



## AGENDA

The Corporation of the Township of Ignace  
Ignace Community Nuclear Liaison Committee  
Wednesday, March 9<sup>th</sup>, 2022  
At 6:00pm CDT via Zoom  
Meeting ID: 886 8753 7014    Passcode: 562560



- 1) Call to Order
- 2) Adopt Agenda – MOTION #2022-0309-1
- 3) Declaration of Conflict of Interest
- 4) Approval of Previous Meeting Minutes
  - a) February 9, 2022 – MOTION #2022-0309-2
- 5) Introduction of new ICNLC member
- 6) Business arising from Minutes
- 7) Old business
- 8) Presentation – *Preliminary Transportation Plan* – Caitlin Burley
- 9) Discussion regarding ICNLC Office
- 10) ICNLC Engagement Update – Kim Richards
- 11) New Business
- 12) Regional Partner Updates
- 13) Township Updates
- 14) NWMO Updates
  - a) Engagement Update
  - b) Transportation Update
  - c) Technical Update
  - d) Partnership Update
  - e) Communications Updates
  - f) Relationship Manager Update



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- 15) Correspondence and Information
- 16) Report or Input of Committee Members
  - a) Community Studies Update – Cindy Stark
- 17) Adjournment – MOTION #2022-0309-3

DRAFT



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 Ignace Community Nuclear Liaison Committee Meeting  
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<https://zoom.us/j/96819226334?pwd=MVZUbXN5V01jVidrQ1hQM2VJL0pyQT09>

**ICNLC Members:**

Brad Greaves - Chair	Penny Lucas - Mayor	<b>Regrets:</b>
Tyler Peacock	Roger Dufault	Wyatt Mantle
Paul Dufault	Cindy Stark	Donna Chief
Debbie Hart		Lee Kennard
Diana Baril		

**NWMO:**

Rachelle Davenport	Chantelle Gascon	Vince Ponka
Lisa Ferrara	Daila Delescaille	Jack Falkins
Robin Beauclair	James Wagar	Kevin Muloin
Matt Long	Paula Goldrup	Rick Saarinen
Ted Mitchell	Billy Moore	

**Township staff :**

Kimberly Richards	Jeff Lederer	Keith Roseborough
Leisel Edwards	Lynda Colby	

1. **Call to Order – Chair Brad Greaves called the meeting of the Ignace Community Nuclear Liaison Committee to order at 6:00 pm. February 9, 2022.**

2.

**Verbal Motion: # 2022-0209-1**

**Moved by: Debbie Hart**

**Seconded by: Cindy Stark**

**That, the Agenda of the Ignace Community Nuclear Liaison Committee dated February 9, 2022, 2021 be approved as amended.**

*Amendments: none*

**Carried**

3. **Disclosure of Pecuniary Interest and the General Nature Thereof**

4.

**Verbal Motion: #2022-0112-2**

**Moved by: Paul Dufault**

**Seconded by: Diana Baril**

**That, the minutes of the Ignace Community Nuclear Liaison Committee dated January 12, 2021 be approved as amended.**

*Amendments: none*

**Carried**



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**5. ICGR Update – Penny Lucas**

*NWMO is not going to be going to the ICGR as this point, but they are still willing to sponsor Penny's presence there as a panellist at the conference. As they will not be sponsoring anybody else going at this time, NWMO is suggesting that later in the year that they would be able to sponsor some Ignace community members to take a tour of the DGR being built in Finland currently.*

**6. ICNLC Project Coordinator Update – Jeff Lederer**

*Kim Richards has accepted a new position at the Township of Ignace as Community Designer, and she will be helping primarily with the Willingness Project by taking concepts brought forth from community studies to create renderings and visions of development. The job posting for the ICNLC Project Coordinator is being done right now and should be posted tomorrow. The Posting will be advertised both internally and externally. Brad Greaves will be sitting on the interview panel for the position, and Jeff invited ICNLC members to express if they would also like to sit on the interview panel. Diana Baril volunteered.*

**7. Business Arising from the Minutes**

Brad wanted to update the Committee that the changes of the ICNLC Terms of Reference to include twelve (12) members on the ICNLC from the previous eleven (11) members will be brought to Ignace Council at the March meeting.

**8. Old Business**

*None*

**9. NWMO Environmental Presentation – Billy Moore and Joanne Jacyk**

Billy began by outlining the three main objectives of the presentation:

- 1) Give an overview of the environmental baseline monitoring program
- 2) Give an update on the work that was completed in 2021
- 3) Introduce the Virtual Open House

Billy informed the Committee that the slideshow being shared with the Committee will be released for the public within a week or so. Billy will send the slides to the Committee members after the meeting to welcome any feedback for changes before release.

The purpose of the baseline environmental work is to begin a better understanding of the current environmental conditions as they exist today in the study area. This includes current stressors that are on the environment as well cumulative effects that can be found in the area. Once there is a better understanding of the local environment, NWMO can better predict how the future potential project will directly or indirectly impact the environment. Measures can then be explored to manage, mitigate, and in some cases eliminate entirely these identified impacts. KGS has been contracted to complete the baseline work as designed. KGS has subcontractors who complete work in specialized areas.

**1) Overview of the Environmental Baseline Monitoring Program**

Areas included in the environmental baseline monitoring program include:

- Soil quality monitoring



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- Sediment quality monitoring
- Tissue Chemistry
- Hydrology program
  - Surface water volume, general water chemistry, pH, dissolved oxygen, nutrients, ions, total dissolved metals, radionuclides and glyphosate, plankton, benthic invertebrates, and sediment sampling will be completed at some or all of the 23 water sampling sites
  - Atmospheric monitoring
  - Air quality, noise, and light conditions monitoring
  - Terrestrial ecosystem mapping and habitat suitability modeling
  - Winter aerial moose survey
    - was completed in January 2022 and is being completed by Northern Bioscience. Survey methodologies are essentially the same as used by the MNR so that collected data can be accurately compared with existing MNR data. This study will help gain a better understanding of the baseline moose population and the demographic structures of moose population present on the site today.
  - Aquatic habitat ecosystem study
    - Aims to detail various aquatic ecosystems present in the study area as it exists today, surveys completed to collect information on water courses that may be directly or indirectly influenced by and APM Project in the future.
  - eDNA sampling

The purpose of all of these studies is to use the data from this baseline monitoring program to inform future targeted monitoring initiatives for specific species or specific ecosystem being studied. This broad program can be very effective for detecting cryptic or rare species that are harder to detect through conventional monitoring programs.

2) *Update on work completed in 2021*

- 15 sites visited for soil quality monitoring
- 39 sites visited for surface water quality monitoring, with 140 samples collected.
- 153 sites visited for eDNA sampling, with 467 samples collected.
- 287 sites mapped for Aquatic Habitat Mapping, including 146 wetlands, 13 ponds, 42 lakes, and 86 rivers and streams.
- 600 sites mapped for both Terrestrial Ecosystem Mapping and Habitat Suitability & Use Mapping.
- 11 lake bottoms mapped and 6 river/streams measured for Flow Metering & Bathymetry (over 400 km of bathymetric data transects on 11 lakes).

The NWMO has partnered with the Toronto Zoo Native Bat Conservation Program in conducting research to close knowledge gaps in the ecology of Ontario's bat population. The goal of this work is to contribute to conservation efforts now and in the future, which starts with studies to better understand bat populations and trends.

Billy talked about ways in which community members can participate in these studies by supplying equipment like boats, ATVs, etc., or contribute as an operator or field guide.

Vince Ponka introduced the Committee to the Virtual Open House and how it will be displayed for participants.



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**10. ICNLC Storefront Update – Kim Richards**

Construction is well underway in the new ICNLC office space. The contractor is still waiting on the order for the door and window that had to be custom ordered to match the building façade. Hopefully the space will be ready and open to the public by the end of March.

**11. Discussion regarding ICNLC initiatives for 2022**

Brad talked about the current ICNLC website and the need to update it soon. Brad would like to have answers to questions as people in the community answer them.

**12. ICNLC Engagement Update – Kim Richards**

As COVID-19 lockdown has come to an end, a youth advisory working group meeting was held yesterday morning. There were some new dates set for a gaming night on March 22 and a movie night on March 25 at the Learn More Centre. As mentioned at the last ICNLC meeting, the mini essential skills workshop series will be starting up soon as it was originally planned in January when the province went into lockdown. This will include various free or low-cost workshops to be put on a weekly basis. The first one will be a resume building workshop put on by Jody Waldock from Crossroads Employment Centre. It is being considered to start the workshops online now until restrictions for indoor gatherings are lifted. Arnold Beebe has gotten the OK to start up PAL courses again and we will hopefully be scheduling something soon.

**13. New Business**

Brad discussed the new Willingness Working Group. There will be two meetings per month virtually. Brad inquired if there were any ICNLC members who would be interested in being on the Working Group. The group will discuss engagement initiatives for the coming year in regards to willingness and the final report that was finalized last year. There will be multiple ways to engage the community and the working group will be part of developing the engagement strategy.

Cindy Stark volunteered to be on the Willingness Working Group.

**14. Regional Update – Tyler Peacock**

Dryden is continuing on their Community Capacity work. The Dryden Nuclear Education Engagement Committee Terms of Reference will be up for approval by Council in February. There was a learning session with NWMO in January, and another scheduled for February 23.

Dryden's youtube channel documenting NWMO engagement can be found here:

[https://www.youtube.com/channel/UC-kGsOVLe6xKmJzJypi\\_Ndg](https://www.youtube.com/channel/UC-kGsOVLe6xKmJzJypi_Ndg)

**15. Township Updates – Penny Lucas**

The Township continues to work with NWMO. Lots of work has been done through various Township Committees and current projects that are being prepared for this summer and continuing projects from last year. There has been some activity at the site of the new senior's living complex as the geotechnical studies are underway. The Regular Meeting of Council will be held on Tuesday, February 22<sup>nd</sup> this month at 6:00pm CDT, as Monday, February 21<sup>st</sup> is the Family Day holiday.



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## 16. NWMO Updates

### a) **Engagement Update – Chantelle Gascon**

Chantelle provided a written report in the meeting package.

### b) **Communications Update – Vince Ponka**

The project got a lot of attention regionally as well as in several stories in the Toronto Star in the past month or so. There has been a lot of progress in the Swedish government approving their DGR. The release of the NWMO Transportation Plan got a lot of attention as well and a lot of great feedback has been received so far. The Canada Land podcast was released early January, which Mayor Lucas featured in recently. There are plans for engagement in Spring and Summer underway and the team is excited to get back out into the community in person once it is safe to do so.

### c) **Indigenous Engagement – Kevin Muloin**

The team has had to work from home since the last meeting, so engagement in the field hasn't happened. There has been some virtual contact with the communities that they are working with. Some communities are starting to welcome the NWMO team into their communities again as COVID-19 restrictions lift, and they are working on a plan to engage with them. The team has taken advantage of this time to train new staff and preparing for getting out in the community again once they are able. Management of agreements and working with the communities are the main focus right now.

### d) **Partnership Update – Mac Potter**

NWMO continues to work with the stakeholders to advance dialogue. Current discussions with the Township continues to evaluate the pillars and principles that are identified through the Memorandum of Understanding, which was executed in August last year. Their core work includes looking at and evaluating the pillars and principles and determining a strategic pathway on how they can meet those as part of the partnership dialogue. As NWMO continue to meet with leadership, technical staff, appropriate outside legal council, as required to aid in those discussions. As it relates to the City of Dryden, NWMO continues to meet with city representatives on a monthly basis as a significant neighbouring community. NWMO continues to have discussions on determining a suitable pathway to seek partnership on a long-term basis. As per the Terms of Reference which were executed last year, a number of different goals and milestones were identified and continue to be worked towards collaboratively for long-term partnership.

### e) **Technical Update – Geoff Crann**

Rachelle read Geoff's written report on his behalf: At Borehole 6 the drilling and testing has been completed and they are now installing a Westbay monitoring system and they should be finished in the last week of February, after which they will start demobilizing the site. And this will conclude the deep borehole work. Quarterly monitoring and sampling is going on in the deep borehole, and they will be starting the shallow groundwater wells this quarter.

### f) **Relationship Manager Update – Rachelle Davenport**

Rachelle, Chantelle Gascon, and Norm Sandberg will be this month's guests at the Dryden Learning Series, and they will be talking about regional engagement. NWMO has noticed more user groups who have reached



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out and asked for presentations and updates throughout the Northwest region. There were plans for going out into Ignace and neighbouring communities to have NWMO lead technical sessions that would give opportunity to communities within the region to spend time with NWMO's subject matter experts. NWMO has had some very positive discussions with Wabigoon and Dyment local service boards. Rachelle wanted to clarify the purpose of the Dryden Satellite Office. The office was opened by the Ignace municipality so that community people can talk to other community people. It is an opportunity for Ignace to tell the story to the region of what it is like to be the community involved in this new process of being a part of the APM Project. NWMO will be having a storefront next door to the Ignace Satellite Office, which will be open once it is ready as safe to continue public engagement. Renovations are planned to start next week, and they are aiming for a March open.

**17. Correspondence and Information**

*A copy of a letter was circulated with the Committee from Chantelle Gascon regarding the Integrated Strategy for Radioactive Waste.*

**18. Report or Input of Community Members**

a) Community Studies Update – Cindy Stark

The working group will be meeting tomorrow morning at 10:00 am, and Cindy will provide an update at the next ICNLC meeting.

**19. Adjournment**

**Verbal Motion: #2022-0209-3**

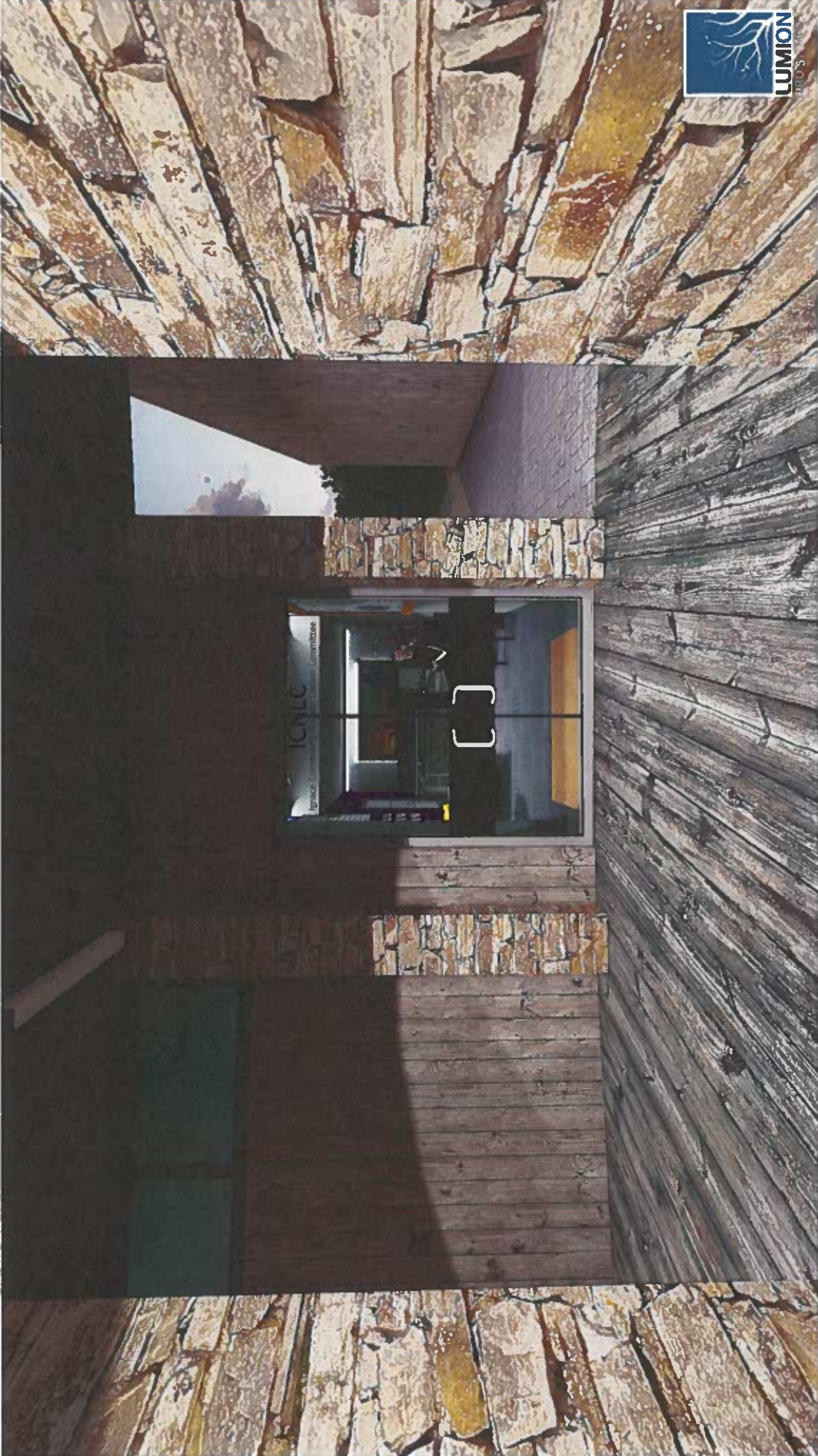
**Moved by: Paul Dufault**

**Seconded by: Diana Baril**

**That, the meeting of the Ignace Community Nuclear Liaison Committee dated February 9<sup>th</sup>, 2022 be adjourned at 7:43 pm.**

**Carried**







## ICNLC Ignace Community Nuclear Liaison Committee

**What is the ICNLC?**  
In 2007, the Government of Canada (GC) and the Nuclear Waste Management Organization (NWMO) created the Ignace Community Nuclear Liaison Committee (ICNLC) to help the community understand the long-term management of used nuclear fuel. The ICNLC is a community-based organization that provides a forum for the community to share its views and concerns about the long-term management of used nuclear fuel. The ICNLC is a non-profit organization that is independent of the NWMO and the GC.

### The ICNLC's Role

The ICNLC is comprised of local and provincial volunteers appointed by municipal councils in partnership with the Nuclear Waste Management Organization (NWMO). The ICNLC helps the community learn more about Canada's long-term management of used nuclear fuel.



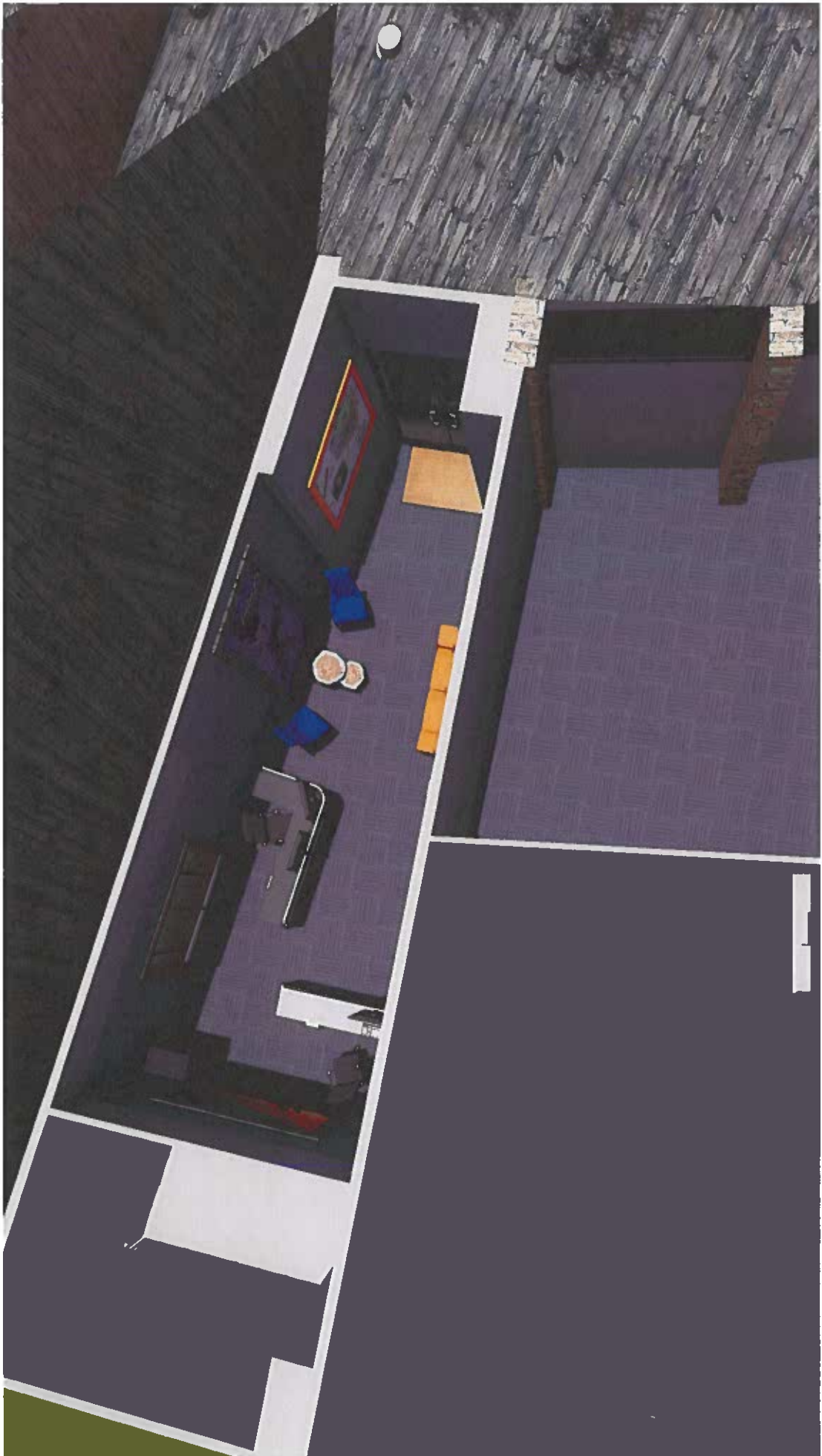
# Ignace Community Nuclear Liaison Committee











# Deep geological repositories for used nuclear fuel: stewardship or abandonment?

by Jeremy Whitlock, BSc, MEng, PhD  
jeremyjwhitlock@gmail.com

Today many countries that generate nuclear electricity are developing, or plan to develop, a deep geological repository (DGR) for the long-term isolation of used nuclear reactor fuel from the biosphere. The DGR concept involves deep entombment of the used nuclear fuel in stable rock formations for millennia, reflecting both state-of-the-art science and engineering, as well as several aspects of nature's own geological repositories for concentrated radioactive material (for example, the high-grade uranium ore deposits in the Athabasca Basin of western Canada, over a billion years old).

The first operational DGR will be located in Finland<sup>1</sup>, now in the final steps of licensing prior to accepting used nuclear fuel from that country's reactors. In Canada the Nuclear Waste Management Organization (NWMO) is nearing the end of a lengthy process to select a suitable site for a DGR<sup>2</sup>.

Some criticism of the DGR concept labels it as *abandonment* of the used nuclear fuel once the emplacement period is concluded, and favours instead the concept of *rolling stewardship*, or continual and indefinite surface storage and monitoring<sup>3</sup>.

This essay examines the case for both rolling stewardship and geological repositories, and concludes that the facts point to the opposite being true:

**Rolling stewardship, in fact, represents *abandonment* of our long-term obligation for managing used nuclear fuel, while geological repositories represent long-term *stewardship*.**

We first summarize the challenge presented by used nuclear fuel in terms of ensuring long-term safety, then address how both rolling stewardship and DGRs address this challenge.

## The Challenge of used nuclear fuel

“Used nuclear fuel”<sup>4</sup> refers to reactor fuel (usually uranium-based) that has been removed from a reactor following its period of service. It's called “used” since, in addition to containing all of the radioactive waste products from its time in the reactor, it still contains a significant amount of

<sup>1</sup> For more information see <https://www.posiva.fi/en/> (from Posiva, the builder/operator of Finland's DGR).

<sup>2</sup> <https://www.nwmo.ca/>.

<sup>3</sup> See, for example: G. Edwards, *Nuclear Waste: Abandonment versus Rolling Stewardship* ([http://www.ccnr.org/Rolling\\_Stewardship.pdf](http://www.ccnr.org/Rolling_Stewardship.pdf)); *The Nuclear Waste Abandonment Issue in Northwestern Ontario* (<https://wethenuclearfreenorth.ca/nuclear-waste-abandonment/>); G. Edwards: “*The Age of Nuclear Waste is Just Beginning*” (<https://www.dianuke.org/dr-gordon-edwards-age-nuclear-waste-just-beginning/>).

<sup>4</sup> See also NWMO, Canada's Used Nuclear Fuel, <https://www.nwmo.ca/en/Canadas-Plan/Canadas-Used-Nuclear-Fuel>.



potential energy that could be extracted (a hundred times more), using advanced reactor designs and waste reprocessing techniques. Depending on the details of this advanced technology, much of the long-term radioactive waste products would potentially also be destroyed in the process of normal operation.

Since this advanced technology is not yet commercially available, and uranium resources are reasonably abundant, many countries with nuclear programs have adopted a two-pronged approach consisting of: (1) safely storing used nuclear fuel in surface facilities that can last hundreds of years; and (2) developing, at the same time, a long-term solution that addresses the time period during which the used nuclear fuel remains a significant hazard.

In terms of both the radioactive and chemical content of the used nuclear fuel, this time period is essentially *forever*. There is nothing unusual about this length of time – it describes the period that almost every other toxic waste product of our industries remains toxic. There are several key differences with used nuclear fuel however, which explain why it tends to receive more attention; namely, it's high radioactivity, availability, and manageable size:

- 1) ***Used nuclear fuel is highly radioactive.*** This means that in addition to being chemically hazardous (chiefly as a heavy metal that can damage the kidneys), it is also radioactively hazardous. Initially, and for several hundred years, this radioactivity is the primary hazard and requires both substantial shielding and careful handling. Due to the nature of radiation, the its hazard decreases with time, and after a few hundred years the main risk to humans becomes internal uptake rather than external exposure – therefore, for most of the lifetime of the used nuclear fuel, shielding is not as important as measures that keep it out of the drinking water and food cycle: at this point the goal is similar to that of many chemical toxins. Indeed, although the radioactive hazard of used nuclear fuel decreases slowly with time, its chemical toxicity (as with other waste forms) continues forever.
- 2) ***Used nuclear fuel is all in one place.*** It is not dispersed to the atmosphere or waterways through normal operation. This is of course a good thing, but a waste product that doesn't go anywhere must also be responsibly handled and stored. For the nuclear industry this means surface facilities with some impressively high-tech, robust arrangements for continued safe storage and monitoring, which are dependent upon continuing institutional controls – typically with a safety analysis envelope looking ahead several hundred years. Reassessment (and replacement or refurbishment) of the containment approach will be needed at some point in this time frame.
- 3) ***Used nuclear fuel is small in volume.*** Uranium contains, gram for gram, millions of times more potential energy than any chemical source, and this means that even a lifetime of operation of nuclear energy generates a relatively small amount of used nuclear fuel. “Relatively small”, combined with being “all in one place” as just discussed, translates directly to manageability. The number of used nuclear fuel containers will be in the thousands, which seems large but is an entirely manageable task over several decades.

These unique aspects of used nuclear fuel – its radioactivity, localization, and compactness – are simultaneously what draws society’s attention (possibly more than any other waste form), and what provides a unique opportunity to do something about it.

In short – we have a long-term plan for used nuclear fuel because we *should*, and we *can*.

## What “long-term” means

As soon as you decide to address the actual, long-term risk of any waste material, you need to remove all institutional controls from the equation – i.e., the humans. This is because we will not be around forever, at least in the location where the waste is stored.

For example, one thing that we know will happen in the relatively near future (compared to the life of our waste materials), is glaciation. As Figure 1 shows<sup>5</sup>, roughly every 100,000 years, our planet drops in temperature and much of the continental land mass in the northern latitudes become covered in ice up to 4 km thick. To say this ice destroys everything in its path would be an understatement: it reshapes the landscape, grinding off several metres of the surface and scattering it around the continent as “glacial till”. Much of this glacial till is moulded into today’s familiar landforms by the torrents of water from the glacier’s eventual melting. The erosion from this melting also leaves behind valleys and lakes where there were none before.

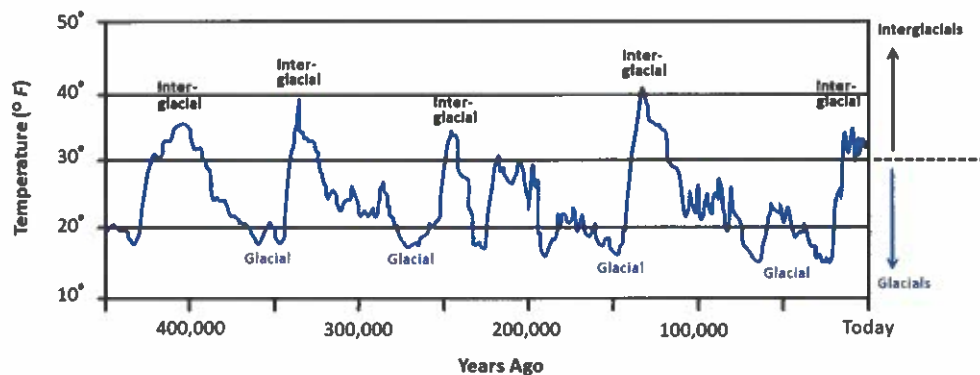


Figure 1. Glacial-interglacial cycles of the past 450,000 years<sup>5</sup>

Clearly, glaciation is a “wiping-the-slate-clean” event that leaves nothing behind, on – or several metres below – the areas of the earth surface that it impacts. The most recent of these glaciations peaked roughly 20,000 years ago, and is directly responsible for much of the striking scenery of Canada today.

As globally catastrophic as glaciations are, of course, there are a number of other aspects that also must be addressed in a long-term strategy for any form of waste: for example, structural decay (erosion, corrosion, etc.), weather events, seismic events, social developments, and incursion of plants

<sup>5</sup> Adapted from S. Eldredge and B. Biek, *Glad you Asked: Ice Ages – What are They and What Causes Them?*, Utah Geological Society, <https://geology.utah.gov/map-pub/survey-notes/glad-you-asked/ice-ages-what-are-they-and-what-causes-them>.

and animals – and all of these must be accommodated in the long-term strategy without relying upon ongoing human intervention.

## Geological repositories vs. rolling stewardship

Around 50 years ago, at the dawn of significant growth of nuclear electricity generation worldwide, several countries, including Canada, decided to take on the above challenge of finding a long-term solution for used nuclear fuel. As a result, today, used nuclear fuel is probably the only waste material that has a true long-term plan, largely due to its unique characteristics as described above<sup>6</sup>.

For any type of waste there are two fundamental choices for such a long-term plan: destroy it completely, or deal with it appropriately. As mentioned earlier, destroying used nuclear fuel by recycling it in advanced reactors would potentially lead to significantly more energy production. This may be a commercial possibility someday, but for the foreseeable future a practical solution is needed. Practicality also rules out a few other suggested strategies, such as shooting the waste into space or the Sun.

Amongst the countries addressing this issue, the most popular strategy for appropriate dispositioning of used nuclear fuel is *deep geological repositories*: the packaging of used nuclear fuel in robust containers designed to last hundreds of thousands of years (the duration of the hazard), and emplacing these deep underground in rock formations with certain attractive characteristics (e.g., low seismicity and ground-water movement).

The DGR concept is supported by decades of international research, and involves complex geophysical and geochemical modelling that is scientifically verified based on both experimentation and several analogues in Nature herself<sup>7</sup>. As in Nature, a DGR relies upon the multiple-barrier concept, which for the Canadian approach means the following<sup>8</sup>:

- At the heart is the nuclear fuel itself, a robust ceramic resistant to dissolution in water;
- Next is the sealed metal fuel tubes, resistant to erosion and corrosion, and designed to survive the high temperatures, radiation, pressures, and vibration of over a year in a reactor core;
- Next is the emplacement container of the DGR, designed to hold the fuel in the underground conditions for the duration of its hazard;
- Next is the highly absorbent bentonite clay surrounding the fuel, similar in concept to the clay barrier that protected Saskatchewan's highly-concentrated uranium deposits for over a billion years;

<sup>6</sup> See also J. Whitlock, *The Good News About Nuclear Waste*, <http://nuclearfaq.ca/good-news-about-nuclear-waste.htm> (2021).

<sup>7</sup> See also J. Whitlock, *How Can We Have Confidence in Predictions of the Long-term Safety of a Geological Repository?*, [http://nuclearfaq.ca/cnf\\_sectionE.htm#waste-confidence](http://nuclearfaq.ca/cnf_sectionE.htm#waste-confidence), and *What does Nature tell us about nuclear waste disposal?*, [http://nuclearfaq.ca/cnf\\_sectionE.htm#v2](http://nuclearfaq.ca/cnf_sectionE.htm#v2).

<sup>8</sup> NWMO, *Multiple-Barrier System*, <https://www.nwmo.ca/en/A-Safe-Approach/Facilities/Deep-Geological-Repository/Multiple-Barrier-System>.

- The final barrier is the overlying 500 km of rock, chosen to have a number of qualities that impede radionuclide movement – chief among these is low ground-water movement, taking hundreds of thousands of years for any dissolved radionuclides to reach the surface, and ensuring that radiation levels on the surface remain forever below natural background levels.

The concept of *rolling stewardship*, on the other hand, is a commitment to continuing our monitored, surface storage indefinitely, while marking the storage appropriately and communicating this information from generation to generation. Rolling stewardship represents a fundamental distrust of the science behind the DGR concept (and unfortunately also some misunderstanding, such as claims<sup>9</sup> that “geology is a descriptive science, not a predictive one”, which is certainly not true<sup>10</sup>). Rolling stewardship assumes that institutional controls can be maintained on used nuclear fuel in perpetuity, or at least until a better option comes along.

As part of its initial multi-year consultation with Canadians (2002-2005) to gauge the public view on DGR versus other strategies, including continued surface storage, Canada’s Nuclear Waste Management Organisation (NWMO) asked this very question<sup>11</sup>. In general, the result was qualified support for doing something concrete about the long-term hazard, while remaining flexible for opportunities to improve our approach as the science progressed – this led to the concept of *Adaptive Phased Management*,<sup>12</sup> being implemented by the NWMO today.

## Stewardship vs. abandonment

Which brings us to the question of *stewardship vs. abandonment*.

**Stewardship** is defined as “*the conducting, supervising, or managing of something; especially: the careful and responsible management of something entrusted to one’s care.*”<sup>13</sup>

**Abandonment** is defined as “*giving up to the control and influence of another person or agent.*”<sup>14</sup>

While it is true that the DGR concept includes, once emplacement activities are complete (taking the better part of a century), the decommissioning of surface facilities and eventual abandonment of the site, this does not imply that stewardship of the used nuclear fuel ends.

On the contrary, the used nuclear fuel will continue to receive the careful and responsible management of the DGR concept for millennia afterwards, developed by thousands of international experts to whom this was entrusted, over two centuries of inquiry (by the time the first DGRs receive final closure).

<sup>9</sup> G. Edwards, *Nuclear Waste: Abandonment versus Rolling Stewardship*, [http://www.ccnr.org/Rolling\\_Stewardship.pdf](http://www.ccnr.org/Rolling_Stewardship.pdf).

<sup>10</sup> See, for example, G. De Marsily (Ed.), *Predictive Geology: With Emphasis on Nuclear-Waste Disposal*, Pergamon Press (2013).

<sup>11</sup> NWMO, *Selecting APM: A Three-Year Study*, <https://www.nwmo.ca/en/Canadas-Plan/Selecting-APM-A-Three-Year-Study>.

<sup>12</sup> NWMO, *About Adaptive Phased Management*, <https://www.nwmo.ca/en/Canadas-Plan/About-Adaptive-Phased-Management-APM>.

<sup>13</sup> <https://www.merriam-webster.com/dictionary/stewardship>.

<sup>14</sup> <https://www.merriam-webster.com/dictionary/abandon>.

The used nuclear fuel will be safe from hurricanes, tornadoes, wars, terrorism, earthquakes, and yes – glaciers. It will most likely be (unless society takes major new steps in this direction) the only waste form on the planet with this level of long-term security, and the only waste form not found in glacial till throughout the continent by civilizations recolonizing the former ice sheet zones in the next interglacial period.

On this time scale, the term “stewardship” clearly has a much broader implication than temporary storage under the watchful eyes of humans. It implies sustainable, long-term protection against forces that will exist long after humans are gone. It implies a sound, conservative, scientific approach that minimizes uncertainties and relies on passive, natural processes (because the level of certainty regarding loss of institutional control on this time scale is 100%).

This is, in fact, *geological stewardship*.

The recognition that we are morally obligated to pursue a long-term solution for used nuclear fuel today, rather than bequeathing this responsibility to future generations, is an important one, but of course is not limited to used nuclear fuel. It applies to everything we do on this planet, including all forms of waste production. It just may be, however, that nuclear waste is the only form of industrial waste for which this responsibility is being acted upon to any significant degree.

To ignore this moral obligation today, while the solution is in our grasp, is abandonment. This brings us to the critical observation:

**Rolling stewardship represents *abandonment* of our long-term  
responsibility for managing used nuclear fuel,  
while geological repositories represent long-term *stewardship*.**

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*Dr. Jeremy Whitlock has over 27 years' experience as a scientist and manager in the Canadian and international nuclear community. Since January 2017 he has worked in the Department of Safeguards at the International Atomic Energy Agency (IAEA) in Vienna, helping to ensure that countries meet their obligations under the Nuclear Non-proliferation Treaty (NPT). Prior to that he worked at Atomic Energy of Canada Ltd. (AECL) in Mississauga and Chalk River, in reactor physics and from 2006-2016 as Manager of Non-proliferation and Safeguards (since 2015 Chalk River has been operated by Canadian Nuclear Laboratories).*

*Dr. Whitlock received a BSc in physics from the University of Waterloo (1988), and an MEng and PhD in nuclear engineering from McMaster University (1995).*

*Dr. Whitlock is a Past President and Fellow of the Canadian Nuclear Society ([www.cns.ca](http://www.cns.ca)). He is also a public speaker and author on nuclear issues, including a The Canadian Nuclear FAQ ([www.nuclearfaq.ca](http://www.nuclearfaq.ca)), a website of frequently-asked questions (FAQs) on Canadian nuclear technology.*

*Dr. Whitlock lives in Vienna, Austria, and feels that canoes are the closest humans have come to inventing a perfect machine.*

March 2022  
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**NWMO (Ignace) Engagement Activities Report**

**For the period:** February 10, 2022 to March 9, 2022  
**Prepared For:** Ignace Community Nuclear Liaison Committee  
Meeting of March 9, 2022  
**By:** Chantelle Gascon, Community Liaison Manager

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**Project Updates and Engagement**

February 23, 2022 City of Dryden Learning Series – Regional Engagement  
Ongoing Community Studies Interviews

**Youth Engagement, Youth Advisory Working Group Initiatives & EIES**

February 11, 2022 University of Manitoba CGS Student Chapter  
Geoscience/Hydrogeology Presentation  
March 1, 2022 Youth Economic, Community & Culture Community Studies  
Workshop

**Upcoming**

March 22, 2022 ICNLC Youth Gaming Night (support)  
March 23, 2022 City of Dryden Learning Series: Municipal Forum  
March 23, 2022 Ignace LMC Open Office Event (pending facility restrictions)  
March 25, 2022 ICNLC Family Movie Night (support)  
March 31, 2022 Dougall Media Career Fair  
April 11, 2022 Mobile Learn More Centre arrival