)
Interest cost	(3,693,000)	(3,470,000)	(254,000)	(245,000)	(675,000)	(628,000)
Past service cost	(20,000)	-	-	-	-	-
Employee contribution	(1,117,000)	(1,055,000)	-	-	-	-
Benefits paid	1,965,000	2,858,000	242,913	210,347	324,809	272,604
Net actuarial gain (loss)	(1,977,000)	(119,000)	550,000	(1,071,724)	2,639,000	(2,085,000)
Accrued benefit obligation, December 31	(69,458,000)	(62,459,000)	(6,514,164)	(6,792,077)	(17,161,755)	(18,305,564)
Changes in plan assets						
Fair value of plan assets, January 1	105,485,314	95,494,322	-	-	-	-
Expected return on plan assets	6,105,000	5,542,992	-	-	-	-
Benefits paid	(1,965,000)	(2,858,000)	-	-	(325,000)	(273,000)
Net actuarial gain (loss)	(9,416,000)	4,241,000	-	-	-	-
Employer contribution	1,952,141	2,010,000	-	-	325,000	273,000
Past service cost	20,000	-	-	-	-	-
Employee contribution	1,117,000	1,055,000	-	-	-	-
Fair value of plan assets, December 31	103,298,455	105,485,314	-	-	-	-
Funded status						
Fair value of plan assets	103,298,455	105,485,314	-	-	-	-
Accrued benefit obligation	(69,458,000)	(62,459,000)	(6,514,164)	(6,792,077)	(17,161,755)	(18,305,564)
Accrued benefit asset (liability)	33,840,455	43,026,314	(6,514,164)	(6,792,077)	(17,161,755)	(18,305,564)
Short-term portion	-	-	(200,000)	(200,000)	(250,000)	(250,000)
Long-term portion	33,840,455	43,026,314	(6,314,164)	(6,592,077)	(16,911,755)	(18,055,564)
	33,840,455	43,026,314	(6,514,164)	(6,792,077)	(17,161,755)	(18,305,564)
Components of cost recognized						
Current service cost	2,157,000	2,027,000	261,000	331,000	1,145,000	885,000
Interest cost on accrued benefit obligation	3,693,000	3,470,000	254,000	245,000	675,000	628,000
Expected return on plan assets	(6,105,000)	(5,543,000)	-	-	-	-
Cost recognized	(255,000)	(46,000)	515,000	576,000	1,820,000	1,513,000

The short-term portion of the accrued liability benefit of $450,000 (2017 – $450,000) that is included in accounts payable and accrued liabilities is part of the total $23,675,919 (2017 – $25,097,641) accrued benefit liability at the end of the year for the supplementary pension and other post-employment benefit/LTD plans.

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

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

Sensitivity information related to the other post-employment benefit plans is as follows:

	2018	2017
	$	$
Effect of 1% increase in health-care cost trends on		
Accrued benefit obligation	3,853,000	4,696,000
Service cost and interest cost	530,000	437,000
Effect of 1% decrease in health-care cost trends on		
Accrued benefit obligation	(2,887,000)	(3,432,000)
Service cost and interest cost	(372,000)	(313,000)

The supplementary pension plan is unfunded and is secured by a Standby Letter of Credit of $8,196,100 (2017 – $8,079,900) issued by OPG.

8. Deferred lease inducements

	2018	2017
	$	$
Tenant inducements	835,676	1,127,523
Less accumulated amortization	(124,502)	(332,681)
	711,174	794,842

9. Guarantees

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

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

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

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

The NWMO also arranged a Standby Letter of Credit issued by OPG to secure its supplementary pension plan (Note 7).

10. Operating leases

The NWMO has entered into a number of leases for office premises and vehicle which expire at various dates up to June 30, 2027.

The estimated annual minimum payments over the initial term of these leases up to their expiration are as follows:

	$
2019	1,037,167
2020	980,498
2021	997,870
2022	1,011,348
2023	1,030,148
Thereafter	3,647,888
	8,704,919

11. Segment reporting

The NWMO has two reportable segments as follows:

- Federal mandated program (APM);
- Other direct services outside its mandated programs, which include DGR and LLM for OPG, with service contracts which became effective January 1, 2009, and February 1, 2011.

Segment information is as follows:

	APM		DGR/LLM		Total	
	2018	2017	2018	2017	2018	2017
	$	$	$	$	$	$
Contribution revenue	64,868,614	60,845,400	2,573,573	5,135,400	67,442,187	65,980,800
Interest income	116,151	43,418	5,881	4,273	122,032	47,691
Total revenue	64,984,765	60,888,818	2,579,454	5,139,673	67,564,219	66,028,491
Amortization of capital assets	954,649	1,229,371	7,235	47,182	961,884	1,276,553
Operating expenses	64,030,116	59,659,447	2,572,219	5,092,491	66,602,335	64,751,938
Total expenses	64,984,765	60,888,818	2,579,454	5,139,673	67,564,219	66,028,491
Capital asset additions	1,308,469	549,680	-	-	1,308,469	549,680

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

12. Government remittances

Accounts payable and accrued liabilities include the following amounts with respect to government remittances:

	2018	2017
	$	$
Goods and Services Tax/Harmonized Sales Tax ("GST/HST")	606,343	1,004,345
Less GST/HST receivable	(325,915)	(179,505)
Net GST/HST payable	280,428	824,840
Workplace Safety and Insurance Board premiums payable	1,200	-
	280,428	824,840

13. Comparative amounts

In 2018, the presentation of expenses in the statement of operations was revised to reflect how the NWMO is managing project activities at the current phase of the APM and DGR projects. The following comparative amounts have been reclassified to conform to the current year's financial statement presentation:

		2017
	As reclassified	As previously stated
	$	$
Statement of operations		
Expenses		
Adaptive Phased Management		
Staffing and administration	27,300,051	27,300,051
Engagement	12,090,643	-
Engineering	7,602,387	-
Site assessment	5,952,260	-
Stakeholder relations	2,457,057	-
Safety	2,230,997	-
Regulatory approvals	901,620	-
Transportation	1,118,432	-
Mobilization	6,000	-
Siting process	-	17,846,281
Design and development safety case	-	11,728,829
Building relationships	-	2,016,792
Governance structure	-	508,612
Adapting to change	-	252,882
Funding formula/financial surety	-	6,000
	59,659,447	59,659,447
Deep Geologic Repository		
Staffing and administration	2,393,097	2,393,097
Safety assessment/waste characterization	750,890	-
Geoscience	471,036	-
Environmental assessment	1,138,143	-
Regulatory review stage	-	1,138,143
Design stage	-	1,221,926
	4,753,166	4,753,166

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