

The background of the cover features a grid of squares in blue and orange, with large circular arcs in the same colors. The NWMO logo is positioned in the top right corner.

nwmo

NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES

GUIDED BY SCIENCE.
GROUNDED IN KNOWLEDGE.
COMMITTED TO PARTNERSHIP.

Annual Report 2020

The Honourable Seamus O'Regan
Minister, Natural Resources Canada
Ottawa, ON K1A 0A6

March 2021

Dear Minister,

We are pleased to submit to you the annual report of the Nuclear Waste Management Organization (NWMO) for fiscal year 2020.

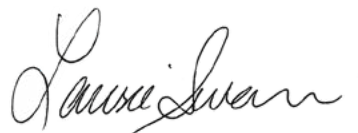
We submit this report in compliance with sections 16(1) and 23(1) of the *Nuclear Fuel Waste Act*.

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
Chair of the Board



Laurie Swami
President and CEO

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Messages

Wayne Robbins, Chair of the Board

It remained my pleasure to serve as Chair of the Board for the Nuclear Waste Management Organization (NWMO) in 2020. It is a unique privilege to oversee a project of such generational importance as Canada's plan for the safe, long-term management of used nuclear fuel, and to know that it is being implemented in a manner that protects people and the environment.

Throughout 2020, the NWMO has continued its crucial work to implement Canada's plan. While the year has been challenging, and some work affected because of the global COVID-19 pandemic, the Board remains confident in the organization's continued progress to implement this important project.

During the pandemic, we have seen the organization successfully adapt and shift many of its operations online, including many aspects of community engagement, while also continuing its important technical work. The Board of Directors has had to meet in a new, entirely digital environment, as well as adapt to work in a pandemic. If anything, the resilience the entire organization displayed this year has deepened our confidence in its ability to successfully implement Canada's plan.

Despite the challenges of 2020, we are pleased with the continued momentum the NWMO accomplished this year. The organization remains on track to select a site in 2023 and has demonstrated its ability to maintain its long-term technical timelines while adjusting for external events. The Board is also confident the NWMO will be able to meet its longer-term goals for the start of licensing, construction, transportation, and eventual operation of the repository.

The Board added a new member at the start of 2020 – Glenn Jager – but following that addition, the makeup of the Board itself remained unchanged this year. This continuity provided some stability amid an otherwise tumultuous year.



The Board has the honour of serving as an oversight body for the NWMO. It is a role we take seriously, and to inform our work, we are committed to keeping abreast of public opinion and developments in the nuclear industry. In previous years, we attended events and conferences, both as representatives of the NWMO and to gain valuable insights. This year, some of us were able to attend virtually instead of being there in person.

In 2020, the Board met more frequently with the Executive Committee in an effort to support their work as they adapted to the pandemic. Through these meetings, the Board was both able to offer guidance and receive reassurance the implementation of Canada's plan is continuing to move forward.

In particular, the Board was pleased to see important milestones met towards planning for the transportation of used

nuclear fuel, environmental baseline monitoring, the safety case for Canada's plan, the engineering and technical site assessments to support that case, and outreach and engagement work in potential siting areas.

We meet regularly with the Executive Committee as part of our work to oversee the strategic direction of the organization. We were able to continue these meetings virtually since we were unable to meet in person.

The Board's governance duties include approving the NWMO's business plans, performance objectives and budgets. Fiscal responsibility is of the utmost importance, especially with a project of this size and duration. We are committed to ensuring that the NWMO maintains the necessary financial resources to successfully implement it in a way that is socially acceptable, technically sound, environmentally responsible, and economically feasible.

The Board also wishes to express its ongoing support for and engagement with the NWMO's commitment to work together with Indigenous communities and towards Reconciliation. This year, the Board was pleased to see the NWMO continue to implement its Reconciliation Policy and incorporate Indigenous Knowledge into its work. We also recognize the organization took important steps to further its commitment to diversity and equity in 2020.

To include Indigenous perspectives in our work, the Board meets annually 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. We held this meeting virtually in fall 2020.

This past year, the NWMO demonstrated that it is an adaptive, responsive and resilient organization. It continues to make important progress towards implementing Canada's plan for the safe, long-term management of used nuclear fuel. In the following pages, I invite you to read how that work in 2020 has been guided by science as the NWMO moves towards partnership with potential siting communities.

Sincerely,

A handwritten signature in black ink, reading "Wayne Robbins". The signature is fluid and cursive, with a small flourish at the end.

Wayne Robbins
Chair of the Board

Laurie Swami,

President and Chief Executive Officer

Through adaptation and resilience, we moved forward in 2020.

It was a year marked by the global COVID-19 pandemic that affected every corner of our organization, as it did the world. It was hard on our people, hard on the communities we work with, hard on the NWMO. We would be lying to say it was smooth sailing to continue implementing Canada's plan for the long-term storage of used nuclear fuel amid such tumult.

Yet, it is precisely because it has been so challenging that I am so pleased with the progress made. This is an essential, national infrastructure project to protect people and the environment for generations to come. It is simply too important to be curtailed by even the strongest global headwinds.

We have always said Canada's plan was adaptive, even in how we describe the approach – Adaptive Phased Management. This year, I am proud to say the NWMO has proven its ability to adapt, and dare I say excel, even under difficult circumstances.

We moved quickly as an organization to work from home. It was challenging on a personal level for so many on our team, but we rose to the occasion and came together to work through the logistics. In some ways, it brought us closer together. We have seen one another's children on video calls, we have been inside one another's homes virtually, and we have shown kindness and empathy as we all adapted to a new normal.



The communities we work with were right there alongside us. They showed up to virtual meetings and digital engagement activities, and we supported them in addressing the broader effects of the pandemic as well, which you can read more about in this report.

Amid all that, we have many milestones to celebrate this year.

The release of our draft transportation planning framework for public input lays the groundwork for the safe and secure transportation of used nuclear fuel to a deep geological repository. Canada's plan will allow for used nuclear fuel to be moved from its current location in safe and secure interim storage to a long-term solution inside a repository that protects people and the environment for generations to come.

We are now focused on two potential sites as we move towards site selection in 2023. We have successfully assembled enough land in South Bruce in southern Ontario to form a potential repository site in the area, an important milestone that allows us to continue our site assessment activities in the area in 2021 – activities that include deep borehole drilling and environmental baseline monitoring. These site assessment activities remain ongoing near Ignace in northern Ontario as well.

Some of our technical work this year was admittedly delayed. Planned studies, trials and in-person meetings were cancelled

or delayed as the pandemic advanced. However, we were able to continue some technical fieldwork this year and plan for further work in 2021. By mid-2020, we were able to reopen our Oakville test facility in a safe manner that adheres to public health guidelines. While that means there were very few public in-person tours of the facility, it has allowed our important technical work to continue.

We also made significant progress in developing and drafting safety case studies for the two potential sites that remain in the site selection process. This work includes examining features of the repository system, testing key safety parameters, and confirming that people and the environment will be protected in the long term under a range of scenarios. Our geoscience team made progress interpreting and analyzing data from earlier field studies, in particular, samples from earlier borehole drilling near Ignace. At the same time, we have added to the conversation about small modular reactors and ensured Canada's plan remains adaptive to the potential of that technology to power communities and businesses across the country.

We also continued to share Canada's plan with the public. Our media presence increased this year, as did our social media presence. We continued to work with governments and elected officials at all levels.

Another moment of adaptation at the NWMO: the Minister of Natural Resources Canada asked us late in the year to lead an engagement process with Canadians and Indigenous peoples to inform the development of an Integrated Strategy for Radioactive Waste, which will include low- and intermediate-level waste.

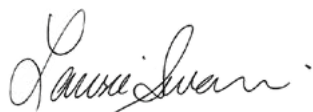
This work will result in a proposed strategy and options to implement the Government of Canada's radioactive waste policy that is currently under review. It is a new task that will draw on our expertise in engaging Canadians. It will run in parallel with, but separately from, the implementation of Canada's plan for the safe, long-term storage of used nuclear fuel in a manner that protects people and the environment.

Our work with community leaders also includes Indigenous communities – work that is guided and informed by our Council of Elders and Youth and our Reconciliation Policy. Implementation of that policy continued throughout 2020 through our ongoing commitment that all staff receive cultural awareness and Reconciliation training. We even expanded it this year to invite families of NWMO staff to join our online training sessions. We also continued to participate in land acknowledgments, to assess our policies and procedures against our Reconciliation assessment tool, and to interweave Indigenous Knowledge into all our work.

This year also laid bare deep divides and inequities that remain across Canada and around the world. At the NWMO, we have always worked to be a diverse and inclusive workplace, and to support and participate in the hard work of Reconciliation. We have worked together through training sessions and other activities to learn more about the importance of that commitment and the challenges we all must face.

In 2020, the NWMO has proved we are strong enough, resilient enough and adaptable enough to do just that. I encourage you to read the following pages to see how the NWMO has navigated the rocky waters of 2020, as we remain guided by knowledge and keep moving towards partnership.

Thank you,



Laurie Swami

President and Chief Executive Officer

Introduction to the NWMO

For nearly 60 years, Canada has been using nuclear power as a reliable energy source to power our homes, businesses, schools, and hospitals. As worldwide demand for energy grows and climate change intensifies, nuclear power is increasingly becoming part of the conversation.

The Nuclear Waste Management Organization (NWMO) plays an important role that completes the fuel cycle. We are the guardians who will be entrusted to ensure used nuclear fuel is managed safely in the very long term, protecting people and the environment.

Currently, used nuclear fuel (a byproduct of nuclear power) is safely stored on an interim basis at existing reactor sites in Canada. The current storage method is safe, but temporary. Canadians have made it clear that it is important to implement a long-term approach – and not leave it for future generations.

Through the *Nuclear Fuel Waste Act*, the Government of Canada assigned responsibility for the long-term management of Canada's used nuclear fuel to the NWMO. We are a non-profit organization that was established by Canada's nuclear fuel waste owners – Ontario Power Generation, Hydro-Québec and New Brunswick Power Corporation.

From inception, the NWMO understood that any long-term solution needed to be developed collaboratively with Canadians and Indigenous peoples. Canada's plan for used nuclear fuel, known as Adaptive Phased Management (APM), emerged through a three-year dialogue with specialists and the public. It is based on the values and objectives that they identified. In 2007, the Government of Canada selected APM as the country's plan for the long-term management of Canada's used nuclear fuel.

Adaptive Phased Management (APM)



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 a 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 used nuclear fuel. The management system involves phased and adaptive decision-making, supported by public engagement and continuous learning. In all aspects of implementing this plan, the NWMO is guided by science, grounded in knowledge and committed to partnership – our theme for this annual report.

Initially, 22 communities expressed interest in learning about the project and exploring their interest to host it. Based on technical and social evaluations, we gradually narrowed down to two potential siting areas, both in Ontario – one near Ignace and one in South Bruce. Ignace and South Bruce have both been deeply involved since 2010 and 2012 respectively.

Canada's plan will only proceed in an area that can be demonstrated as safe and has informed and willing hosts. To meet this criteria, together with potential siting area communities, we are exploring the potential for partnership, determining criteria for willingness and looking at how the project could enhance community well-being in these areas.

Canada's plan is adaptive by design, and this aspect became especially important this past year. During the global COVID-19 pandemic, we found ways to adapt our work – from how we engage with communities, to how we provide Reconciliation training, to how we conduct technical work at our proof test facility in Oakville. With these and other adjustments, we have been able to maintain momentum in delivering on our mandate.

We are approaching a significant milestone – we expect to select a site by 2023. The work we are conducting now is laying the foundation for a transition to a new series of activities. Once a preferred site is selected, we will initiate regulatory processes, construct a Centre of Expertise and begin to transition our operations to the site. The next phase of our work is fast-approaching, and we will be ready.

This project is important for potential siting areas, for the environment, for industry – and most of all, for Canadians.

Informing and guiding our work

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.

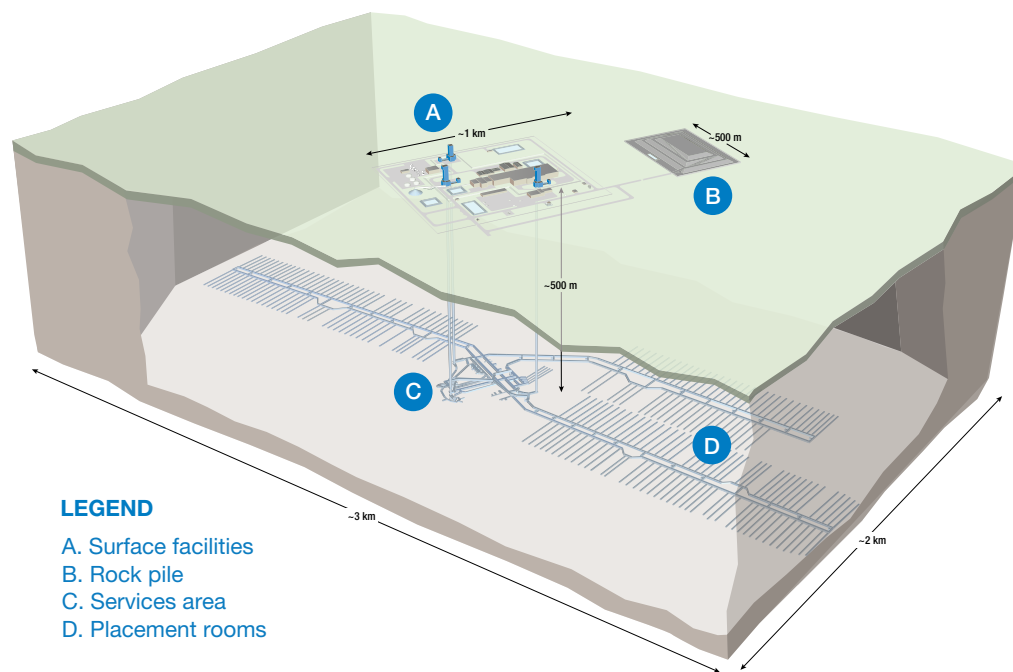
An Ethical and Social Framework

We are guided by an Ethical and Social Framework (www.nwmo.ca/ethicalandsocial) that was developed with the involvement of leading Canadian ethicists and Indigenous thought leaders during the study phase of our work and first published in 2004. We continue to use the framework and build on it as we advance the project.

The Ethical and Social Framework incorporates the following principles:

- » 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 deep geological repository



This diagram shows a conceptual layout for the surface facilities, and the underground services area and placement rooms in the deep geological repository in a site with sedimentary rock. The design will continue to become more detailed as the project progresses.

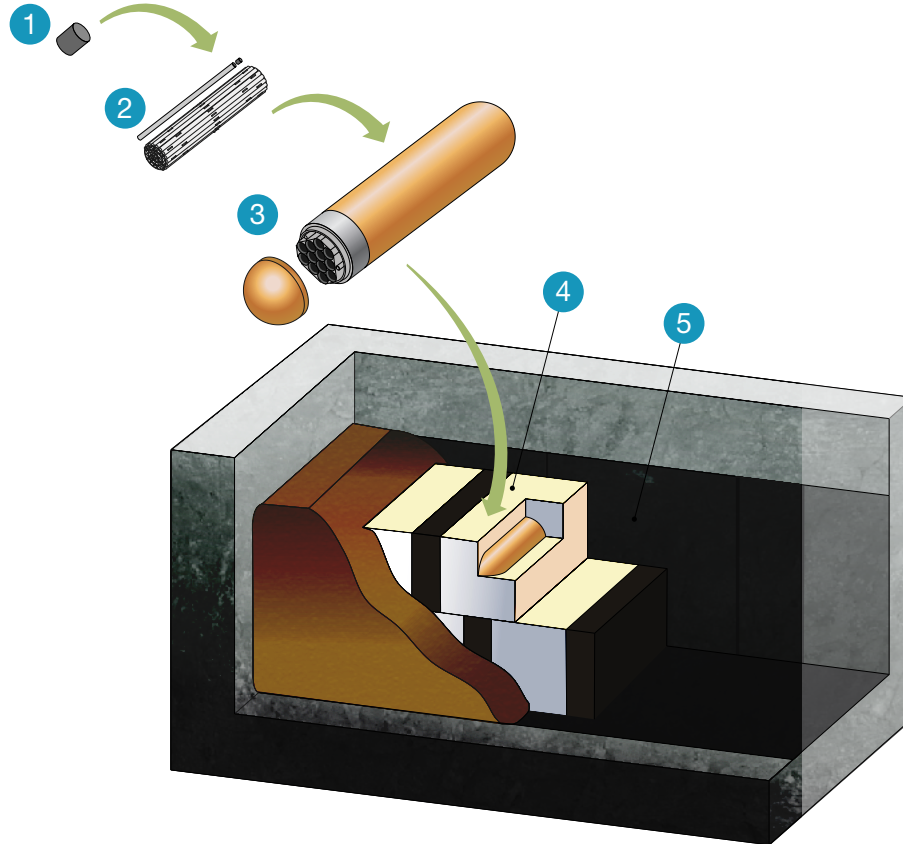
The deep geological repository uses a multiple-barrier system designed to safely contain and isolate used nuclear fuel over the long term. It will be constructed at a depth of approximately 500 metres depending on the geology, and consists of a network of placement rooms for the used nuclear fuel.

At the surface, there will be facilities where the used fuel is received, inspected and repackaged into purpose-built containers encased in a buffer box 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.

The repository will include a centralized services area, which allows for ventilation underground through three shafts located within a single, secure area. The layout also includes multiple access tunnel arms that enable technical specialists to situate placement rooms in areas with the most suitable rock. The buffer boxes will be arranged (e.g., two high) in the horizontal placement rooms, and any spaces will be backfilled with bentonite pellets.

In preparation, the NWMO has begun work on site-specific conceptual designs of the underground repository layout for potential siting areas in Ontario based on information from geoscience assessments and initial borehole drilling. This will be an iterative process. As the NWMO acquires additional site-specific information, we will continue to evolve the design of the repository.

Rigorous safety standards govern the project, and we have committed to meet or exceed applicable federal and provincial regulatory requirements to protect the health, safety, and security of people and the environment.



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

The engineered-barrier system

Within the repository, a series of engineered and natural barriers will work together to safely contain and isolate used nuclear fuel. Each of these barriers provide a unique and stand-alone level of protection. If any one of the barriers deteriorate, the next one comes into play.

- 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, made from Zircaloy, 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 emplacement 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.


Our timelines

Although the pandemic has had an impact on our work, we remained focused and productive. While some initiatives had to be paused temporarily, we were able to bring forward others by several months. Still, it was necessary to adjust some of the planned timelines associated with regulatory approvals (e.g., submitting the project description and impact assessment) and building the Centre of Expertise to fully address all the work required in these areas.


By strategically adapting our work plans over the course of the year, we remained on track to meet our expected site selection date of 2023. Site selection will mark an important milestone in Canada's plan as the decision will bring to an end the siting process we initiated in 2010. Timelines for construction and moving our operations to the site also remain unchanged. We are committed to moving forward with Canada's plan, and the following graphic provides a snapshot of historic and future milestones for 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 Adaptive Phased Management (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 central, preferred 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 2015	Twenty-two communities initially express interest. In collaboration with interested communities, the NWMO conducts initial screenings, followed by preliminary assessment desktop studies and community engagement. Areas with less potential to meet project requirements are eliminated from further consideration.
	2015 to 2023	The NWMO expands assessment to include field investigations. Areas with less potential are eliminated from further consideration as the narrowing down process continues.
	2023	A single, preferred site is identified. The transportation planning framework is finalized.
Towards construction	2024	Detailed site characterization begins. The project description is submitted, triggering the federal impact assessment. The Licence to Prepare Site application is submitted to the Canadian Nuclear Safety Commission (CNSC).
	2026	Impact assessment studies are submitted as part of the regulatory process.
	2027	The grand opening of the Centre of Expertise is held.
	2028	The impact assessment is approved (estimate). The Licence to Prepare Site is granted (estimate).
	2029	The Licence to Construct application is submitted to the CNSC.
	2032	The Licence to Construct is granted (estimate).
	2033	Design and construction begin.
Beginning operations	2040 to 2045	Operations of the deep geological repository begin. Transportation of used nuclear fuel to the repository begins.

The NWMO in 2020 by the numbers




The NWMO is
18
years old.



We expect to select a
single, preferred site
for the deep geological
repository by

2023.



The NWMO has
research projects
underway with

17
universities.



We completed Reconciliation
assessments of

11

NWMO policies, procedures
and standards to ensure
that Reconciliation is
reflected in all our work.



We held a total of
20 virtual and physically
distanced community
workshops and
addressed
926 individual
inputs
to the environmental baseline
design program.



We have received approximately
145 metric
tonnes

of bentonite clay (in various
forms) to support an upcoming
emplacement trial (placing
bentonite boxes in a mock
emplacement room).

There are

2

areas remaining in the site selection process.



The NWMO has

192

employees.



The NWMO
has Learn More
agreements with

23

communities and
organizations.



We provided more than

\$800,000

of support to communities during
the global COVID-19 pandemic.



We reviewed
and accepted

270

sets of geoscience data
from our work in Ignace
and South Bruce.



40 young
people and

17 first
responders

participated in transportation
planning framework engagement
sessions tailored to each group
respectively.



Interweaving Indigenous perspectives into Canada's plan

At the NWMO, we are committed to interweaving Indigenous Knowledge into Canada's plan, and understanding and honouring the Indigenous perspective.

As part of establishing a solid foundation for working with Indigenous peoples, we have embarked on a Reconciliation journey. In advancing that journey, we recognize that Reconciliation is more than an acknowledgment of injustice (although that is part of the process); it also means taking action to co-create a better future built on rights, equity and well-being.

In 2020, we did just that by implementing our Reconciliation Policy (www.nwmo.ca/reconciliationpolicy), which we adopted in 2019. We also committed to measuring our progress using both qualitative and quantitative approaches. The NWMO is developing a Reconciliation baseline and has started using assessment tools to evaluate where we are in our contributions to Reconciliation and how we should move forward as an organization.

We also continue to build a culture of Reconciliation. We provide ongoing training and education opportunities to staff, and have extended these opportunities to contractors and external partners. Through participation in Indigenous events and corporate sponsorship initiatives around Reconciliation, we are living our values and helping set new standards for corporate Canada.

We strive to interweave Indigenous Knowledge into all our work. To date, this includes not only fieldwork, but also other aspects such as human resources. In travelling a path together, it is important to consider different world views and how aspects of the Indigenous Knowledge system can inform our project moving forward.

In 2020, we applied our Reconciliation assessment tool to:

11 policies, procedures
& standards

6 frameworks

2 scopes
of work

Implementing the NWMO's Reconciliation Policy

Through our Reconciliation Policy, the NWMO committed to develop an annual implementation plan to measure and publicly report on our progress as an organization.

This past year, the Indigenous Relations team began developing a Reconciliation baseline, which will be used in conjunction with an assessment tool that we are already implementing to ensure we are operationalizing our contributions to Reconciliation. We applied the assessment tool to 11 policies, procedures and standards, six frameworks and two scopes of work in 2020. The evaluations were dialogue-driven and focused on identifying opportunities for improvement. For example, we updated the NWMO Performance Planning and Review Procedure, Code of Conduct and Employment Equity Policy to reflect input received following review under the assessment tool. This work also supports our diversity, inclusion and equity goals.



The NWMO Reconciliation Policy was formalized and blessed through a Traditional Sunrise Ceremony in King City, Ont., in 2019.

Creating a Reconciliation culture

We continue to incorporate Reconciliation into the NWMO culture. Through daily practices, ongoing training, and recognition of Indigenous events and sponsorship, we help to advance the Reconciliation journey at both an individual and a corporate level.

This past year, we created a land acknowledgment guide and presented an employee lunch and learn about land acknowledgments. This guide is meant to build further understanding of the importance of land acknowledgments, and we continue to encourage staff to reflect on and share their individual perspectives on these acknowledgments.

Training is also an important aspect of Reconciliation. Cultural awareness and Reconciliation training are mandatory for NWMO staff. In response to the global COVID-19 pandemic this year, we provided information sessions (including cultural awareness training) to employees at a level that was appropriate for children, allowing those who were home-schooling children due to the pandemic to involve their families in this important discussion.

In 2020, we also developed Reconciliation training (Part II), which builds on the training that was rolled out in 2019. It asks participants to examine identity, connection to the land, treaties, and how we can use Reconciliation to advance our work.

By the end of 2020, 86 per cent of staff had received cultural awareness training and 80 per cent received Reconciliation training (Part I), and Reconciliation training (Part II) was piloted with a small group of employees and delivered to the NWMO's Executive Committee, with plans to roll out to all staff in 2021. The Indigenous Relations team also provided cultural awareness training to contractors and researchers (including Toronto Zoo researchers) who began working in siting area communities when restrictions were lifted.

We also continued to participate virtually in events to enhance learning and promote discussion about Indigenous world view and history. We recognized Red Dress Day, National Indigenous History Month, National Indigenous Peoples Day, the United Nations Declaration on the Rights of Indigenous Peoples, and Orange Shirt Day.



NWMO employees recognized Red Dress Day and Orange Shirt Day. By learning together, we contribute to the ongoing dialogue about Canadian and Indigenous peoples shared history.

As part of our commitment to Reconciliation, we also enhanced our sponsorships of Indigenous programs. We renewed sponsorship agreements with the Gord Downie & Chanie Wenjack Fund to support the Legacy Schools and Legacy Spaces programs for five years, and we continued our annual support to the Right To Play's Promoting Life-skills in Aboriginal Youth program in Ontario for 2021. For the first time, we also sponsored the Indigenous student awards at Ontario Tech University.

The International Association of Business Communicators (IABC) recognized our work on Reconciliation with a 2020 Gold Quill Award. The organization also gained recognition from the IABC Toronto Chapter's 2020 OVATION Awards.

Interweaving Indigenous Knowledge into our work

The NWMO is committed to interweaving Indigenous Knowledge into our work. We learn from and incorporate traditional teachings into our work, such as the role of spirit and ceremony, understanding natural laws, and respecting Mother Earth.

We continue to expand our application of Indigenous Knowledge as we strive to incorporate it throughout our work. For example, in 2020, our Human Resources team co-ordinated with the Indigenous Relations team to offer sharing circles to help manage mental health during the pandemic. We will continue to consider how this knowledge system can be incorporated to help build resilience moving forward.

We also held our annual workshop (virtually this year) that brings together Indigenous Knowledge Keepers and scientists to explore how we can continue to interweave Indigenous Knowledge into our scientific and technical research programs.



What was said

"The NWMO's cultural awareness training was a great introduction to the history and modern realities for Indigenous communities in Canada, with a useful mix of presentation and discussion. It is encouraging that the NWMO is not only on a journey of Reconciliation itself, but also makes training an integral part of external collaborations. We were grateful for the opportunity to participate."

– Toby Thorne
Bat Researcher, Toronto Zoo

Social engagement

With two siting areas remaining in our site selection process – Ignace and South Bruce – not only are we continuing to support communities in learning more about Canada’s plan, but we are also working with them towards defining partnership.

We also continued our engagement activities with First Nation and Métis peoples in and near siting areas, while maintaining ongoing engagement with Indigenous organizations in Ontario and New Brunswick.

The global COVID-19 pandemic had a significant impact on our engagement activity, and it delayed or caused the cancellation of some of our planned activities. Even so, throughout the year, we worked hard to remain present (virtually when necessary) in the communities working with us towards selecting a site for Canada’s plan.

Our sponsorship and donation activities continued to focus on supporting the needs of local communities. We provided funds to communities and municipalities we work with to help them address the health and economic effects of the pandemic. As Canada’s plan is a multi-generational project, we also continued to invest in the education of youth in STEM (science, technology, engineering, and mathematics) learning.

The project is receiving growing attention from the public, and in 2020, we continued to provide fact-based information to Canadians in different ways (e.g., information sessions, social media, website). We also built upon relationships with government officials at the municipal, provincial and federal level.



Caitlin Burley, Manager of Transportation Engagement at the NWMO, talks to a visitor at the Mobile Learn More Centre in the Ignace area.

Municipal engagement activities

The NWMO continued to work with municipalities to begin to explore the potential for partnership agreements that will support the site selection for Canada's plan. We have engaged directly with local leadership and community liaison committees (CLC), and they continued to provide input as we seek to work together to define what willingness means to potential host communities.

During the height of the pandemic, we continued CLC meetings and other outreach activities through online and phone meetings. We also held workshops to share information and seek input about our environmental baseline monitoring virtually in Ignace and South Bruce after the pandemic began. Later in the fall, we also held in-person workshops in South Bruce, following health and safety guidelines.

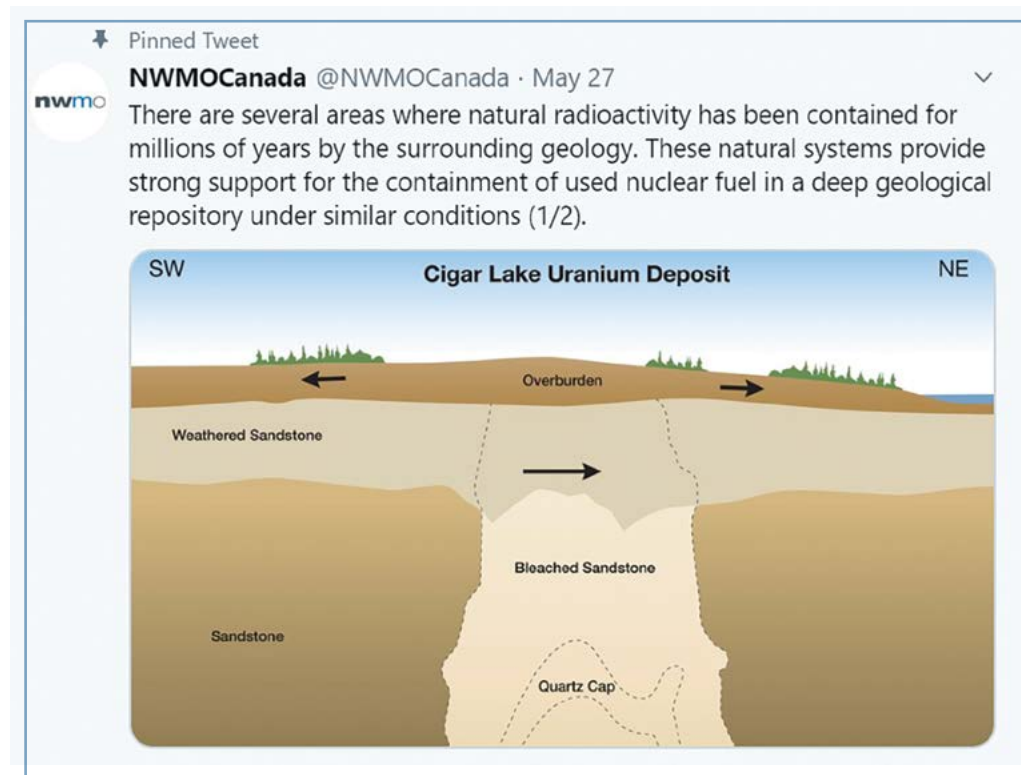
Throughout 2020, we engaged a broad range of municipalities across Ontario. For example, we participated in the 2020 Association of Municipalities of Ontario conference online, and we sent a letter to all 444 municipalities in the province to inform them of progress towards Canada's plan and offer to answer any questions they have.

In the second half of the year, our Mobile Learn More Centre visited interested and neighbouring communities in both potential siting regions. We carefully followed pandemic-related safety protocols, including wearing masks, limiting attendance and following public health guidelines to ensure we resumed our in-person engagement in the safest way possible. We also hosted virtual and in-person open houses in both potential siting areas, again, following defined safety protocols.

Sharing information

Since narrowing our focus to two areas of study, our work has started to receive heightened attention. We have heard a diversity of views about the project – some positive, some negative, and some still making up their mind. With this increased attention, we have expanded communication with interested audiences as we continue to address questions about the project. In 2020, we held virtual information sessions for residents, and shared user-friendly, plain-language materials, audiovisual media, and exhibits.

We also continued to actively engage with audiences on a range of social media platforms: Facebook, Twitter, LinkedIn, Instagram, and YouTube. We addressed comments and questions posted online to ensure the public received timely fact-based information about the technical and social aspects of Canada's plan. We frequently posted new information on our website (www.nwmo.ca) to share updates about support we provided to communities throughout the pandemic, our progress towards identifying a safe site, community engagement activities, environmental stewardship, technical programs, and our journey towards Reconciliation.



This NWMO Twitter post provides an example of a natural system that supports the safe containment of used nuclear fuel in a deep geological repository.



Although the pandemic prevented in-person attendance, Laurie Swami, President and CEO of the NWMO, recorded a video message for the 2020 Métis Nation of Ontario Annual General Assembly.

Engaging First Nation and Métis communities

During 2020, the NWMO continued to build sustainable relationships with First Nation and Métis peoples in and near potential siting areas, while maintaining ongoing engagement with national, provincial and treaty Indigenous organizations in Ontario and New Brunswick.

The NWMO actively engaged with Elders, youth and community members, as well as Chiefs, Councils and Presidents or leadership, providing information on the project and deep borehole drilling in the Ignace area. Technical specialists also shared insight into their fields of expertise. As a result of the pandemic, we adapted how we engaged, switching to a virtual format to continue providing current information on the project. With our plan to drill initial boreholes in South Bruce in 2021, we anticipate and look forward to working with the Saugeen Ojibway Nation and other Indigenous communities as the work progresses.

NWMO engagement staff continue to reach out to Indigenous communities through each of their community liaisons to discuss their situation with respect to the pandemic. We plan to resume in-person engagement activities once pandemic restrictions are lifted and the communities are comfortable with allowing visitors to come and present.

Engaging youth

Canada's plan is a multi-generational infrastructure project. As such, from our very beginning, the NWMO has invested in building the next generation of scientists, engineers, journey persons, and nuclear industry employees.

We invest in bursaries and scholarships to encourage education in the skilled trades and STEM. These include the NWMO Women for STEM Scholarship, as well as bursaries handed out by local organizations and municipalities. We also supported an endowed memorial scholarship at Western University: Flight 752 Memorial Graduate Scholarship in Engineering and Science. All 176 passengers (including Canadians) on the Ukraine International Airlines flight travelling from Tehran to Kyiv were killed in a tragic accident when the plane was brought down by an Iranian surface-to-air missile. The scholarship is a way to honour the Western University graduate students on the flight, who had worked on research projects for the NWMO.

We contribute annually to Scientists in School, Science North and Shad Canada to promote STEM learning in siting areas and beyond. This year, Science North delivered online workshops in Ignace, Shad held webinars for youth across Canada, and Scientists in School created virtual community workshops. In South Bruce, we supported a new digital summer camp to teach young people about nuclear energy through the Nuclear Innovation Institute.

The NWMO also invests in students directly with our annual summer student program, which grew to 11 students this year. Despite the pandemic, the NWMO was able to maintain the program and supported the students in doing their work for us virtually, and we were able to hire many of these students from within our potential siting communities. Nine of the students were able to continue to work with us part time once their classes resumed in the fall.

We also help teachers and administrators bring more STEM education to the classroom. Since 2016, we have implemented a funding program called Early Investments in Education and Skills (EIES). Among other investments, the EIES can be used to help teachers and school administrators purchase and implement technology to teach everything from coding to robotics.



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The NWMO sponsored the Best Ever Summer Camp for young people in the Grey, Bruce and Huron regions and local Indigenous communities.



Cherie Leslie, Senior Engagement Advisor at the NWMO, presents a cheque to Emma Martin, Community Relations Director at Wellness and Emotional Support for Youth Online.

Giving back through sponsorships and donations

The NWMO is committed to leaving a positive legacy in all the communities with which we engage. Through sponsorships and donations, the NWMO invested in activities throughout 2020 such as education, mental and physical health, Reconciliation, and environmental stewardship.

Some of our sponsorship activities are intended to support long-term community development and wellness. For example, in Ignace, we supported the Busy Bag program that distributes bags with resources for do-it-yourself activities to children up to 14 years old, while in South Bruce, we helped fund the construction of a new playground in Formosa.

The NWMO shared more than

\$1,373,000 to support **126** programs, communities, initiatives, and scholarships in 2020.

In environmental stewardship, we funded a partnership with the Toronto Zoo to support its work to study bat populations in Ontario. We also invested in the Pine River Watershed Initiative Network and Saugeen Valley Conservation Authority's Water Well Improvement Program in South Bruce.

A community's physical and mental health is crucial to its wellness. That is why the NWMO supports children and youth participation in sport and physical activity in possible host areas and communities in the region. This year, before the pandemic, NWMO funding contributed to new rink boards for the South Bruce Minor Hockey Association and supported the Little Bands Native Youth Hockey Tournament in Dryden.

The pandemic also prompted the NWMO to adapt our sponsorship and donation activities. As part of our early response, we worked with Bruce Power to provide free hand sanitizer to residents and Indigenous communities in the area. In northern Ontario, we purchased and distributed locally produced hand sanitizer procured from local breweries in Thunder Bay and Kenora. We also donated masks to local businesses through the Thunder Bay Chamber of Commerce.

As the pandemic's effects increased, we supported the Kenora District Municipal Association's implementation of a digital, remote work environment. In Ignace, we provided funding to Blessings in a Backpack, a program to help provide food to children who were missing out on school breakfast and lunch programs, and Roots to Harvest, which supports food security in the Thunder Bay area. In South Bruce, we supported the Wellness and Emotional Support for Youth Online program that dealt with an increased demand for mental health resources related to the pandemic. Towards the end of the year, we made a donation to support food banks in the Ignace, South Bruce and surrounding regions. The funds helped provide emergency food access during the pandemic to Canadian and Indigenous families with children, seniors and people who use emergency meal programs.

Strengthening relationships with governments

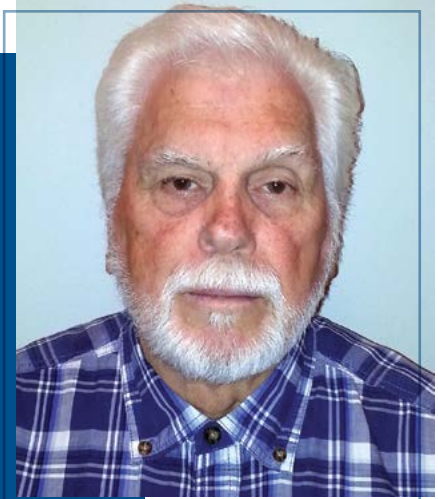
During 2020, NWMO staff have engaged with representatives of federal and provincial governments to provide information about the project and our progress in implementing it. We remain connected on topics of shared interest such as pandemic recovery, siting process updates, and land access. The NWMO works with lead ministries within the federal and provincial governments as our primary points of contact, and in addition to meeting with government officials, the NWMO staff also brief provincial and federal elected representatives.

What was said

"I would like to express the Métis Nation of Ontario's deepest appreciation to the Nuclear Waste Management Organization's COVID-19 Pandemic Community Support Funding. In these challenging times, constructive relationships such as ours are crucial to helping those most in need. The citizens and councillors of the Moon River, Georgian Bay, Barrie, and Great Lakes Métis Councils are truly grateful for your generosity and will apply this kindness to its fullest in supporting community health and well-being."

– David Dusome

Regional Councillor, Métis Nation of Ontario Region 7



"The NWMO has been part of this community for a long time now – over ten years – and they have proven to be valuable corporate partners. Their record shows that they are here for us during transitional and challenging times. . . They are part of our family now too."

– Penny Lucas

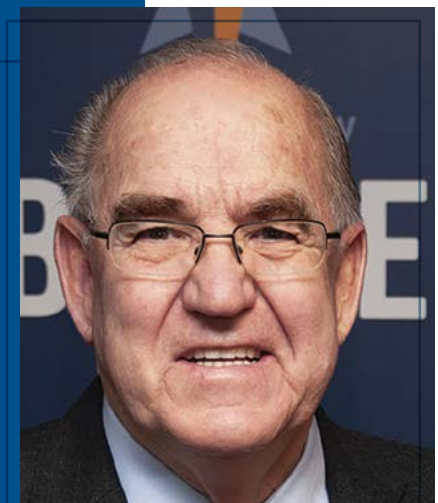
Mayor, Ignace



"The NWMO has graciously provided our community with funding to help with COVID-19 relief efforts. . . As we move to a new normal and as people adjust, we will be able to find new ways to explore the project with the NWMO and the community."

– Robert Buckle

Mayor, South Bruce



Site assessment

When 2020 began, the Ignace area in northwestern Ontario, and in southern Ontario the Township of Huron-Kinloss and Municipality of South Bruce were considered potential host areas for the project. We had made clear that in the south, either Huron-Kinloss or South Bruce would move forward in the process once a potential repository site was located in the area through an ongoing process with local landowners.

By late January 2020, the NWMO announced we had signed agreements with landowners in South Bruce, providing confidence that we would have sufficient land for a deep geological repository, and that Huron-Kinloss was no longer considered a potential host for the project. Through continued work with landowners, by fall the NWMO had aggregated just over 1,500 acres of land – enough to potentially host a deep geological repository in the area.

During 2020, the NWMO continued to conduct progressively more detailed technical and social studies in both the Ignace and South Bruce siting areas, working with municipal and Indigenous communities.

We continued to hold meaningful discussions to explore the potential for partnerships and worked with communities remaining in the siting process on project visioning – a reflection of the community's vision of how the project could be implemented.

While we temporarily suspended the field program in March due to the global COVID-19 pandemic, the geoscience team brought forward lab and computer-based work originally planned for later in the year. We were also able to restart some light fieldwork at the end of the year to recover some of the schedule loss.

Accessing land

The agreements the NWMO signed with landowners in South Bruce include a combination of option and purchase arrangements, which allow the NWMO to conduct studies and landowners to continue using the land.

In southern Ontario, we continue to hear questions about the potential impacts on property values. The NWMO has committed to develop, in consultation with the Municipality of South Bruce, a program to compensate certain property owners in the vicinity of the deep geological repository if their property values are adversely affected by the project.

While the NWMO continues to engage with the Saugeen Ojibway Nation, other Indigenous communities, and local municipalities, the aggregation of land in South Bruce does not suggest that any of the communities mentioned has provided its support for the siting of the repository in this area.

In the Ignace area, the potential repository is located on Crown land, and we have worked with the appropriate government bodies to secure access for studies.

Site investigations

Technical studies – which include deep borehole drilling – contribute to our ability to assess if a potential site will be a safe location for the repository. At the time the pandemic first impacted our work, we had just drilled our fourth 1,000-metre-long borehole in the Ignace area, and were planning to initiate borehole drilling in South Bruce by mid-year. In response to public health guidance, we stopped field activities and temporarily sealed the fourth borehole in the Ignace area to allow for future downhole testing.

Switching gears, we focused on data interpretation from samples collected during the drilling of the second and third boreholes in the Ignace area and developed borehole integration reports. This information also supported further development of a 3D geological model for the site. Throughout this process, we sought feedback and comment from the international Adaptive Phased Management Geoscientific Review Group.

We spent considerable time preparing and planning to resume site investigation activities, including deep borehole drilling, in both siting communities. With the uncertainties related to the pandemic and based on community input, we decided to defer the start of deep borehole drilling in both areas to spring 2021 to allow sufficient time to plan and co-ordinate with communities and contractors. In the meantime, we were able to restart some light fieldwork at the end of the year.



A seismic source vehicle conducted 2D seismic survey in the Ignace area.

In the Ignace area, working alongside cultural monitors and guides from the Wabigoon Lake Ojibway Nation, we conducted pressure profiling and water sampling in the instrumented boreholes, installed a micro-seismic monitoring station (to monitor for seismic activity such as low-magnitude earthquakes) and assessed locations for additional station installations in 2021. We also conducted 2D seismic surveys in the area and cleared just over four kilometres of trails to support planned downhole testing activities in boreholes four to six in 2021.

The NWMO and our contractors developed site safety protocols to address the need for additional pandemic protective measures, including personal protective equipment

requirements such as masks. We conducted all 2020 fieldwork activities without reportable incidents, demonstrating our commitment to protecting people and the environment, at all stages of the project.

In South Bruce, at the sites identified for the first and second boreholes, we were able to conduct preliminary environmental and archaeological studies. In addition, we completed pre-drilling private drinking water well sampling around the borehole locations, along with pre-drilling noise and emissions studies. Before starting borehole site access and drill pad construction, the Saugeen Ojibway Nation conducted cultural verification and held a ceremony at one of the borehole locations, including a pipe ceremony, water ceremony and feast. The NWMO completed construction of the first borehole access and drill pad in South Bruce, and initiated construction of the second.

We wrapped up 2020 with a focus on detailed planning and the establishment of supporting contracts to prepare for deep borehole drilling activities planned for both communities beginning in spring 2021.

What was said

"Despite the pandemic, the geoscience team at the NWMO has progressed with the APM Project by focusing on data interpretation and integration. We have continued our review of the geoscience program, reports and work plans, with virtual meetings and interactive participation. The GRG members are impressed by the steady progress and look forward to continuing to work with the NWMO geoscience team as the site selection process continues."

– Dr. Peter K. Kaiser

Chair, Adaptive Phased Management Geoscientific Review Group (APM-GRG)



Partnership

We continue to implement a partnership road map to guide discussions about partnership with communities in the siting process and to begin to create a framework to implement the project if the site in their area is selected.

During 2020, the NWMO worked on project visioning with siting area communities through a series of virtual and in-person workshops, meetings, and other outreach activities. The resulting visions were then shared publicly through municipal websites for further feedback and were presented before municipal councils. This marks an important milestone in our work towards exploring partnership in potential host communities.



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

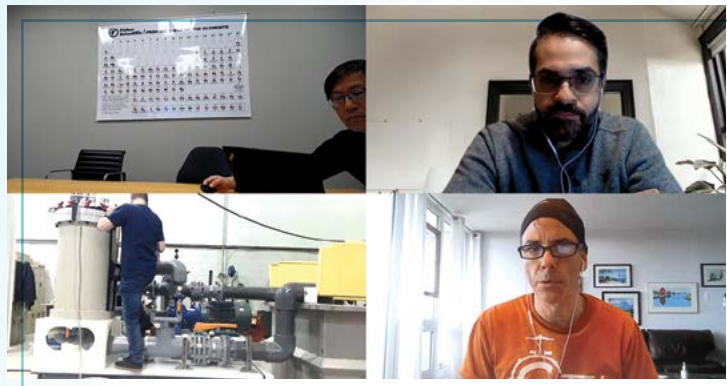
Engineering, safety and technical research

The NWMO's technical team faced some challenges in 2020 during the global COVID-19 pandemic. While the pandemic impacted many of our key vendors, partners, universities, and institutions, and many activities needed to be paused, the technical team and our partners were extremely effective in working together to prioritize and re-initiate work streams to minimize this impact.

In March 2020, we needed to temporarily close our proof test facility in Oakville, Ont., due to pandemic-related restrictions. We modified our design management processes to enable remote inspection and acceptance of designs and equipment, and prioritized resuming activities at our proof test facility by early June, following health and safety guidelines.

A key focus for 2020 was developing a full-scale emplacement plan to support forthcoming engineered-barrier system (EBS) emplacement trials at our Oakville facility in 2021 and 2022. These emplacement trials will enable us to test and demonstrate our ability to fabricate and emplace the EBS to meet our design requirements. The engineering team also advanced conceptual repository facility designs. This work will be the foundation for site-specific repository layouts.

Repository safety, both during the operating period and postclosure (the period after the repository has been filled, sealed off and closed), is of paramount importance. While safety is achieved through the durable multiple barriers, it is documented through the development of detailed safety assessments, or case studies. These assessments demonstrate that the design is robust, the barriers are sufficient and regulatory requirements for safety will be met.



During a factory acceptance test, an engineer at Empire Buff (bottom left) takes a picture of a pressure gauge on his phone, which he then shares with staff at Integrant Technologies and the NWMO.



Emplacement machine testing in a mock emplacement room confirms that there is no interference at full lift.

In the past, the NWMO developed safety cases in both crystalline and sedimentary environments. The assessments considered hypothetical sites and used available information. In 2020, with the narrowing of the potential sites to two, the NWMO began to develop preliminary site-specific safety assessments.

This past year, the NWMO continued to draw upon the expertise of our internal Technical Research Review Committee in aligning our research needs and integrating the outcomes of our research activities into our design and technical assessments. The NWMO has supported research at 17 universities for many years, with the majority here in Canada.

Engineering

To develop our full-scale emplacement plan, we leveraged our experience participating in Posiva's Full-Scale In-Situ System Test (FISST) project, a full-scale emplacement trial of their EBS at the ONKALO site in Finland. Specifically, we sought Posiva's review of our plans to benefit from their experience.

To prepare to initiate trials in 2021, the engineering team continued to produce the EBS components (i.e., copper-coated used fuel containers, bentonite blocks, gapfill bentonite), and to design and fabricate purpose-built equipment. We successfully fabricated and commissioned our vacuum lifting equipment to move bentonite blocks and used fuel containers, and further developed our next generation of the gapfill placement auger, which fills the remaining "gaps" between the container and the rock with granular bentonite.

Advancing the conceptual repository facility designs this past year supported the development of associated cost estimates. These estimates contribute to the overall Adaptive Phased Management lifecycle cost estimate that will be updated in 2021. The NWMO also initiated a multi-year repository design contract with Hatch Ltd. to begin site-specific designs in support of regulatory approval applications planned for 2024.

In the spirit of further innovation and design optimization, in 2020 we started work with Integran Technologies Inc. on a refined copper electroplating process using a new chemistry bath. We expect that the program will optimize the copper coating that is applied to used fuel containers to resist corrosion. The NWMO also initiated parallel copper trials with BEP Surface Technologies Ltd. in the United Kingdom.



Top: The NWMO received raw bentonite at our proof test facility in Oakville, Ont., to support highly compacted bentonite block pressing.

Right: At the National Research Council's Boucherville facility, the NWMO's used fuel container is being loaded into a machine that rotates the container so copper can be applied using a cold spray copper process.



Safety and technical research

The NWMO started to develop site-specific assessments using available site information. The process will be iterative over the coming years as more environmental and geological data is collected through our site assessment activities, including borehole drilling and environmental baseline monitoring. We are also updating our safety assessment system modelling software, reflecting the latest codes and industry best practices.

One consideration of the postclosure assessment is the potential effect of climate change. As we have seen, climate change is already impacting the environment in which we live. We commissioned Golder Associates Ltd., a leading consultancy that specializes in the area of earth and the environment, to conduct a climate change assessment for both siting areas to understand what potential changes could be expected well into the future.

Another consideration in the safety of the site is the assessment of criticality, or the potential for a self-sustaining nuclear chain reaction from the fuel. The NWMO calculated preliminary assessments of criticality for various scenarios and fuel enrichments, in order to support planning for acceptance of CANDU and research fuels. As expected, limiting the quantity of fissile material in a container is a strong factor in ensuring criticality safety.

As we approach our regulatory approvals phase, which begins in 2024, we will have to further consider some of the radiological safety aspects and associated processes, even though operations are a couple of decades in the future. In 2020, the NWMO developed conceptual Radiation Protection and Safeguard program documents. These describe, at a high level, the standards, procedures and reports that will be required to meet regulatory requirements. We will further develop and refine these documents as we advance the project.

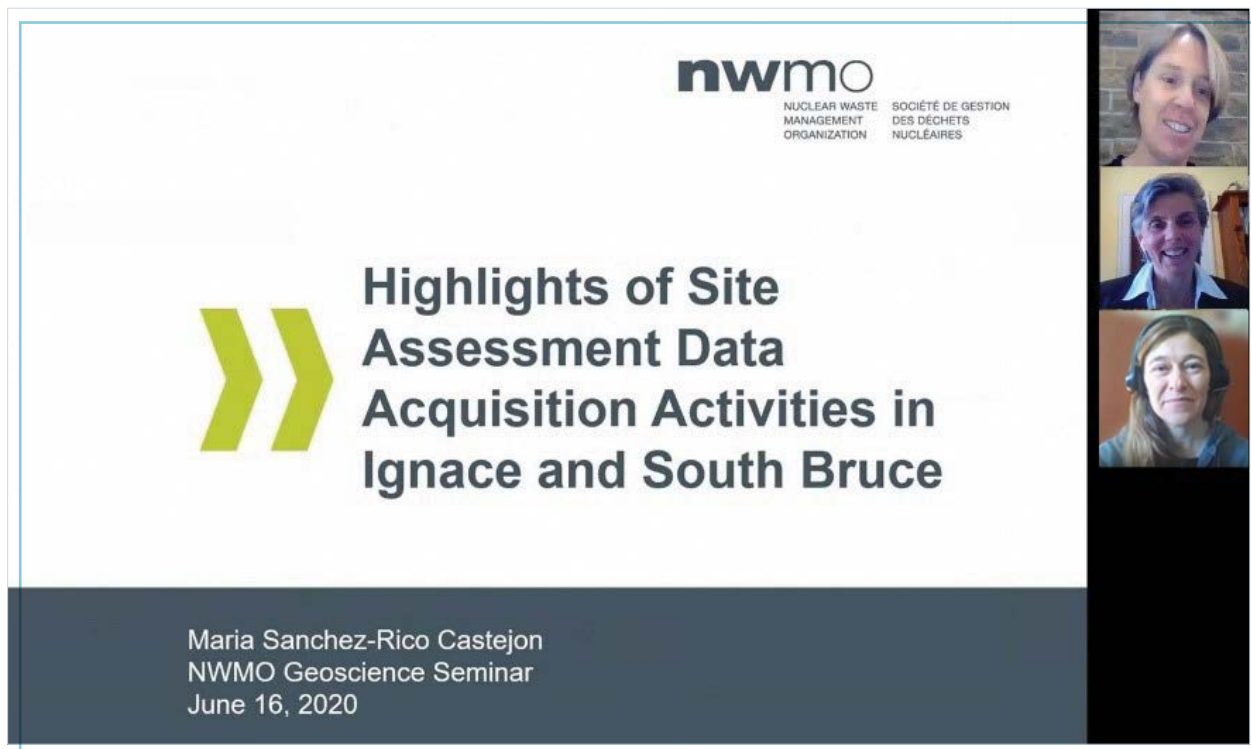
In 2020, the NWMO received

145
metric tonnes | of raw bentonite at our proof test facility
in Oakville, Ont., to support highly
compacted bentonite block pressing.

Research and development

Based on the work that was completed last year in the development of our integrated research and development (R&D) program report, we were able to better plan for R&D activities through all phases of the project and include appropriate budgets for this work in our lifecycle cost estimate update.

The annual NWMO Geoscience Seminar is one of the important ways we showcase our R&D activities. The seminar brings together NWMO experts, our key R&D partners, international collaborators, and the Canadian Nuclear Safety Commission to share relevant R&D activities related to our work and deep geological repositories in general. This year, although we were unable to assemble for our typical in-person event due to pandemic-related travel and gathering restrictions, we successfully launched our first virtual Geoscience Seminar to share important R&D activities with the industry. The virtual event drew a record number of participants, who expressed interest in following up on research underway at other universities and institutions and assessing applicability to their own projects.



The NWMO and participants in the Geoscience Seminar delivered presentations virtually during this pandemic year.

Canadian university research

Working with our university partners, we were able to maintain progress in our research activities even though 2020 presented many challenges in maintaining in-lab research programs due to the pandemic. We made progress in analysis, report writing and publishing on completed research, and prioritizing work that will proceed once research facilities are reopened. For example, a prestigious international journal, *Progress in Materials Science*, published an article written by our corrosion science team that confirms the copper coating on our container for used nuclear fuel is robust and thick enough to withstand any corrosive effects for over 1 million years (www.nwmo.ca/materials_science).



What was said

"The PolyCSAM facility is the ideal setup for the industrial scale-up of the NWMO's copper coating process. . . We are delighted to join the NWMO and the NRC in this very important project for Canada."

– Luc Pouliot
Chief Operating Officer and Chief Technology Officer, Polycontrols

International collaboration

The NWMO continues to collaborate with our international counterparts to share information, conduct joint research and learn from shared experiences as it relates to the safe management of used nuclear fuel.

In 2020, we maintained co-operation agreements with international counterparts in Belgium, France, Finland, Japan, Sweden, South Korea, Switzerland, and the United Kingdom. The agreements help to ensure we are considering international best practices, as well as sharing our experiences as we implement Canada's plan.

Due to the global COVID-19 pandemic, some planned projects had to be delayed and meetings transitioned from in person to virtual. However, as the NWMO did not have to travel to virtual meetings, more technical staff were often able to attend valuable information-sharing sessions.

The NWMO worked closely with Radioactive Waste Management (RWM) in the United Kingdom this past year. Before the pandemic paused international travel in Canada, we took part in the Canada-UK Nuclear Energy Summit in February. We had also planned to co-chair with RWM a technical session at the International Association for Impact Assessment Conference in May. When the conference was postponed until 2021, we still found a way to exchange information through video conference.

Additionally, we maintained relationships with government and industry peers and kept them apprised of the progress of Canada's plan.



Staff from the NWMO, Nagra and NUMO meet online to discuss microbiology corrosion research.

Exchanging technical knowledge with other countries

Underground research laboratory experiments at the Mont Terri Project and Grimsel Test Site in Switzerland continued, as well as the Äspö Hard Rock Laboratory in Sweden. Projects include studies of corrosion, microbiology, sealing system performance and groundwater behaviour in natural underground conditions, and laboratory testing of rock strength. The NWMO technical team attended progress meetings virtually.

Specialists at the NWMO contributed to international projects, including the Effective Rock Mass and the POST Projects (with SKB of Sweden), the Nuclear Energy Agency (NEA) Clay Club, the NEA Integration Group for the Safety Case, and the DECOVALEX coupled-process modelling project. We are also working with Nagra (Switzerland), NUMO (Japan) and others on developing and performance-testing the copper coating technology.

The NWMO also continued our participation in Posiva's Full-Scale In-Situ System Test (FISST) project, joining EBBO (Engineered Barrier System Behaviour Test) – the next phase of this program at Posiva's ONKALO facility in Finland.

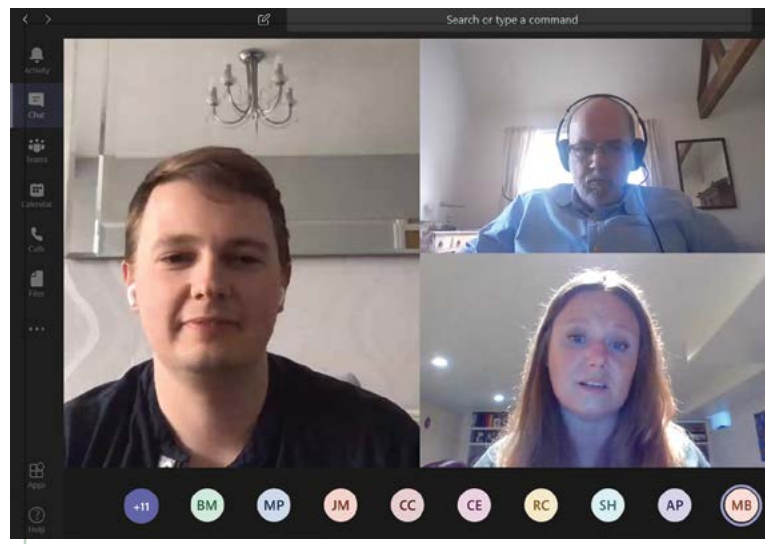
Canada and the United Kingdom exchange knowledge

The Canada-UK Nuclear Energy Summit – supported by Natural Resources Canada – brought together Canadian organizations with their United Kingdom counterparts to explore collaboration and export opportunities to the United Kingdom for new build, waste management and future nuclear technologies. Lisa Frizzell, Vice-President of Communications at the NWMO, took part in a panel that focused on used fuel management and decommissioning.

In November, the NWMO also sponsored the Canada-UK Colloquium (academic conference/seminar), which this year focused on the challenges and opportunities involving nuclear energy and public policy. Laurie Swami, President and CEO of the NWMO, presented with Rumina Velshi, President and CEO of the Canadian Nuclear Safety Commission, and other industry leaders in the nuclear sector.

Used nuclear fuel management is expected to become increasingly important in the coming decades in Canada and around the world, as many reactors are expected to reach the end of their technical lifetime.

Also in 2020, staff members in various disciplines from the NWMO and RWM – from environmental assessment and engagement to geoscience and engineering – participated in two virtual information exchange meetings. The first explored areas of common interest such as site selection and scientific data management. Discussion covered understanding reporting needs, capturing the data needed and keeping it organized to facilitate submissions. Building on learning from the first meeting, both organizations held an additional session to delve into best practices for environmental data management.



Thomas Reilly, Concepts Selection Manager at RWM (left), Mark Gough, Environmental Assessments Manager at RWM (top right), and Melissa Mayhew, Senior Environmental Scientist at the NWMO (bottom right), take part in a discussion during a virtual learning exchange.

We have knowledge-sharing agreements
with waste management organizations in

8 other
countries.

Meetings with industry peers

In February, Véronique Dault, Director of Government and External Relations at the NWMO, participated in an International Roundtable on the Final Disposal of High-Level Radioactive Waste and Spent Fuel to discuss Canada's plan in Paris, France. The roundtable was jointly organized by the Organisation for Economic Co-operation and Development's Nuclear Energy Agency (NEA), the Ministry of Economy, Trade and Industry of Japan, and the Office of Nuclear Energy from the United States Department of Energy. During the roundtable, participants expressed a great amount of interest in Canada's plan, and our participation helped inform the NEA's latest report on best practices for final disposal (www.nwmo.ca/nea).

Then in August, Ms. Swami and Ms. Dault participated in a virtual discussion with NEA Director-General William D. Magwood, IV. This briefing provided an opportunity for the NWMO to strengthen our relationship with the NEA, emphasize the importance of international consensus on the best practice of long-term storage of used nuclear fuel in a deep geological repository, and identify ways the NEA can help support Canada's plan.



What was said

"I was really pleased with the level of interest and participation in the learning exchange. The feedback I've had from RWM participants has been universally positive, with everyone seeing real value in sharing our knowledge and experience."

– Mark Gough
Environmental Assessments Manager, RWM

Transportation planning

Once the deep geological repository is operational in the 2040s, the NWMO will begin transporting used nuclear fuel from interim storage facilities to the repository.

No matter the location, used nuclear fuel will need to be transported past communities and through traditional territories to arrive at a central location for its containment and isolation for many generations to come.

Work is already underway to ensure transportation will be safe and secure, with a plan that reflects public priorities and concerns.

In 2020, the NWMO published a draft transportation framework (www.nwmo.ca/transportationplanning). This framework summarized priorities Canadians have identified related to the transportation of used nuclear fuel and outlined a proposed approach to collaborative transportation planning based on those priorities.

We developed the framework following thousands of conversations with communities and those interested in Canada's plan, and have shared it publicly for broader engagement and refinement.

We also continued to engage in conversations about the NWMO's transportation program and Canada's plan with those new to the project. Due to the global COVID-19 pandemic, we have found new ways to engage (including virtual platforms) that we expect we will be able to continue using in the future to reach remote audiences or depending on circumstances.

The NWMO understands that Indigenous voices are critical to transportation planning. Applying a Reconciliation lens to this work will help us to fully understand how planning can be implemented in a way that takes into account Indigenous priorities.

When transportation begins, used nuclear fuel will be stored in specially designed transportation packages, which are certified by the Canadian Nuclear Safety Commission (CNSC) to meet stringent testing and regulatory requirements. We continue to study both road and rail as potential transportation modes.



Road is one mode of transport the NWMO is considering for the transportation of used nuclear fuel; the other is rail.

Transportation engagement

Following the release of the draft transportation planning framework, we held online workshops in fall 2020 with current and former potential siting area communities, including Indigenous and surrounding communities, as well as dedicated sessions for youth and first responders. We also held some in-person meetings when possible and gathered feedback via our website. We asked people if the emerging framework reflects their priorities and sought feedback on our proposed approach.

Based on the public input we receive, we will revise the framework and publish a revised version in 2021. The framework is intended to be a dynamic document that we will revisit over the next 25 years through ongoing engagement to ensure it remains reflective of Canadian and Indigenous perspectives.

As communities are at different stages of learning about transportation of used nuclear fuel, we continued to engage in conversations (virtually during the pandemic lockdown) about the NWMO's transportation program – in particular, demonstrating safety, the international track record for transporting used nuclear fuel and collaboratively developing transportation plans over the long term.

We gave presentations to the Métis Nation of Ontario, Nigigoonsimikaaning, Seine River, the Coalition of Aboriginal Peoples, the Assembly of First Nations, the Ontario Coalition of Indigenous Peoples, and community liaison committees. Additionally, we engaged with nuclear host communities via newsletter and virtual workshops.

In 2020, we also participated in the Ontario Good Roads Association conference, and in virtual trade shows at the Association of Municipalities of Ontario and the Municipal Finance Officers' Association of Ontario.

Additionally, the NWMO conducted public attitude research with Canadians and Indigenous peoples via online surveys to get a broader perspective about used fuel transportation.

We continue to inform governments about our plans through one-on-one updates with federal and provincial representatives, as requested. For example, we provided information to an interjurisdictional working group made up of public servants from Transport Canada, the CNSC, and respective provincial transportation ministries of Ontario, Quebec, and New Brunswick, that meets annually.

A summary of conversations about transportation are reported annually and available at www.nwmo.ca/transportation. Public attitude research reports are available on our website at www.nwmo.ca/reports.

488 people | shared feedback through the transportation planning framework survey by the end of 2020.

What was said

"The more transparent the process is, the more we can be certain there won't be any surprises in the long run. The fact that the NWMO is going to incredible lengths to engage people now and planning ahead says a lot about the viability of the project."

– Terry Kelly

East Ferris Councillor and veteran volunteer firefighter



Technical transportation program highlights

Technical work in 2020 continued to focus on exploring design concepts and key components of the used fuel transportation system, as well as conducting assessments of transportation modes, logistics and routing options for the remaining areas in the site selection process.

This work considers both road and rail modes of transport, as well as the use of various transportation packages, in particular: the Used Fuel Transportation Package (UFTP), the Dry Storage Container Transportation Package, and a conceptual Basket Transportation Package (BTP).

Under the *Nuclear Fuel Waste Act* (2002), the NWMO must maintain an updated lifecycle cost estimate for the entire Adaptive Phased Management program; an update is required for 2021. To support this requirement, we established design and costing assumptions to evaluate cost estimates associated with the transportation of used fuel. The transportation system for the 2021 lifecycle cost estimate considers an all-road scenario, whereby we would transport used fuel from Ontario Power Generation sites in UFTPs and from all other sites in BTPs.



Thirty-two bolts are incorporated into the Used Fuel Transportation Package that could be used to transport the used fuel from interim storage facilities to the repository.

Organizational readiness

We are investing in our organization now to prepare for the future by looking towards how to implement Canada's plan following site selection. The next phase of the project will include detailed site characterization, making regulatory submissions, and constructing and operating the deep geological repository.

From an organizational perspective, we are preparing now for the work ahead by ensuring we have a strong safety program, as well as the human and information technology (IT) resources needed. In 2020, we focused on strengthening our safety program and conducting our first safety culture self-assessment. As our work evolves, we need to ensure we have the right people in the right jobs at the right time. This past year, our Human Resources team continued to partner with departments across the organization to bring in talent and plan for future needs. To meet evolving technology needs, the NWMO is securing, optimizing and digitizing the IT environment and critical business processes.

Following site selection in 2023, the NWMO will begin moving operations to the site. Currently, we are continuing to develop our organization's mobilization resource strategy in preparation for this transition.

We are actively planning for initiating the regulatory process, which will also begin after we select a site. Working with potential siting area communities, in 2020 we continued developing local environmental monitoring programs, with a view to collect information that will eventually be needed for the impact assessment.

Given the long time frames associated with the project, the deep geological repository at the selected site may need to accommodate new forms of used nuclear fuel in the future. A fundamental tenet of Adaptive Phased Management is that we will adapt our plans in response to technical advances and new knowledge. We continue to monitor the development of new reactors to ensure we are prepared to safely manage all Canada's used nuclear fuel.

Building a stronger safety culture

Safety is first and foremost in everything we do. In 2020, we continued to deepen our safety culture. To add further rigour to our safety program, we initiated a monthly safety oversight forum, enhanced our safety governance and training programs, and identified where we can apply additional measures through our safety culture self-assessment. We plan to build a safety program that aligns with nuclear industry norms.

Human resources

We are investing in internal systems to make us more efficient. In early 2020, we implemented the second phase of the NWMO Enterprise Resource Planning System, which provides the NWMO with tools to manage employee data and processes, as well as an applicant tracking system to support the NWMO's recruitment activities.

Recruitment strategies continue to evolve to ensure diversity in all disciplines and at all levels of the organization. This past year, our President and CEO signed onto the Electricity Human Resources Canada Leadership Accord, a public commitment to promote gender diversity within the organization. She also committed to the Clean Energy, Education and Empowerment Initiative's Equal by 30 campaign, a pledge to advance gender equality in the energy sector by 2030 by working towards equal pay, equal leadership and equal opportunities for women. Internally, we updated the NWMO's Employment Equity Policy to support our commitment to maintaining a workforce free of direct, indirect and systemic discrimination. The plan also includes targets for increasing representation from under-represented and designated groups.

During the global COVID-19 pandemic, we recognized that work and home life became intertwined for many employees. In response, we increased work schedule flexibility to help employees manage work while balancing other demands, and provided tools and resources to support mental health.

Becoming a learning organization

Canada's plan will be implemented over generations; as such, the plan is adaptive in nature. To meet evolving needs, we have set a goal to become a learning organization. To support this goal, we are investing in staff development and are implementing the early elements of a multi-year organizational learning plan. We hired a Learning and Development leader this past year to build a structured approach to employee competence and development, and introduced programs to support leader behaviours and supervisory skills.

Information technology

One of the NWMO's top IT priorities has been to create a mobile workforce that enables employees to communicate and collaborate, regardless of their location. This endeavour proved invaluable as we managed the impacts of the pandemic when employees had to transition to a work-from-home environment quickly. With the proper tools in place, staff were able to access critical systems for work delivery and use virtual collaboration tools.

To ensure that our IT is secure, we have in place a cybersecurity program to defend against malicious attacks, and we continuously strengthen our security posture, train employees, and actively monitor for threats and vulnerabilities.

Mobilization

After a site with informed and willing hosts is selected in 2023, we will begin to transition operations to the area. We are creating a mobilization plan that can adapt to the site that is eventually selected and to partnership agreements developed with host communities. The plan takes into consideration our collective agreements, and human resources policies and procedures to enable our organization to work optimally in a new host community environment. In 2020, our employee Mobilization Information Team continued to provide a forum for employee questions and information sharing relative to mobilization.



Feedback from community members will form the basis of an environmental monitoring program.

Preparing for licensing applications

Following site selection, we will initiate the required regulatory process. This work 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 Site, and developing the materials for a Licence to Construct.

The NWMO is working with potential siting area communities, both Indigenous and non-Indigenous, on designing both baseline and assessment methods to help us study the local environment and use in preparing to formally launch the regulatory approvals processes.

We concluded the process for designing an environmental monitoring program for the Ignace site in 2020, and expect to complete it for the South Bruce site in early 2021. These programs will be living documents and updated annually.

This past year, the NWMO also started a new and exciting relationship with the Toronto Zoo's Native Bat Conservation Program. Native bats in Ontario are currently threatened by a fungal infection known as white nose syndrome. The program is targeted at learning more about Ontario's native bats and identifying what steps should be taken to protect this animal. This research will help inform our biodiversity studies and contribute to protection of the environment. We installed monitoring equipment in South Bruce in 2020 and aim to install similar equipment in the Ignace area in 2021.

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. The CNSC has published several new regulatory documents that explain its expectations for the information the NWMO must provide when we seek a licence for a site. The NWMO will continue to seek additional guidance as we prepare for licence applications.



An acoustic monitor is installed in the South Bruce area to identify bats.

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 Canadian Nuclear Safety Commission (CNSC), as Canada's independent regulatory authority, regulates the use of nuclear energy and materials to protect the health, safety, and security of Canadians and the environment; and to implement Canada's international commitments on the peaceful use of nuclear energy. 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 to the CNSC. A licensing decision under the *NSCA* on a repository can be taken only after the successful completion of an impact assessment, following the process established under the *Impact Assessment Act*. 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

Canada has an active research sector exploring new technologies such as small modular reactors (SMRs). SMRs would generate used fuel requiring safe, long-term management.

As of mid-2020, the first environmental assessment review for a proposed SMR project in Canada continues. The licence application to prepare the site for a micro modular reactor at the Chalk River Laboratories was filed in 2019. In November, Ontario Power Generation announced it is resuming planning activities for future nuclear power generation at its Darlington site, where it now expects to host a grid-sized SMR.

In 2020, we continued to actively encourage organizations developing new concepts to work with us to identify fuel waste characteristics and ensure their wastes are compatible with the repository safety case.

The NWMO has agreements in place with several SMR proponents to allow these discussions to be conducted, but has not yet actively assessed potential SMR waste streams.

Once we have sufficient information about new types of fuel to be managed, we would determine potential impacts to repository designs and how our funding formulas can be adapted to include new entrants.

Governance and accountability

Canadians can be assured that the organization responsible for managing our 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. As a not-for-profit corporation, the NWMO falls under the *Canada Not-for-profit Corporations Act*.

We are governed by a nine-member Board of Directors and are accountable to Canada's Minister of Natural Resources. The member organizations elect the Board, which includes capabilities in Indigenous culture and financial management, and represents a range of perspectives from within and outside the nuclear industry. The Board takes a leadership role in developing the corporation's strategic direction, and the NWMO provides an annual report to the Minister each year, as required by the *NFWA*.

The Advisory Council, an independent advisory body established under the *NFWA*, provides ongoing advice to us. Other independent expert bodies offer additional guidance and review on technical, social and Indigenous matters, ensuring the organization is continually pursuing excellence.

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

Annual reporting to Minister

Every year, in accordance with the *NFWA*, the NWMO produces an annual report, which is made public on our website and tabled in Parliament. The Minister issues a statement on it each year: www.nwmo.ca/ministerstatement.

Triennial report

Every third year, the *NFWA* requires an expanded version of the annual report, which reports on the previous three years and includes comprehensive comments from the Advisory Council about the progress and findings of the NWMO. The next triennial report will be published in March 2023.

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. In accordance with our bylaws, the NWMO's Annual General Meeting of Members was held in June 2020.

Board of Directors

Chair of the Board: Wayne Robbins

Vice-Chair of the Board: Glenn Jager

President, CEO and Director: Laurie Swami

Directors: Lesley Gallinger, Sean Granville, Michael G. Hare, Ronald L. Jamieson, Josée Pilon, Beth Summers

The Board of Directors convened nine formal meetings in 2020, which included additional meetings to ensure strong governance as the organization managed through the impacts of the global COVID-19 pandemic. The minutes can be viewed online at www.nwmo.ca/board.

As a result of the pandemic, the Board did not hold its traditional strategy session, but incorporated strategic discussions into each of its meetings. Some of the additional Board meetings focused on the impacts of the pandemic on the NWMO's work. The Board also received regular reports from and held its annual meeting virtually with the Advisory Council to discuss relevant topics of importance.

To include the Indigenous perspective, the Board meets annually 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 2020, they held a virtual meeting.



Board of Directors: Wayne Robbins, Glenn Jager, Laurie Swami, Lesley Gallinger, Sean Granville, Michael G. Hare, Ronald L. Jamieson, Josée Pilon, Beth Summers.

Committees of the Board



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 six times in 2020, plus one joint AFR-Human Resources, Compensation and Governance (HRCG) committee meeting.

As of Dec. 31, 2020, the committee had five directors: Beth Summers (Chair), Lesley Gallinger, 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 human resources functions, including compensation practices, human resources policy, organization design, labour relations, the pension plan and governance. The HRCG committee met six times in 2020, plus one joint AFR-HRCG committee meeting.

As of Dec. 31, 2020, the committee had five directors: Lesley Gallinger (Chair), Sean Granville, Josée Pilon, Beth Summers, and Wayne Robbins.

Siting committee



Through the Siting committee, the Board maintains oversight of the site selection process and manages any identified risks associated with its execution. The committee met four times in 2020.

As of Dec. 31, 2020, the committee had five directors: Ronald L. Jamieson (Chair), Glenn Jager, Sean Granville, Michael G. Hare, and Wayne Robbins.

Project Oversight/Technical committee

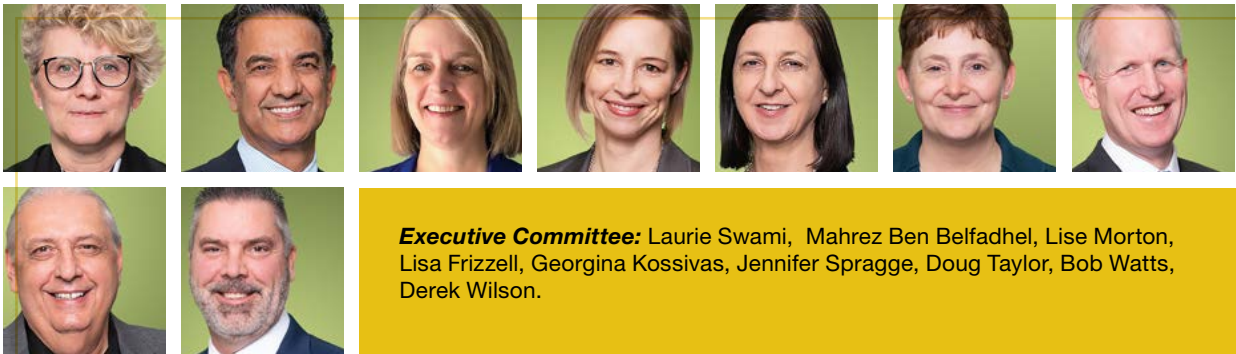


This year, the Technical committee transitioned to the Project Oversight committee, reflecting the evolution to a greater focus on project execution and oversight while still maintaining primary oversight for the technical program. The committee provides oversight of the NWMO's project planning and execution, including safety, recommending new projects for Board approval, project planning and controls, contracting strategies and contractor performance, technical matters, and project risk as it relates to the implementation of Adaptive Phased Management (APM). The Technical committee met twice, and the Project Oversight committee met twice in 2020.

The Project Oversight committee was formed on June 12, 2020, and has four members: Glenn Jager (Chair), Lesley Gallinger, Michael G. Hare, and Laurie Swami. Brad Curle and Lawrence Johnson participated as non-director members on the Technical committee.

Officers

Chair of the Board:	Wayne Robbins
President and CEO:	Laurie Swami
Vice-President of Site Selection:	Mahrez Ben Belfadhel <i>(until April 30, 2021)</i> Lise Morton <i>(since March 15, 2021)</i>
Vice-President of Communications:	Lisa Frizzell
Chief Financial and Risk Officer:	Georgina Kossivas
Vice-President of People and Technology, and Chief Ethics Officer:	Jennifer Spragge
Vice-President and General Counsel:	Doug Taylor
Vice-President of Indigenous Relations and Strategic Programs:	Bob Watts
Vice-President of Construction and Projects:	Derek Wilson
Board Secretary:	Gillian Morris



There are **11** Advisory Council members,
who represent a broad range of expertise.

Advisory Council

The Advisory Council is an independent and arm's-length body that reviews and comments on the NWMO's work, as a requirement of the *NFWA*.

There are 11 Advisory Council members who represent a broad range of expertise, including engineering, community engagement, public affairs, environment, sustainable development, Indigenous relations, Indigenous Knowledge, and community-based research.

Council members

David R. Cameron (Chair), Donald Obonsawin (Vice-Chair), Joseph Cavallancia, Monica Gattinger, Sue Hartwig, Dean Jacobs, Diane M. Kelly, Derek Lister, Dougal McCreath, Stella Swanson, Linda Thompson.

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

In 2020, the Advisory Council focused on providing the NWMO with advice in these key areas:

- » Site assessment, engineering and technical transportation activities;
- » Plans for establishing the final siting decision process and community willingness;
- » Partnership development and community well-being funding to support building partnership agreements;
- » Assessments of risks related to the NWMO's work;
- » Development of the NWMO's Transportation Planning Framework;
- » Business planning activities and recovery plans related to pandemic delays;
- » Development of the NWMO's regulatory plans;
- » Topics related to used fuel transportation;
- » Reconciliation and traditional knowledge activities; and
- » Technical matters related to long-term safety.



Advisory Council: David R. Cameron, Donald Obonsawin, Joseph Cavallancia, Monica Gattinger, Sue Hartwig, Dean Jacobs, Diane M. Kelly, Derek Lister, Dougal McCreath, Stella Swanson, Linda Thompson.

Peer reviews

The NWMO continues to seek independent comment on our technical work through peer reviews and through publication in journal articles. These external reviews help ensure high technical standards are met, as well as consistency with international best practice. More information is available at www.nwmo.ca/peerreview.

Adaptive Phased Management Geoscientific Review Group (APM-GRG)

The APM-GRG is a group of internationally recognized geoscientific experts that reviews and provides advice and guidance on the NWMO's geoscience site assessment approach, methods and findings. The group helps ensure our technical work consistently meets or exceeds international best practices. More information is available at www.nwmo.ca/apmgrg.

Council of Elders and Youth

The Council of Elders and Youth is an independent advisory body made up of First Nation and Métis Elders and youth. It provides counsel to the NWMO on how to apply Indigenous Knowledge in implementing APM and enhancing the development and maintenance of good relations with First Nation and Métis communities and organizations. More information is available at www.nwmo.ca/eldersandyouth.

What was said

"Safety is always front and centre when it comes to Nuclear energy. The Nuclear Waste Management Organization continues to make important progress as Canada works towards net-zero emissions by 2050."

– The Honourable Seamus O'Regan
Minister, Natural Resources Canada



Municipal Forum

The Municipal Forum is an assembly of municipal leaders with experience and expertise on municipal issues and challenges. It provides advice on municipal perspectives and processes to help guide the NWMO's engagement and outreach. More information is available at www.nwmo.ca/engagingmunicipalorganizations.

Environmental Review Group (ERG)

The ERG provides expert advice and guidance on environmental programs and impact assessment theory and practice. The ERG advises the NWMO on developing an effective impact assessment process – one that includes early engagement and planning for impact assessment studies. More information is available at www.nwmo.ca/environment.

Integrated management system

The NWMO continues to operate our integrated management system for activities supporting the long-term management of used nuclear fuel. To sustain governance excellence, accountability and safety, the organization maintains certifications to Canadian and international standards, including:

- » ISO 9001:2015 for quality;
- » ISO 14001:2015 for environment; and
- » CSA Z1000:2014 for health and safety management.

In addition to complying with these standards, the NWMO has augmented our management system to satisfy the CSA N286-12 Management System Requirements for Nuclear Facilities, which includes facilities for used nuclear fuel. The NWMO's integrated management system is regularly reviewed and enhanced to ensure it continues to support our key planning priorities and provides a strong foundation on which to implement our mission and values. The focus on protecting people and the environment fully aligns with the CSA N286-12 management principle that safety is the paramount consideration guiding decisions and actions.

Developing a Canadian Integrated Strategy for Radioactive Waste



A NEXT STEP

Part of Canada's
Radioactive Waste Review

An Integrated Strategy for Radioactive Waste is part of Canada's radioactive waste review.



In November 2020, the Minister of Natural Resources Canada formally launched an inclusive engagement process to modernize Canada's Radioactive Waste Policy (www.radwastereview.ca). The objective is to elaborate on the existing policy in order to provide greater leadership on radioactive waste management, and ensure that the policy is based on the best available science, continues to meet international practices, and reflects the values and principles of Canadians.

The NWMO has been asked by the Minister of Natural Resources to lead the development of an Integrated Strategy for Radioactive Waste to ensure that all Canada's radioactive wastes have disposal solutions (www.nwmo.ca/isrw).

The NWMO has been asked to lead the strategy development in part to leverage our nearly 20 years of recognized expertise in the engagement of Canadians and Indigenous peoples on plans for the safe, long-term management of used nuclear fuel. This work will run in parallel with the Adaptive Phased Management (APM) Project, but will be separate from it.

We will make informed and practical recommendations to the Canadian government on a more comprehensive radioactive waste management strategy.

All Canada's low- and intermediate-level radioactive waste is safely managed today in interim storage. An integrated strategy will ensure the material continues to be managed in accordance with international best practice over the longer term. Building on previous work, this strategy represents a next step to identify and address any gaps in radioactive waste management planning, while looking further into the future.

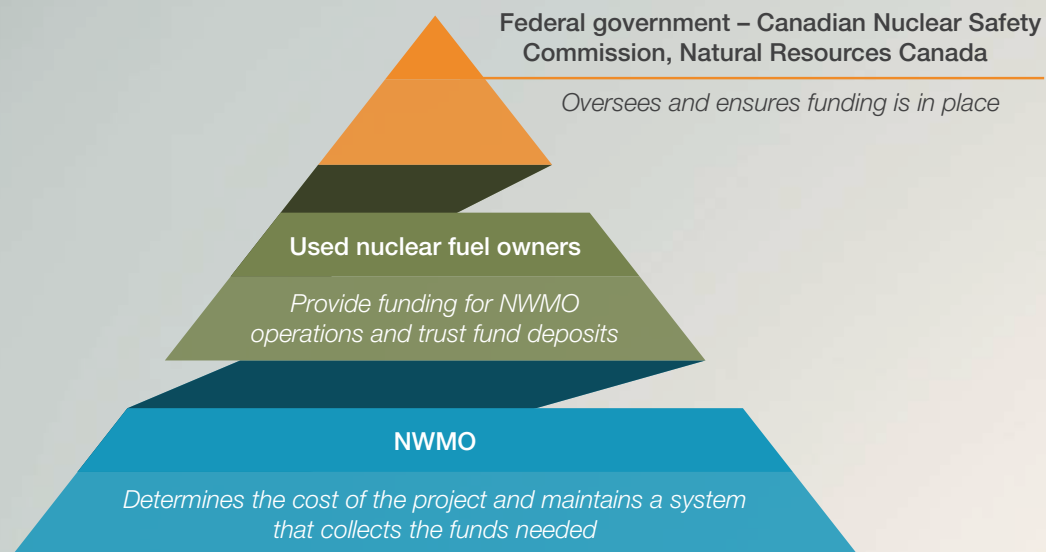
As with APM, for the development of this integrated strategy, the NWMO will follow an open and transparent engagement process, which will yield a strategy that reflects the values and interests of the public.

Interested individuals and organizations will have a variety of ways to participate while respecting public health directives related to the global COVID-19 pandemic, and can sign up for updates at radwasteplanning.ca.



Ensuring funding is in place

Canadians expect that the money necessary to pay for the long-term care of Canada's used nuclear fuel will be available when needed. This expectation is being met. The roles and responsibilities of financial surety are summarized in the diagram below.





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

Factors that influence cost

Adaptive Phased Management (APM) cost estimate includes costs to develop, construct, operate, monitor, and decommission a long-term facility. This includes the deep geological repository, the Centre of Expertise and the need to transport the used nuclear fuel to the repository.

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 3 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. From the lifecycle cost estimate developed in 2016, if new reactors are built, the potential volume could rise to as many as 7.2 million bundles. For planning purposes, our 2016 cost estimate is based on an expected volume of about 5.2 million fuel bundles.

We update fuel bundle volume estimates and trust fund balances that impact APM cost estimate and funding requirements on an annual basis based on fuel bundle estimates provided by the nuclear energy producers. We then determine the trust fund contribution requirements for the following year to ensure sufficient resources for future use.

Financial reporting requirements

The *Nuclear Fuel Waste Act (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 below. The following section of this 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 *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 \$5.4 billion as of the end of 2020. Balance estimates are rounded to the nearest \$ million. This money is in addition to other segregated funds and financial guarantees the companies have set aside for nuclear waste management and decommissioning.

Experience in other countries has demonstrated the importance of safeguarding these funds so that they will be preserved for their intended purpose. The *NFWA* built in explicit provisions to ensure 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)*.

Owner	Trust fund balance (\$ million) December 2020
OPG	4,988
HQ	183
NBP	204
AECL	61*
Total	5,436

All figures in the chart above are approximate.

* NOTE: AECL is not a member of the NWMO and is required to contribute to a trust fund for used nuclear fuel under the *NFWA*. See [page 71](#) for more detail.

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.

Canadian Nuclear Safety Commission (CNSC) financial guarantees reporting

As mandated under the *NSCA*, the CNSC requires waste producers to provide financial guarantees to cover the cost (in present value terms) associated with decommissioning, interim storage and the long-term management of radioactive waste (including used nuclear fuel) produced to date.

These financial guarantees available for year 2021 total \$20 billion. They are reviewed independently by the CNSC as part of the waste owner licence requirements and are satisfied by segregated funds that are dedicated to nuclear waste management and decommissioning (totalling approximately \$23 billion as of year-end 2020), 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 estimate 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 approximately 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. The funds in place today will grow to cover the full project cost over the long term 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, 2021, present value) to manage approximately 5.2 million fuel bundles from 2021 onwards is \$10 billion.

Pre- and post-construction costs

Included in the \$10 billion funding requirement is \$2.9 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 the site preparation licence and the construction licence under the *NSCA*. These pre-construction nuclear facility costs are paid for by the waste owners based on the annual NWMO budget as approved by the Board of Directors.

Also included is \$7.1 billion to construct the facility, transport the fuel to the repository, and operate, close, and monitor the repository. The *NFWA* requires that post-licence to construct costs must be funded through contributions to the *NFWA* trust funds established by Ontario Power Generation (OPG), Hydro-Québec (HQ), New Brunswick Power (NBP), and Atomic Energy of Canada Limited (AECL). As of December 2020, the total value of these funds, including investment income, was approximately \$5.4 billion. The balance of the *NFWA* trust funds is sufficient to cover the post-licence to construct costs for the existing inventory of used fuel bundles in Canada. Waste owners will continue to contribute to the funds to cover the existing liabilities as required and future bundles as produced.

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

Budget forecast for 2021

For 2021, the NWMO Board of Directors approved a budget envelope of \$176.4 million for APM. Annual costs beyond 2021 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 2021 cost-sharing percentages among the waste owners are: OPG: 93.30 per cent, NBP: 3.81 per cent, HQ: 2.20 per cent, and AECL: 0.69 per cent.

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

With the recent development in small modular reactors, the NWMO has begun initial reviews of the funding formula and its application to this new fuel waste form. Previous discussions with a number of stakeholders on this topic resulted in the following conclusions:

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

Trust fund deposits for 2021

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

The 2021 *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 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 midpoint of the 2040 to 2045 date range 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 used fuel bundles 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 2021 trust fund deposit requirements are shown in the table below.

Total trust fund deposits: Year 2021

Owner	Trust fund balance (\$ million)	Deposit to trust funds (committed and future bundles) (\$ million)*
	December 2020	2021
OPG	4,988	62.5
HQ	183	0
NBP	204	5.0
AECL	61	0.3
Total	5,436	67.8

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

Attachment 1

Financial guarantee status – Used fuel owners

Hydro-Québec (HQ)

The fair value of the *NFWA* Trust Fund as at Dec. 31, 2020, was estimated at \$183 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:

- » \$502 million for decommissioning and long-term management of low- and intermediate-level radioactive waste; and
- » \$282 million for used fuel.

Ontario Power Generation (OPG)

In accordance with the *NCSA*, 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 2021-22 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 2021-22 period, as it has done in the past.

The CNSC Financial Guarantee requirement for 2021 is \$18,354 million (Jan. 1, 2021, present value). This will be satisfied by the 2020 year-end fair market value of the Nuclear Funds of \$22,182 million without the requirement of a Provincial Guarantee. The Nuclear Funds of \$22,182 million include \$4,988 million in the Ontario *NFWA* Trust.

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 2020 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, 2020, was approximately \$849 million and was comprised of the following:
 - Used Fuel Fund – \$226 million;
 - Station Decommissioning Fund – \$419 million; and
 - *NFWA* Trust Fund – \$204 million.

Atomic Energy of Canada Limited (AECL)

AECL is not a member of the NWMO and is required to contribute to a trust fund for used nuclear fuel under the *NFWA*. 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 \$61 million as of Dec. 31, 2020.

Auditor's report and financial statements

Management's responsibility for financial reporting

The accompanying consolidated 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 consolidated 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 consolidated financial statements are presented fairly, in all material respects, and in light of information available up to February 16, 2021.

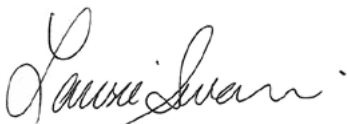
Management has a system of internal controls designed to provide reasonable assurance that the consolidated financial statements are accurate and complete in all material respects. The internal control system includes an established business conduct policy that applies to all employees. Management believes 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 consolidated 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 consolidated financial statements and the external auditor's report. The Committee reports its findings to the Board for consideration when approving the consolidated 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 consolidated 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 16, 2021



Laurie Swami
President and CEO



Georgina Kossivas
Chief Financial and Risk Officer

Independent Auditor's Report

To the Members of Nuclear Waste Management Organization

Opinion

We have audited the consolidated financial statements of Nuclear Waste Management Organization (the "Organization"), which comprise the consolidated statement of financial position as at December 31, 2020, and the consolidated statements of operations, changes in net assets and cash flows for the year then ended, and notes to the consolidated 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, 2020, 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.
- » Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Organization to express an opinion on the financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

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.

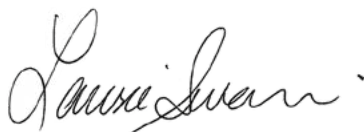
The signature of Deloitte LLP is written in a cursive, handwritten style.

Chartered Professional Accountants
Licensed Public Accountants
February 16, 2021
Vaughan, Ont.

Consolidated statement of financial position
as at December 31, 2020

	2020	2019
	\$	\$
Assets		
Current assets		
Cash	3,203,888	19,071,819
Member contributions receivable (Note 5a)	10,597,104	20,639
Other receivable from members and AECL	2,121,380	120,217
Accounts receivable (Note 12)	219	440,591
Prepaid expenses and deposits	1,619,687	1,807,654
	17,542,278	21,460,920
Capital assets (Note 3)	33,494,135	5,612,904
Accrued pension asset (Note 7)	59,780,395	48,655,845
	110,816,808	75,729,669
Liabilities		
Current liabilities		
Accounts payable and accrued liabilities (Note 12)	16,621,345	21,025,491
Deferred lease inducements (Note 8)	543,839	627,508
Deferred/payable contributions from members and AECL (Note 5b)	877,094	257,921
	18,042,278	21,910,920
Deferred capital contributions (Note 6)	33,494,135	5,612,904
Deferred contributions from members and AECL (Note 5c)	12,781,788	12,016,357
Other post-employment and pension benefits liability (Note 7)	36,998,653	29,294,534
	83,274,576	46,923,795
Net assets	9,499,954	6,894,954
	110,816,808	75,729,669

Approved by the Board of Directors, February 16, 2021



Laurie Swami
President and CEO
Toronto, Ont.



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

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

Consolidated statement of operations
year ended December 31, 2020

	2020	2019
	\$	\$
Revenue		
Contributions from members (Note 4)	110,505,693	95,013,221
Contributions from AECL	846,074	789,608
	111,351,767	95,802,829
Change in deferred capital contributions (Note 6)	(27,881,231)	(2,204,746)
Change in long-term deferred contributions from members and AECL (Note 5c)	(765,431)	(12,775)
Change in member contributions receivable (Note 5a)	10,576,465	(990,362)
Change in deferred/payable contributions from members and AECL (Note 5b)	(619,173)	(107,354)
Total contribution revenue (Note 11)	92,662,397	92,487,592
Interest and other income (Note 11)	90,730	177,102
Total revenue	92,753,127	92,664,694
Expenses		
Adaptive Phased Management		
Staffing and administration	40,931,986	35,426,412
Engagement	19,716,093	21,552,150
Site assessment	9,143,890	12,109,456
Engineering	8,060,635	10,469,149
Stakeholder relations	3,195,877	4,017,817
Safety	4,225,173	3,621,592
Regulatory approvals	3,822,359	2,251,224
Transportation	282,067	560,561
	89,378,080	90,008,361
Services for OPG's Deep Geologic Repository		
Safety assessment/waste characterization	648,262	924,135
Geoscience	359,352	528,123
Environmental assessment	361,521	174,563
	1,369,135	1,626,821
Integrated Strategy for Radioactive Waste		
Communications and engagement	496,909	-
Technical and project management	64,799	-
	561,708	-
Amortization of capital assets	1,444,204	1,029,512
Total expenses (Note 11)	92,753,127	92,664,694
Excess of revenue over expenses for the year	-	-

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

Consolidated statement of changes in net assets
year ended December 31, 2020

	2020	2019
	\$	\$
Net assets (deficiency), beginning of year	6,894,954	(1,839,046)
Excess of revenue over expenses for the year	-	-
Remeasurements during the year:		
Accrued pension asset	8,196,000	13,065,000
Other post-employment and pension benefits liability	(5,591,000)	(4,331,000)
Net assets, end of year	9,499,954	6,894,954

Consolidated statement of cash flows
year ended December 31, 2020

	2020	2019
	\$	\$
Operating activities		
Cash received from contributions	81,951,268	92,682,485
Interest and other revenue received	90,730	177,102
	82,041,998	92,859,587
Cash paid for salaries and benefits, materials and services	(97,909,929)	(80,601,097)
	(15,867,931)	12,258,490
Investing activity		
Purchase of capital assets (Note 3)	(29,400,499)	(3,120,344)
Financing activity		
Cash received from contributions for purchase of capital assets	29,400,499	3,120,344
Net (decrease) increase in cash	(15,867,931)	12,258,490
Cash, beginning of year	19,071,819	6,813,329
Cash, end of year	3,203,888	19,071,819

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

Notes to the consolidated financial statements

December 31, 2020

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*, as required by the *Nuclear Fuel Waste Act* (“NFWA”), which came into force on November 15, 2002. The NWMO transitioned to the *Canada Not-for-profit Corporations Act* and obtained a Certificate of Continuance on December 20, 2012.

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”). The NFWA requires that the NWMO offer nuclear fuel waste management services at a fee to all owners of nuclear fuel waste produced in Canada, including non-members and Atomic Energy of Canada Limited (“AECL”).

Pursuant to a Membership Agreement, cost sharing of APM costs in 2020 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 have been in effect since January 1, 2018.

The NWMO has an agreement with OPG to provide services supporting its Low- and Intermediate-Level Waste Deep Geologic Repository (“DGR”). In late 2017, OPG advised that it was reviewing the level of NWMO support related to its DGR given the status of the regulatory approvals. As such, the NWMO’s activities related to this program were 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 terminated its Engineering, Procurement and Construction Management Agreement with the NWMO. The NWMO continued to offer limited support to OPG in 2020 under the existing DGR Services Agreement and will continue into 2021.

On November 13, 2020, the Minister of Natural Resources Canada (“NRCan”) tasked the NWMO with leading the development of Canada’s Integrated Strategy for Radioactive Waste (“ISRW”). This strategy will address all Canada’s radioactive waste, with the work that the NWMO is leading focusing on existing gaps, specifically in the long-term management for low- and intermediate-level waste. The resulting integrated strategy is not intended to replace other projects currently in progress, but rather incorporate them as part of the recommendations, and is currently anticipated to be completed by the end of 2021, pending completion of NRCan’s review of Canada’s existing Radioactive Waste Policy Framework.

2. Significant accounting policies

Basis of presentation

The NWMO has elected to present consolidated financial statements that included its accounts and those of its wholly owned subsidiaries (collectively, the “NWMO”).

The consolidated 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:

Principles of consolidation

The NWMO's wholly owned subsidiaries are those entities over which the NWMO has control and has the right and ability to obtain future economic benefits, and is exposed to the related risks. Control is the continuing power to determine the strategic operating, investing and financing policies of the other entity without the co-operation of others.

Consolidated wholly owned subsidiaries include:

- » NWMO Property Management 1 Inc.;
- » NWMO Property Management 2 Inc.; and
- » NWMO Property Management 3 Inc.

On January 2, 2020, the NWMO incorporated its three wholly owned subsidiaries to support site assessment activities under the *Canada Business Corporations Act*.

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 and its wholly owned subsidiaries are not-for-profit organizations, and pursuant to section 149(1)(1) of the *Income Tax Act*, are not subject to income tax.

Revenue recognition

Contributions received from members and AECL are treated as restricted contributions, and as such, they are not recognized as revenue until qualifying expenses have been incurred. Any excess or shortfall of member contributions is recorded as deferred/payable contributions or member contributions 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 consolidated statement of changes in net assets.

2. Significant accounting policies (continued)

Pension and other post-employment benefits (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 pooled funds, fixed income securities and limited partnership units in a real estate fund. Market and credit risk on these securities are managed by the plan by placing plan assets in trust and through the plan's 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 receivable from members and AECL, accounts receivable, and accounts payable and accrued liabilities.

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

Related party transactions

Related party transactions are recorded at the exchange amount.

Use of estimates

The preparation of consolidated 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 consolidated 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

	2020		2019
	Cost	Accumulated amortization	Net book value
	\$	\$	\$
Land	27,058,750	-	27,058,750
Computer equipment and software	4,439,831	3,047,429	1,392,402
Transport and work equipment	5,216,236	1,590,016	3,626,220
Furniture and office equipment	1,771,902	1,221,237	550,665
Leasehold improvements	1,979,660	1,942,472	37,188
Office building	1,182,612	353,702	828,910
Vehicles	374,231	374,231	-
	42,023,222	8,529,087	33,494,135
			5,612,904

During the year, capital assets with a cost of \$3,187,605 (2019 – nil) and accumulated amortization of \$3,142,363 (2019 – nil) were written off. The resulting loss of \$45,242 is included in amortization expense.

Capital asset additions totalling \$115,079 (2019 – \$190,143) have been excluded from the consolidated statement of cash flows as they remain unpaid at year-end. During 2020, capital asset additions totalling \$190,143 (2019 – \$76,228) have been included in the consolidated statement of cash flows as they were accrued at December 31, 2019, and paid in 2020 (2019 – accrued at December 31, 2018, and paid in 2019).

4. Related party transactions and balances

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

	2020				2019
	APM	DGR	ISRW	Total	Total
	\$	\$	\$	\$	\$
Transactions during the year					
Member contributions received					
Ontario Power Generation Inc.	101,514,000	1,291,310	226,000	103,031,310	89,415,426
New Brunswick Power Corporation	4,057,383	-	8,000	4,065,383	3,455,795
Hydro-Québec	3,409,000	-	-	3,409,000	2,142,000
	108,980,383	1,291,310	234,000	110,505,693	95,013,221

5. Member and AECL contributions

The NWMO is solely funded through contributions it receives from its members and AECL. The contributions 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 member contributions receivable when the amount is determinable and the ultimate collection is likely.

(a) Contributions receivable from members

Contributions receivable from members are comprised of the following:

	2020	2019
	\$	\$
Ontario Power Generation Inc.	10,257,398	-
New Brunswick Power Corporation	339,706	-
Hydro-Québec	-	20,639
	10,597,104	20,639

(b) Deferred/payable contributions from members and AECL – current

Deferred/payable contributions from members and AECL are comprised of the following:

	2020	2019
	\$	\$
Hydro-Québec	749,809	-
Atomic Energy of Canada Limited	127,285	176,342
New Brunswick Power Corporation	-	68,617
Ontario Power Generation Inc.	-	12,962
	877,094	257,921

(c) Long-term deferred contributions from members and AECL

Long-term deferred contributions from members and AECL represent amounts received or receivable to fund various employee future benefits as follows:

	2020	2019
	\$	\$
Accrued pension asset	59,780,395	48,655,845
Other post-employment and pension benefits liability	(36,998,653)	(29,294,534)
Other post-employment and pension benefit liabilities – short term (Note 7)	(500,000)	(450,000)
Remeasurements in net assets	(9,499,954)	(6,894,954)
	12,781,788	12,016,357

(d) Continuity of deferred contributions from members and AECL

The continuity of deferred contributions from members and AECL is as follows:

	2020	2019
	\$	\$
Balance, beginning of year		
Deferred/payable contributions from members and AECL – current	257,921	150,567
Deferred contributions from members and AECL – long term	12,016,357	12,003,582
	12,274,278	12,154,149
Contributions received	111,351,767	95,802,829
Contributions receivable	10,597,104	20,639
Contribution revenue recognized	(92,662,397)	(92,487,592)
Amounts received previously recognized	(20,639)	(1,011,001)
Change related to deferred capital contributions	(27,881,231)	(2,204,746)
	13,658,882	12,274,278
Balance, end of year		
Deferred/payable contributions from members and AECL – current	(877,094)	(257,921)
Deferred contributions from members and AECL – long term	12,781,788	12,016,357

6. Deferred capital contributions

	2020	2019
	\$	\$
Balance, beginning of year	5,612,904	3,408,158
Contributions for the purchase of capital assets	29,325,435	3,234,258
Less amortization into revenue	(1,444,204)	(1,029,512)
Balance, end of year	33,494,135	5,612,904

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 eligible employees and retirees. The registered pension plan is funded, and plan assets include pooled funds and fixed income securities managed by third parties. The benefit costs and assets related to this plan are recorded in the NWMO's consolidated financial statements.

(b) Supplementary pension plan

The supplementary pension plan is a defined benefit plan covering certain employees and retirees. This plan is unfunded.

(c) Other post-employment benefit plans

The other post-employment benefit plans provide medical, dental and group life insurance coverage for certain groups of full-time employees who have retired from the NWMO. These plans are unfunded.

A funding valuation, which was completed for the registered pension plan as of January 1, 2020, reported an actuarial surplus of \$45.6 million on a going concern basis and a surplus of \$7.3 million on a solvency basis.

The most recent actuarial valuations were performed for the registered pension plan as at January 1, 2020, for the supplementary pension plan as at December 31, 2019, and for the other post-employment benefit plans as at December 31, 2017. The liability as at December 31, 2020, is based on an extrapolation of the previous valuations.

The significant actuarial assumptions for benefit obligations 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	
	2020	2019	2020	2019	2020	2019
	%	%	%	%	%	%
Discount rate at the beginning of the period	5.50	5.50	3.20	4.00	3.20	4.00
Salary schedule escalation rate	3.00	3.00	3.00	3.00	-	-
Rate of cost of living increase	2.00	2.00	2.00	2.00	-	-
Rate of increase in health-care cost trend	-	-	-	-	5.34	5.45
Discount rate at the end of the period	5.25	5.50	2.60	3.20	2.60	3.20
Average remaining service life for employees	14 years	13 years	14 years	13 years	15 years	15 years

Information for the NWMO's pension plans and other post-employment benefit plans is as follows:

	Registered pension plan		Supplementary pension plan		Other post-employment benefit plans	
	2020	2019	2020	2019	2020	2019
	\$	\$	\$	\$	\$	\$
Changes in accrued benefit obligation						
Accrued benefit obligation, January 1	(74,133,000)	(69,458,000)	(7,661,237)	(6,514,164)	(22,083,297)	(17,161,755)
Current service cost	(2,143,000)	(2,046,000)	(288,000)	(245,000)	(1,335,000)	(967,000)
Interest cost	(4,158,000)	(3,902,000)	(262,000)	(279,000)	(744,000)	(719,000)
Past service cost	(5,000)	(12,000)	-	-	-	-
Employee contributions	(1,342,000)	(1,211,000)	-	-	-	-
Benefits paid	2,247,000	2,181,000	276,403	259,927	189,478	221,458
Net actuarial (loss) gain	(3,307,000)	315,000	(2,208,000)	(883,000)	(3,383,000)	(3,457,000)
Accrued benefit obligation, December 31	(82,841,000)	(74,133,000)	(10,142,834)	(7,661,237)	(27,355,819)	(22,083,297)
Changes in plan assets						
Fair value of plan assets, January 1	122,788,845	103,298,455	-	-	-	-
Expected return on plan assets	6,775,000	5,707,000	-	-	-	-
Benefits paid	(2,247,000)	(2,181,000)	-	-	(189,478)	(221,458)
Net actuarial gain	11,503,000	12,750,000	-	-	-	-
Employer contributions	2,454,550	1,991,390	-	-	189,478	221,458
Past service cost	5,000	12,000	-	-	-	-
Employee contributions	1,342,000	1,211,000	-	-	-	-
Fair value of plan assets, December 31	142,621,395	122,788,845	-	-	-	-
Funded status						
Fair value of plan assets	142,621,395	122,788,845	-	-	-	-
Accrued benefit obligation	(82,841,000)	(74,133,000)	(10,142,834)	(7,661,237)	(27,355,819)	(22,083,297)
Accrued benefit asset (liability)	59,780,395	48,655,845	(10,142,834)	(7,661,237)	(27,355,819)	(22,083,297)
Short-term portion	-	-	(250,000)	(200,000)	(250,000)	(250,000)
Long-term portion	59,780,395	48,655,845	(9,892,834)	(7,461,237)	(27,105,819)	(21,833,297)
	59,780,395	48,655,845	(10,142,834)	(7,661,237)	(27,355,819)	(22,083,297)
Components of cost recognized						
Current service cost	2,143,000	2,046,000	288,000	245,000	1,335,000	967,000
Interest cost on accrued benefit obligation	4,158,000	3,902,000	262,000	279,000	744,000	719,000
Expected return on plan assets	(6,775,000)	(5,707,000)	-	-	-	-
Cost (recovery) recognized	(474,000)	241,000	550,000	524,000	2,079,000	1,686,000

The short-term portion of the accrued benefits liability of \$500,000 (2019 – \$450,000) that is included in accounts payable and accrued liabilities is part of the total \$37,498,653 (2019 – \$29,744,534) accrued benefits 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 consolidated 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:

	2020	2019
	\$	\$
Effect of 1% increase in health-care cost trends on		
Accrued benefit obligation	6,767,000	5,630,000
Current service cost and interest cost	908,000	742,000
Effect of 1% decrease in health-care cost trends on		
Accrued benefit obligation	(4,860,000)	(4,082,000)
Current service cost and interest cost	(610,000)	(503,000)

The supplementary pension plan is unfunded and is secured by a Standby Letter of Credit of \$11,997,800 (2019 – \$9,721,600) obtained on the NWMO's behalf by OPG, as approved by the members.

8. Deferred lease inducements

	2020	2019
	\$	\$
Tenant inducements	835,676	835,676
Less accumulated amortization	(291,837)	(208,168)
	543,839	627,508

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 operating leases for office premises and a 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:

	\$
2021	1,399,637
2022	1,259,585
2023	1,030,148
2024	1,036,392
2025	1,040,852
Thereafter	1,570,644
	7,337,258

11. Segment reporting

The NWMO has three reportable segments as follows:

- » Federal mandated program (APM);
- » Direct services outside its mandated program include a service contract with OPG for DGR, which became effective February 1, 2011; and
- » ISRW, effective November 13, 2020.

Segment information is as follows:

	APM		DGR		ISRW		Total	
	2020	2019	2020	2019	2020	2019	2020	2019
	\$	\$	\$	\$	\$	\$	\$	\$
Contribution revenue	90,730,898	90,860,407	1,369,980	1,627,185	561,519	-	92,662,397	92,487,592
Interest and other income	89,440	173,949	1,101	3,153	189	-	90,730	177,102
Total revenue	90,820,338	91,034,356	1,371,081	1,630,338	561,708	-	92,753,127	92,664,694
Amortization of capital assets	1,442,258	1,025,995	1,946	3,517	-	-	1,444,204	1,029,512
Operating expenses	89,378,080	90,008,361	1,369,135	1,626,821	561,708	-	91,308,923	91,635,182
Total expenses	90,820,338	91,034,356	1,371,081	1,630,338	561,708	-	92,753,127	92,664,694
Capital asset additions	29,325,435	3,234,258	-	-	-	-	29,325,435	3,234,258

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

12. Government remittances

Government remittances is comprised of the following:

	2020	2019
	\$	\$
Goods and Services Tax/Harmonized Sales Tax ("GST/HST") payable	(2,153,130)	(120,295)
GST/HST receivable	525,892	560,032
GST/HST (payable) receivable, net	(1,627,238)	439,737

The net government remittances payable balance of \$1,627,238 as at December 31, 2020, has been included in accounts payable and accrued liabilities. The net government remittances receivable balance of \$439,737 as at December 31, 2019, has been included in accounts receivable.


13. Significant event – COVID-19

Subsequent to the year-end, on March 11, 2020, the World Health Organization characterized the outbreak of a strain of the novel coronavirus ("COVID-19") as a pandemic, which has resulted in a series of public health and emergency measures that have been put in place to combat the spread of the virus. The duration and impact of COVID-19 is unknown at this time, and it is not possible to reliably estimate the impact that the length and severity of these developments will have on the financial results and condition of the NWMO in future periods.

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