Durham Nuclear Health Committee (DNHC)

Friday, April 25, 2025
1:00 p.m.
Virtual

Please note: All members of the public may view the Durham Nuclear Health Committee Meetings via live streaming at https://www.durham.video/.
All information and materials sent to Durham Regional Committees will become part of the permanent public record. This includes presentations and oral submissions made during meetings. A video recording of the meeting will be posted on our Regional website. If you have any questions about the collection of information, please contact dnhc@durham.ca.

1. Adoption of Agenda

2. Adoption of Minutes

   2.1 Durham Nuclear Health Committee meeting - February 7, 2025

3. Correspondence

   3.1 Darlington Nuclear Generating Station (DNGS) and Pickering Nuclear Generating Station (PNGS) Community Advisory Council (CAC)

   Agenda and minutes from the joint PNGS/DNGS CAC meeting of December 3, 2024 were emailed to DNHC members on March 10, 2025.

   3.2 Update on the Darlington New Nuclear Project (DNNP)

   The updates were emailed to DNHC members on March 3, 2025. Updates included January's Licence to Construct (LTC) regulatory hearing, recent site progress and a look back at the important progress made in the last 12 months.

   For questions about the project, contact the project phone line (1-800-461-0034), email or by having a conversation at our public information centre (1855 Energy Drive, Courtice, open Monday-Friday 9 a.m. – 3:30 p.m.).

3.3 Whitby resident inquiry regarding OPG application to amend the Pickering Waste Management Facility (WMF) Operating Licence to construct and operate the Pickering Component Storage Structure

Resident is requesting OPG provide a plain language explanation of this project, the anticipated doses, the shielding system, the anticipated lifespan of the structure, how long "interim" storage is in years and exactly where this material is expected to end up for final disposal. This inquiry was forwarded to OPG for a response.

OPG has directed the resident to their presentation for the April 19, 2024 DNHC meeting, which starts on pg 24. There is also additional information provided in the video recording of the meeting and on opg.com and the CNSC website.

Additional content on the Pickering WMF licence amendment will be included in their presentation for this meeting.

3.4 Nuclear Waste Management Organization (NWMO) 2024 Annual Report and 2025-29 Implementation Plan

2024 Annual Report available at NWMO-Annual-report-2024.ashx.

2025-29 Implementation Plan available at Implementation-plan-2025-29.ashx.

Share your thoughts on the Implementation Plan by completing their survey by June 6, 2025.

3.5 Committee member follow-up questions and comments received after the February 7, 2025 meeting

- Regarding the KI tablet presentation, a suggestion was received to promote the information on our local Roger's TV station DRPS segment; this suggestion was forwarded to Paulo Correia, Manager, Health Protection Division, Durham Region Health Department. It was received with thanks and will be considered for a future campaign.

- Regarding the Durham Emergency Management (DEM) nuclear emergency preparedness program presentation, 2 questions were received: Do they have an RTO (Recovery Time Objective) for the recovery process during offsite centre testing? Are the OPG emergency management plans and processes aligned with DEM plans? Mary LaChapelle, Acting Deputy Director, DEM, responded "During the offsite testing, the recovery time objective will be based on the direction received from the Provincial Emergency Operations Center/Province. All stakeholders prepare, plan, respond and exercise in a coordinated effort aligning our plans and processes."

4. Presentations

4.1 Canada's Plan for the Management of Used Nuclear Fuel: Confidence in Safety

Andrew Parmenter, Director, Geoscience, NWMO

4.2 Progress Report by OPG's Nuclear Sustainability Services Division concerning its handling and management of radioactive materials and waste

Presented by Heather Rambukkana, Director Operations and Maintenance – Nuclear Sustainability Services Eastern, OPG

4.3 Update from Ontario Tech University (OTU), Nuclear Engineering program

Presented by Dr. Kirk Atkinson, Director, Centre for Small Modular Reactors, Associate Professor & Industrial Research Chair, Department of Energy & Nuclear Engineering, Faculty of Engineering & Applied Science, OTU

5. Community Updates from OPG

Presented by Lindsay Hamilton, Senior Manager, Corporate Relations and Projects, Corporate Affairs, OPG

6. Other Business

6.1 Dates for the remaining 2025 DNHC meetings are as follows:

- June 20, 2025 1:00 pm
- September 26, 2025 1:00 pm
- November 28, 2025 1:00 pm

Meetings will continue to be held virtually via the TEAMS platform and available for the general public to observe via livestream at https://www.durham.video/.

6.2 DNHC Terms of Reference

A revised Terms of Reference has been posted on our webpage.

7. Next Meeting

June 20, 2025

1:00 pm

VIRTUAL

8. Adjournment

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Canada's Plan for the Management of Used Nuclear Fuel: Confidence in Safety

Presented by:
Andy Parmenter
Director, Geoscience

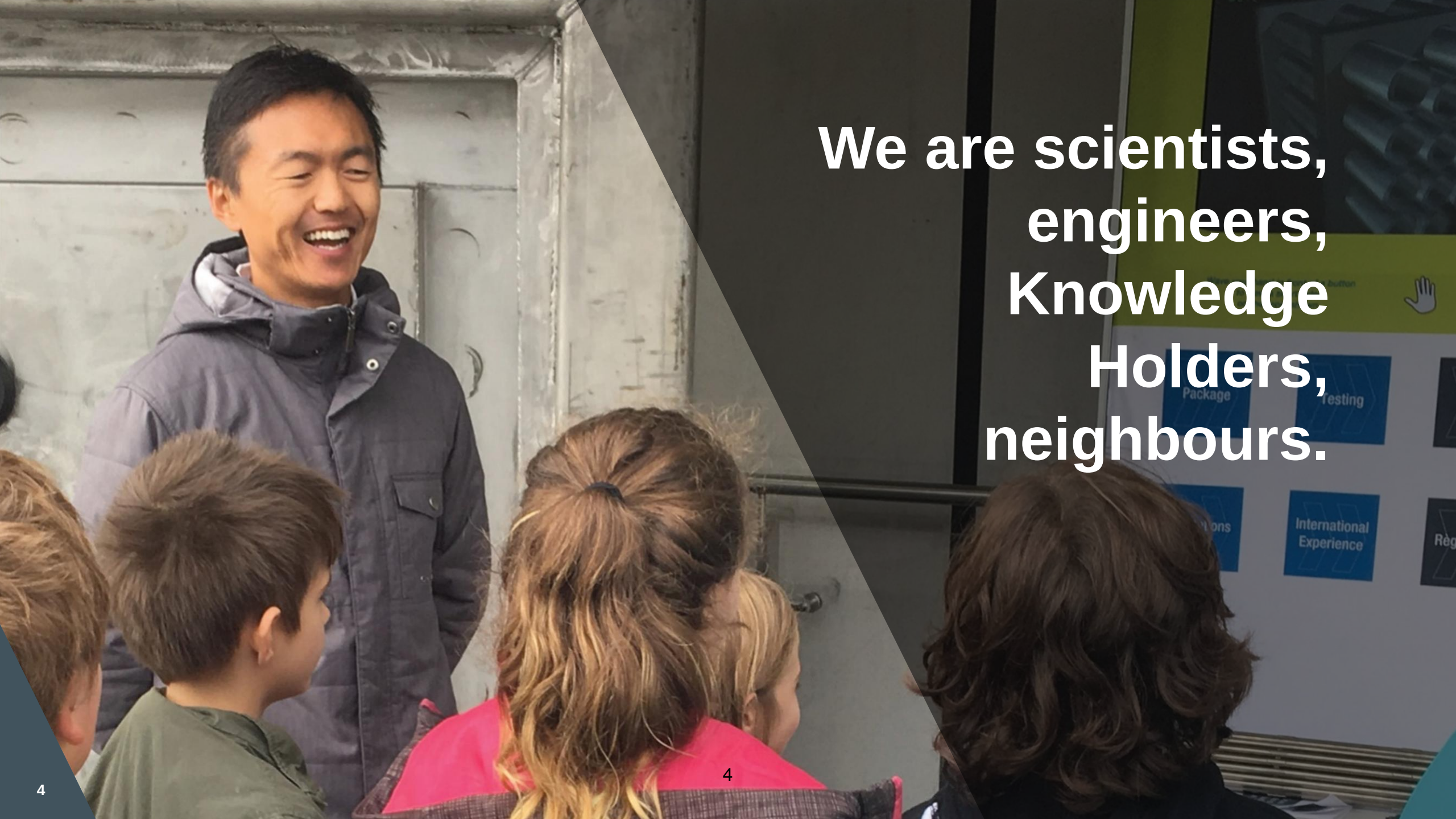
nwmo

NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Land acknowledgment

We are the Nuclear Waste Management Organization.

3



We are scientists, engineers, Knowledge Holders, neighbours.

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Wabigoon Lake Ojibway Nation and the Township of Ignace

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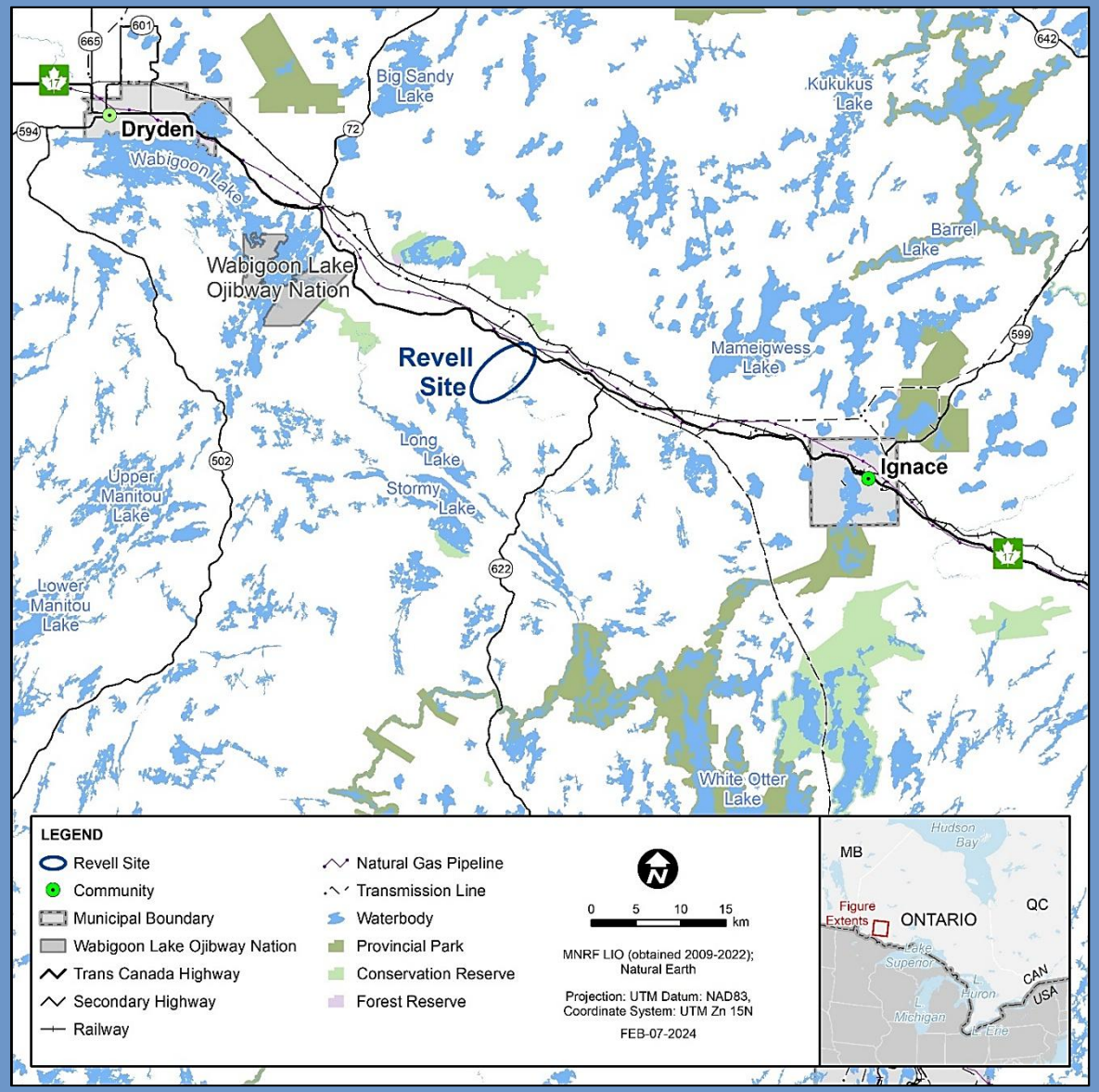
Confidence in Safety at the Revell Site



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Elements of confidence in safety

1. Favourable geological setting
2. Stability of geological setting
3. Low risk of future human intrusion into the repository
4. Site is amenable to geological characterization
5. Robust multiple barrier system
6. Ability to safely construct and operate the repository
7. Able to safely transport fuel to the site
8. Facility performance will meet regulatory criteria

7

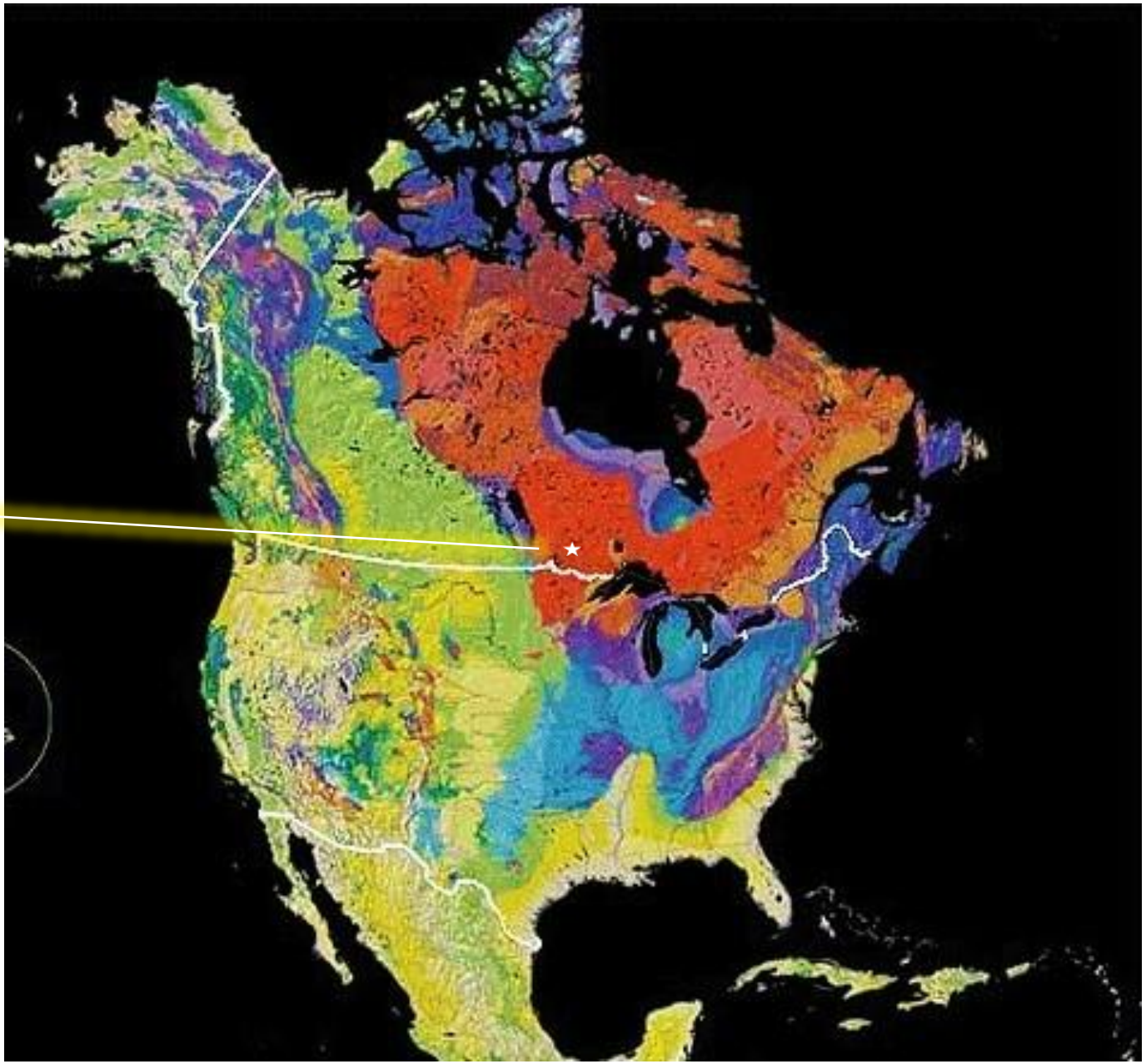
Favourable Setting

The rock is old and stable.

Northwestern Ontario is within the Canadian Shield, the oldest rock in North America at 1 to 4 billion years old

We already know that these rocks can be suitable for a repository.

Pinawa, Manitoba – Canadian Shield. Studied by AECL as an Underground Research Lab



Age of bedrock, from youngest to oldest, is indicated by color: yellow, green, blue, red.
Image: The National Atlas of the United States of America

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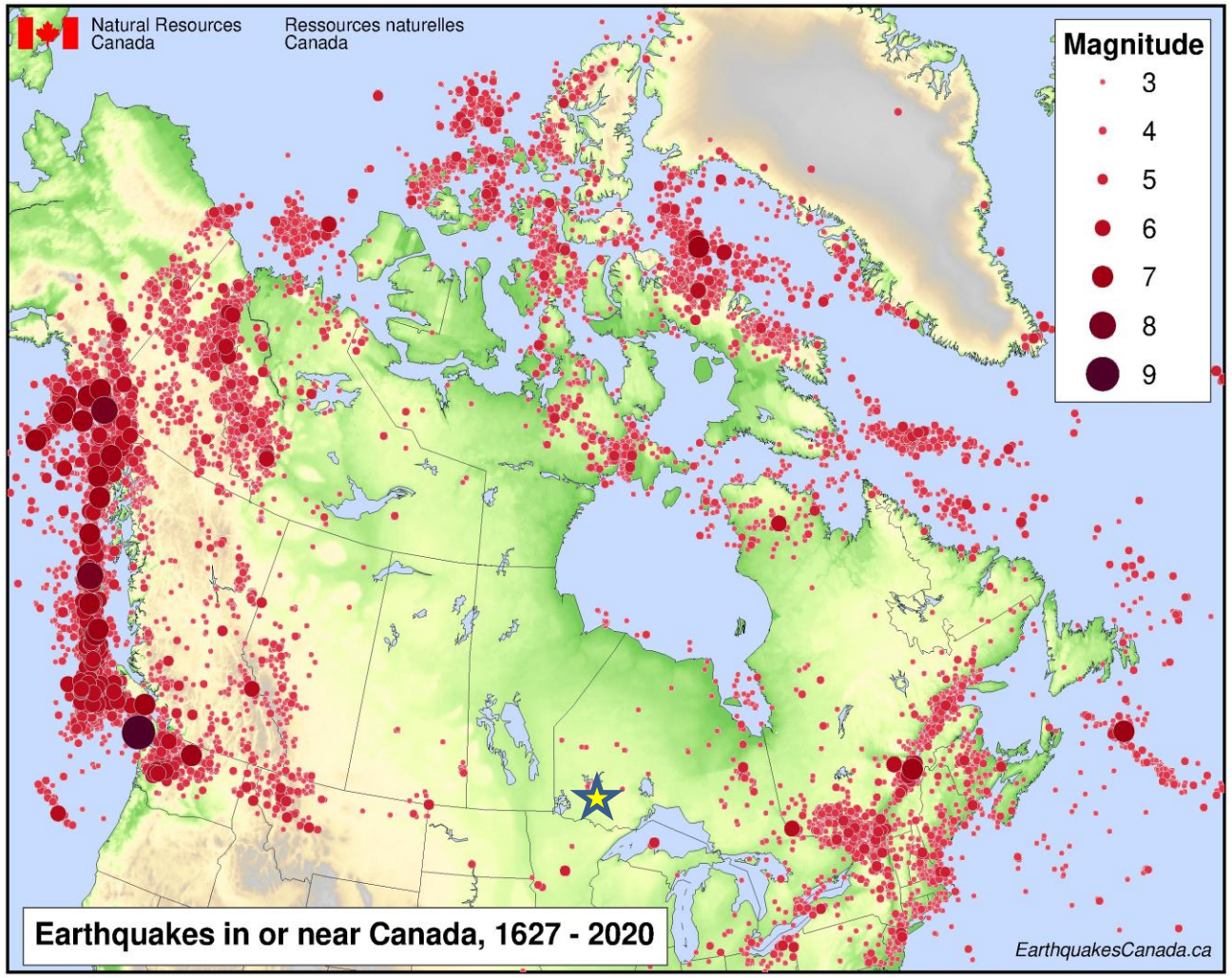
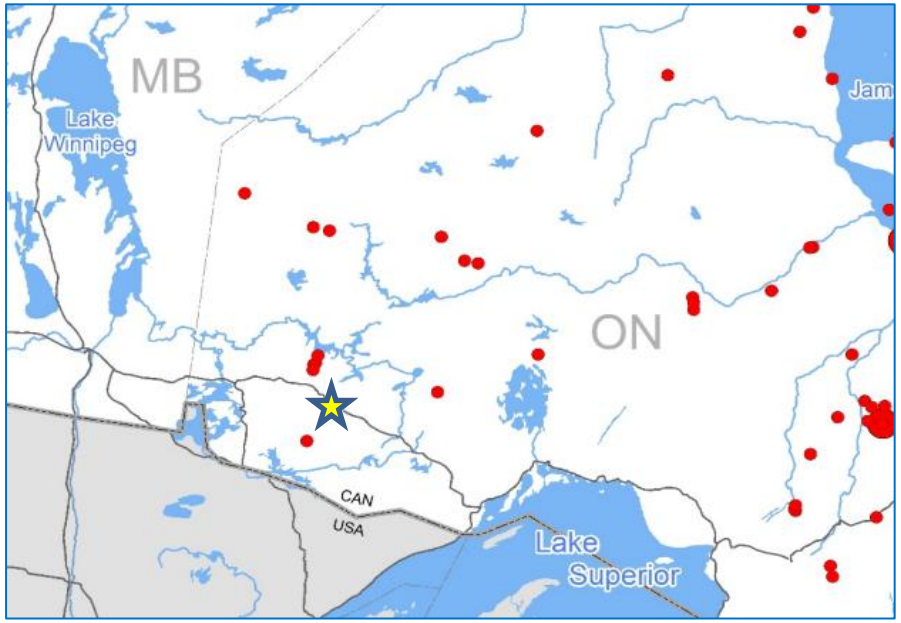
Seismically Stable





Magnitude 3+ earthquakes recorded since 1985 near the Revell Site

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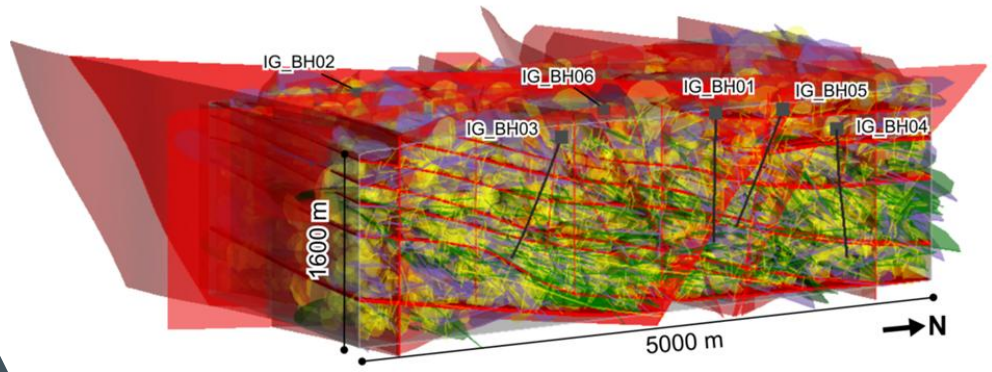
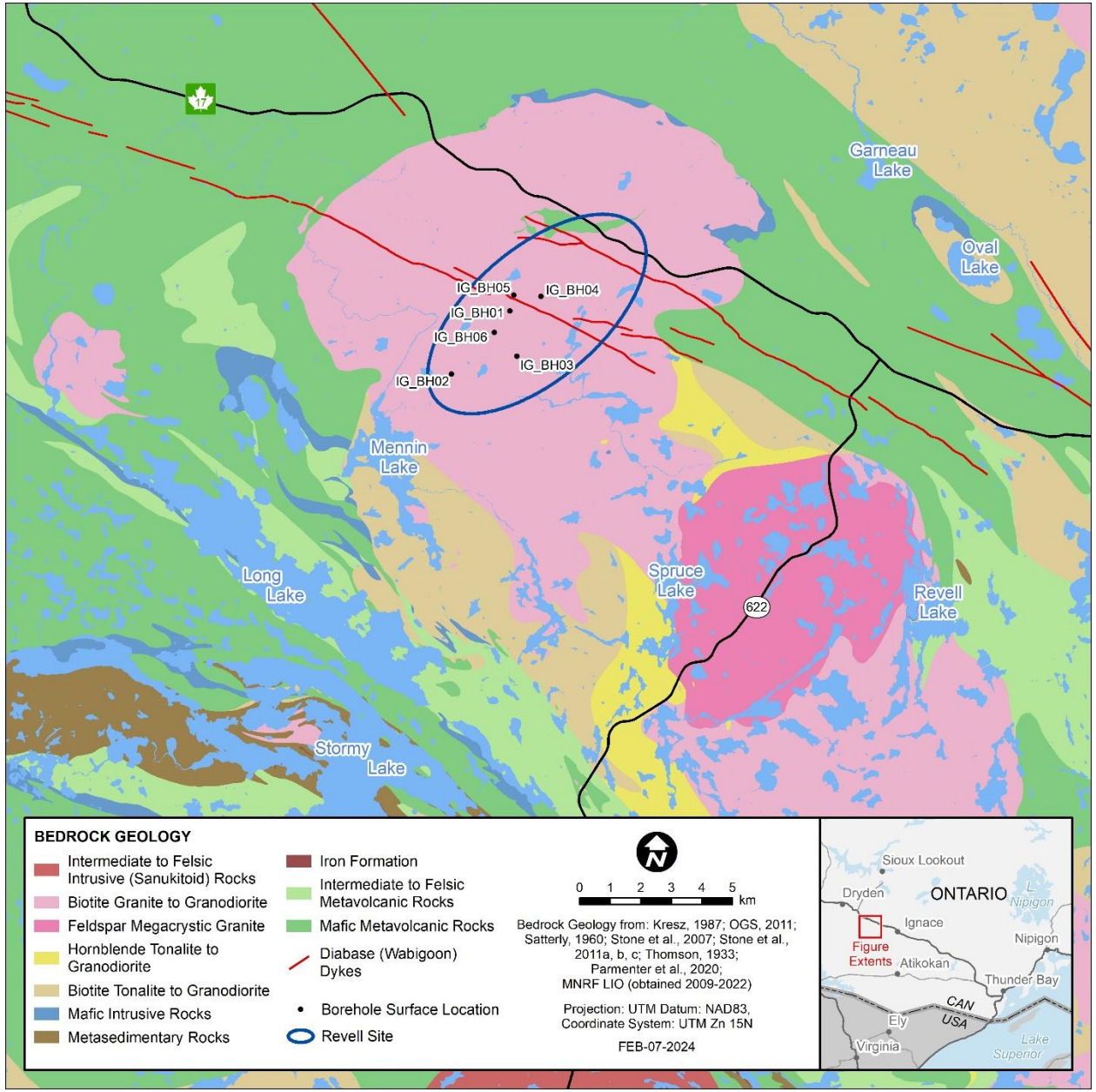
Revell batholith bedrock geology





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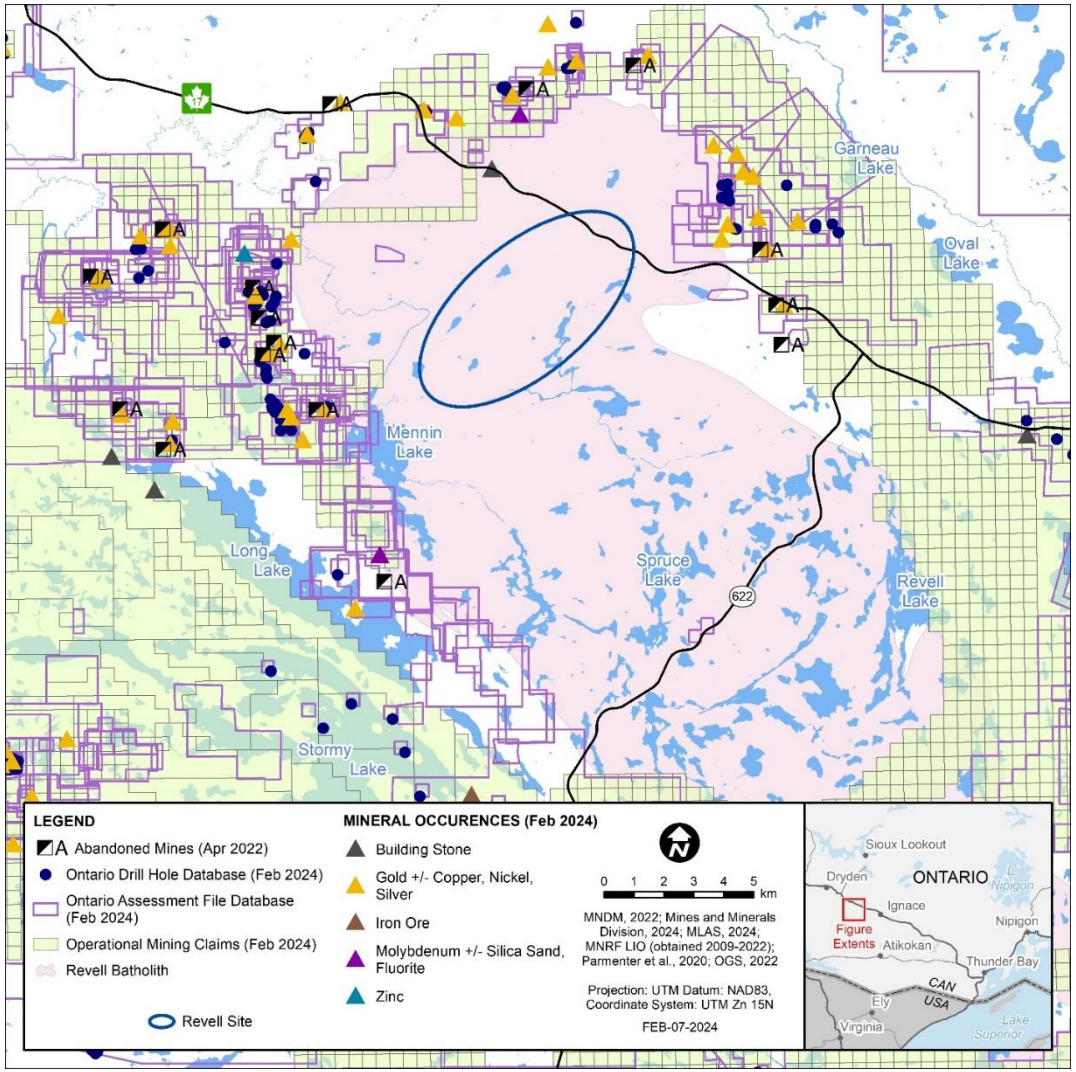
Natural Resources Potential

- Petroleum and coal resources are not encountered in these types of rocks.
- Borehole drilling results are consistent with expected lack of mineral resource potential
- Deep waters are limited in volume, saline, and not attractive for potable water supply



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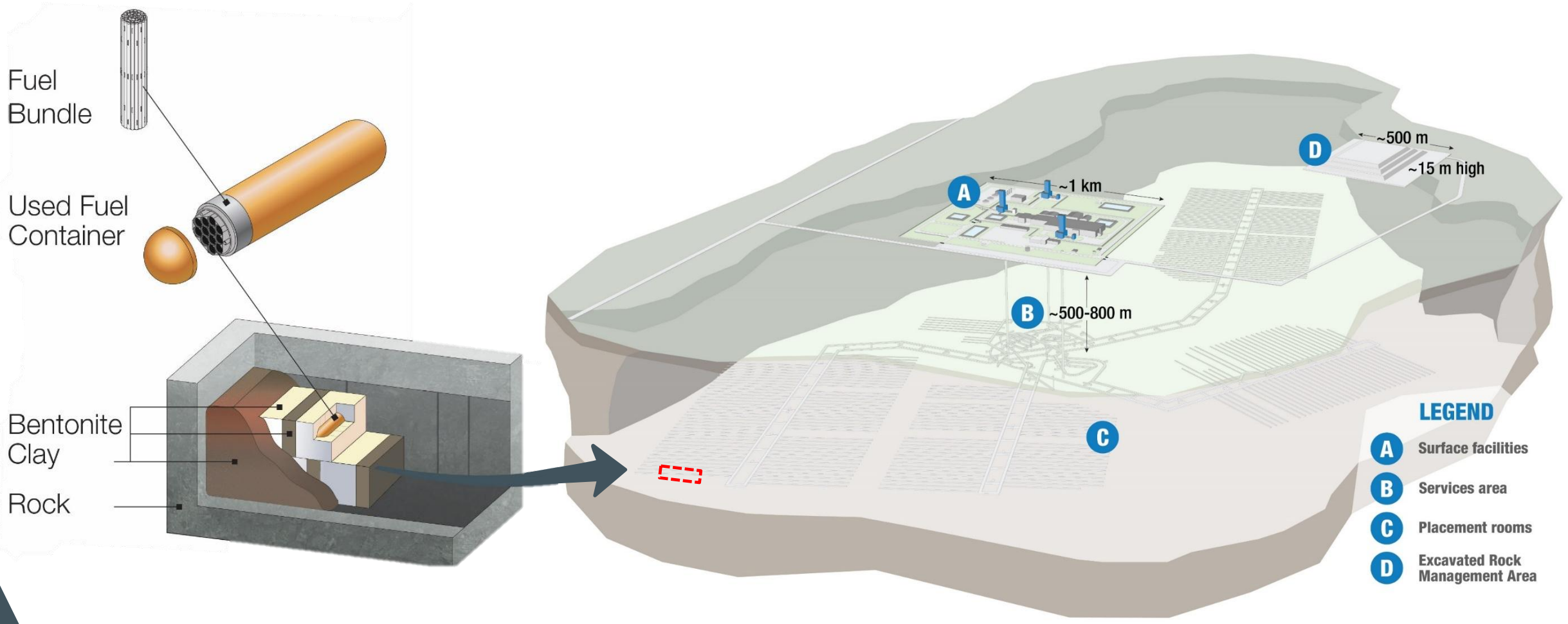
The NWMO's Deep Geological Repository: A multiple-barrier system



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Engineering Proof Testing

Fabrication, inspection, testing

Handling and emplacement

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Used nuclear fuel transportation

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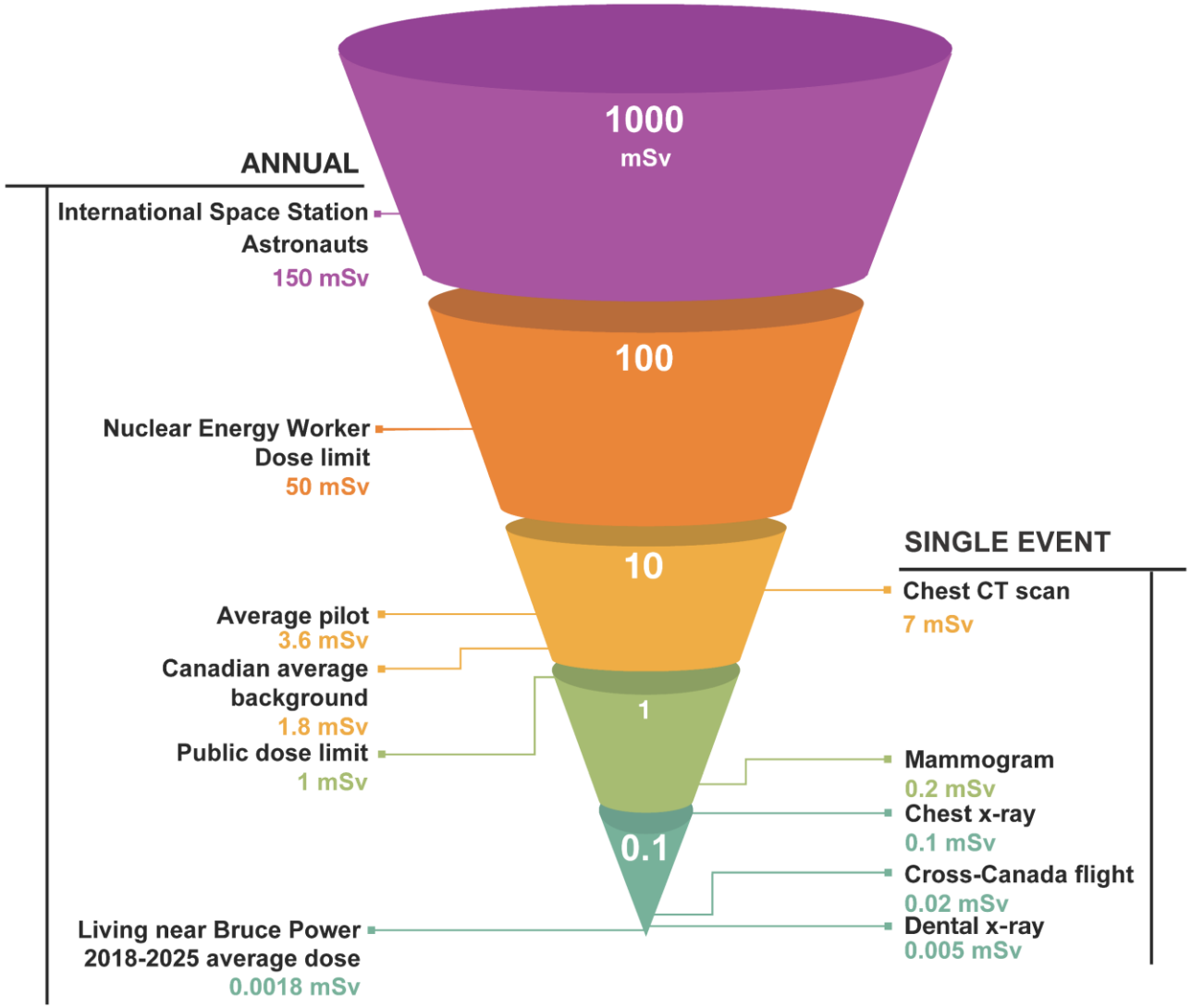
Preliminary Safety Assessment – Dose



- Typical dose rates for various activities or causes
- Pre-closure dose consequences for normal operations estimated to be similar to living near Bruce Power
- Post-closure doses estimated to be even lower
- In all cases, dose limits are met by large margins.

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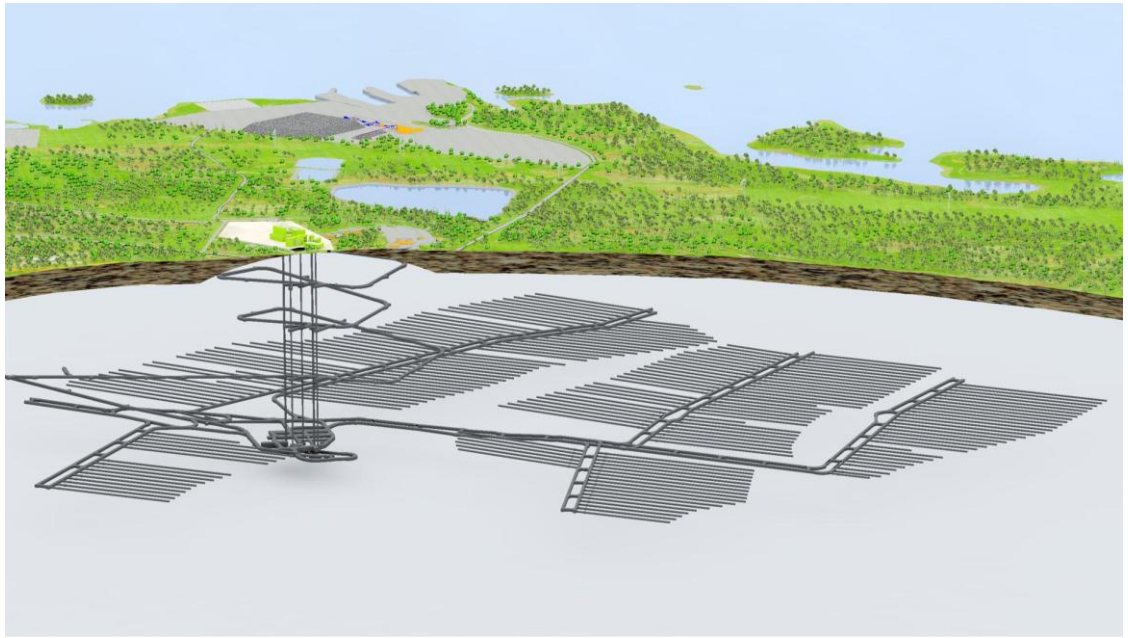
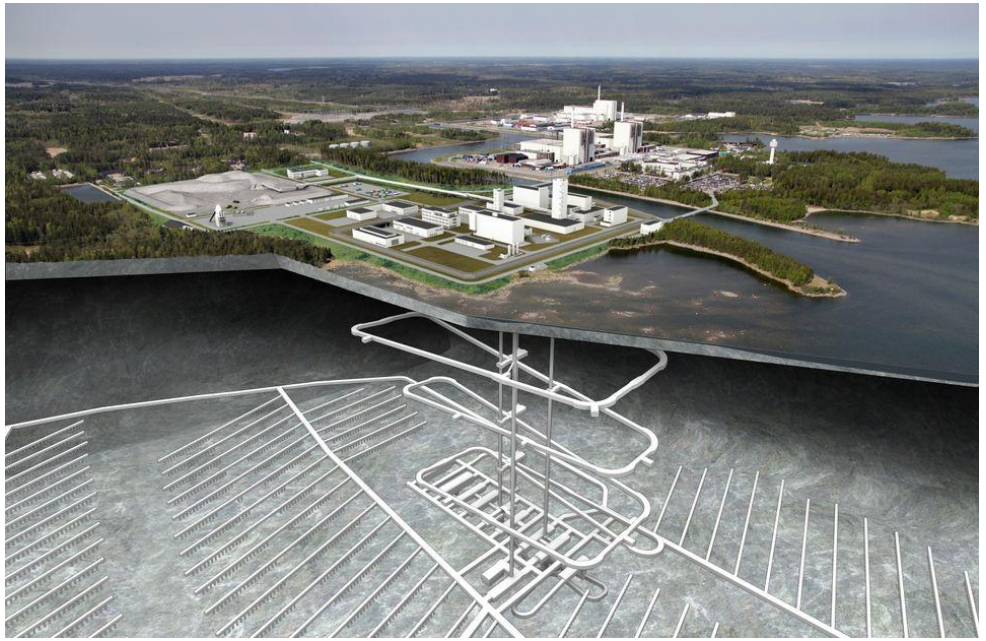
Facility Performance – Crystalline Rock

Northwestern Ontario crystalline rock setting is broadly similar to those selected in Finland and Sweden for a used fuel repository.



Proposed Finnish facility (Source: Posiva)



Proposed Swedish facility (Source: SKB)

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Summary

Overall, based on the assessment results to date, the NWMO is confident that a deep geological repository could be constructed at the candidate site in a manner that would provide safe long-term management for Canada's used nuclear fuel.

We are continuing to improve and extend our understanding, and therefore confidence, to support the regulatory process.

Confidence in Safety reports are available at www.nwmo.ca/reports or https://www.nwmo.ca/en/A-safe-approach

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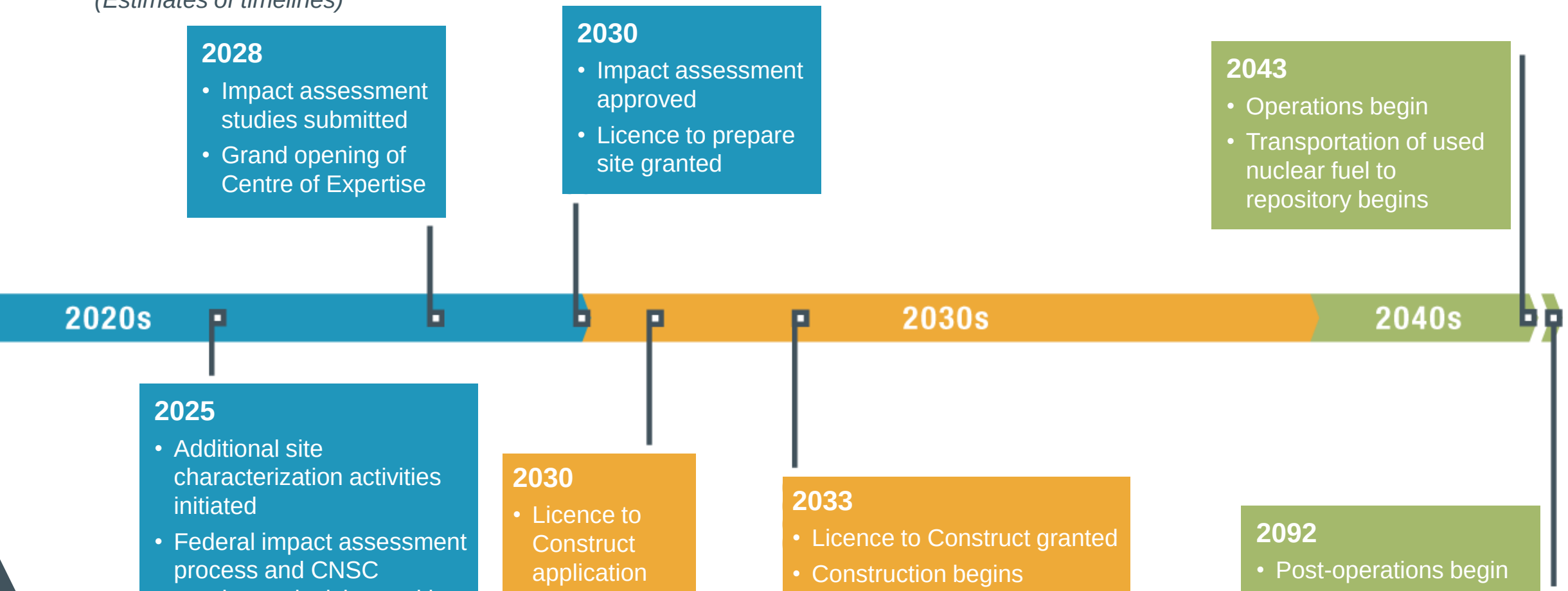
What's next?

(Estimates of timelines)



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Integrated Strategy for Radioactive Waste (ISRW)

In October 2023, NRCan endorsed the ISRW which included the following recommendation, representing new work for the NWMO:

> **Intermediate-level waste and non-fuel high-level waste** to be disposed of in a **deep geological repository** with implementation by the **NWMO.**

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Thank you.

@nwmocanada / @LaSGDN

/company/nwmocanada

www.nwmo.ca

nwmo

Durham Nuclear Health Committee

April 25, 2025 • Heather Rambukkana, Director, Eastern Operations & Maintenance

Nuclear Sustainability Division

A cleaner, more sustainable future.

Ontario is undertaking an energy transformation. One that will help decarbonize the economy and create a brighter future in the province. The foundation of this transformation will be the nuclear industry.

All waste in our care falls under three categories of action.

Preventing

We prevent waste before it is created.

OPG's NS division takes many actions to reduce the amount of total waste we produce.

Within every level of waste we manage we are successfully finding solutions to ensure we prevent waste from being created.

Managing

We manage the waste in our care.

All of the waste generated by nuclear power must be effectively managed for the long term.

This action - Managing Waste - speaks to our long-term stewardship and commitment to safety. While abiding by federal and international regulations we ensure not even an ounce of waste is left unmanaged.

Harnessing

We harness waste and by-products to make nuclear power useful beyond just generation.

Here we find the most innovative and directly beneficial of our actions. The nuclear industry has made massive leaps in creating a more circular economy. We harness the power of our reactors to produce isotopes, making them useful beyond just generating electricity.

Nuclear Sustainability Services

Since 1974, caring for the waste from Ontario's 20 CANDU Reactors

Western Waste Management Facility

- WWMF In service 1974
- Licensed to 2027
- L&ILW from all stations
- Bruce Power used fuel

Darlington Waste Management Facility

- DWMF In service 2005
- Licensed to 2033
- Darlington used fuel
- ILW from Refurbishment

Pickering Waste Management Facility

- PWMF In service 1994
- Licensed to 2028
- Pickering used fuel
- ILW from Pickering re-tube

What We Do

- NSS leverages more than 5 decades of operational experience and expertise to minimize and store nuclear waste and by-products and plan for their permanent disposal.
- Only North American utility to handle all levels of waste, and own its own transportation fleet, incinerator & compactor.

Low-Level Waste




Sort and Segregate

Recycle and Free Release (Clean) → Future Disposal NSDF - OPG

Process (Reduce Volumes) → Interim Storage

Intermediate-Level Waste
Resins, filters, reactor components

Future Disposal DGR - NWMO

Used Fuel
Spent uranium fuel bundles

Wet Storage

Dry Storage

Future Disposal DGR - NWMO

OPG

Nuclear Sustainability Services – Pickering Waste Management Facility (NSS-PWMF)

Operations

- In 2024 Used Fuel from Pickering Nuclear Generating Station (PNGS) continued to be removed from the station and stored safely and on time.
- In 2024, Pickering loaded 80 Dry Storage Containers (DSCs), hitting our 2024 target of 80.
- Current 10-year operating licence to 2028.
- WMF performance reports available on opg.com.

Dry Storage Containers loaded and transferred in 2024

Nuclear Sustainability Services – Darlington Waste Management Facility (NSS-DWMF)

Operations

- In 2024, Used Fuel from Darlington Nuclear Generating Station (DNGS) continued to be removed from the station, and stored safely and on time.
- In 2024, DWMF loaded 57 DSCs, hitting the target of 57.
- The Retube Waste Storage Building provides on-site storage in support of Darlington Refurbishment.
- Current 10-year operating licence to 2033.
- WMF performance reports available on opg.com.

Dry Storage Containers loaded and transferred in 2024

Safety

Nuclear Safety

- Public and employee safety remains OPG's top priority.
- Safety Analysis demonstrates that public and worker dose remains within CNSC regulatory limits during normal operations, and within Safety Report acceptance criteria due to credible accidents and malfunctions.
- OPG's exemplary record of public and employee safety is supported by the Waste Management Facility Safety Report summary, available on Reporting > Regulatory reporting - OPG

Radiation Safety

Radiation Protection has four key objectives:

- Keeping individual doses below regulatory limits.
- Preventing unplanned exposures.
- Maintaining individual risk from lifetime radiation exposure at an acceptable level.
- Ensuring collective doses are As Low As Reasonably Achievable (ALARA).

Approved: Loading 6-Year Cooled Fuel into DSCs at NSS-PWMF

- OPG submitted a request to CNSC in June 2023 to amend the Waste Facility Operating Licence (WFOL) at NSS- PWMF to allow for the storage of minimum 6-year cooled fuel to support PNGS Units 5-8 Refurbishment defueling activities.
- PWMF successfully commissioned 2 DSCs with 6-Year Fuel in 2024 to support this initiative.
- CNSC has provided written acceptance allowing OPG to proceed with processing and storing at the PWMF a maximum of 100 DSCs (at a time) containing a minimum of six-year used fuel.

Storage Building 5

- An additional storage building is required accommodate the interim storage of used-fuel.
- OPG's existing Waste Management Facility Operating Licence allows for six storage buildings on site.
- Pending regulatory approvals, NWMO's used-fuel DGR has an in-service date of mid-2040s.

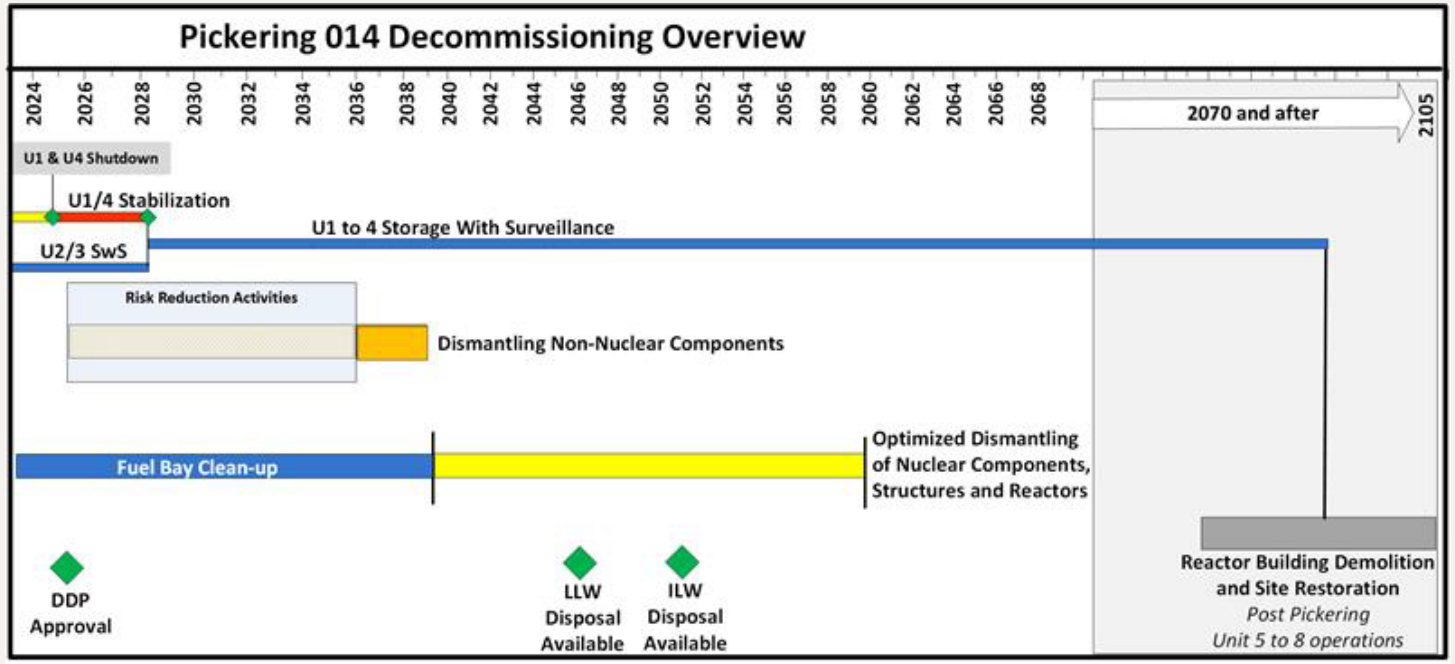
Pickering Component Storage Structure (PCSS)

- To support the refurbishment of Pickering NGS Units 5-8, additional onsite interim storage space for removed L&ILW reactor components is required.
- A Letter of Intent to construct the PCSS was submitted to the CNSC on February 1, 2024.
- Licence amendment submission documents posted to CNSC website
- Intervention deadline May 6; written hearing July 2025

Decommissioning PN Units 1-4

Since 1971, PNGS has played an important role in Ontario's energy mix.

Pickering Units 1-4 Decommissioning Strategy



Stabilization: Once systems are shutdown, they are placed in a safe state until their removal. This involves draining and isolating systems and removing hazardous materials.

Detailed Decommissioning Plan (DDP): Prior to decommissioning, a DDP is developed. It refines and adds detail to the preliminary decommissioning plan. This plan is updated every 5 years at minimum, or as required. The first DDP, submitted to the CNSC in Dec 2024, will be for 2028-2033; and next 2033-2038, etc.

Storage with Surveillance: The long-term control and monitoring of the station before dismantling. Our SWS plan includes rigorous safety protocols, regular inspections, and maintenance activities to ensure the facility remains secure. This phase also gives us time to further plan and prepare for full dismantling. Risk reduction activities are expected to occur during this time to remove any liabilities before full dismantling.

Dismantlement & Site Restoration: Full scale removal and handling of waste from systems, components and structures. There is a mix of conventional/ non-radioactive waste and radioactive waste. Once dismantlement is complete, the site will transition to Site Restoration.

Unlocking *the promise of tomorrow*

- **OPG's reactors also produce valuable Isotopes:**
- **Tritium,** used in the production of self-powered lights, medical research, and nuclear fusion development
- Laurentis is also helping to **extract high-purity Helium-3 (He-3)**, a rare isotope used in quantum computing, border security, and medical imaging

Thank you.

Appendix

Low-Level Waste

What is it?

LLW contains material above established clearance levels and exemption quantities.

What does it look like?

Tools, PPE, clothing, mops, rags, light bulbs, paper, plastics, sheet metal, scaffolding, rock and soil, etc.

How is it stored in the interim?

Above ground, in Low-Level Waste Storage Buildings at the WWMF.

Currently, there are 14 LLSBs at WWMF, each with a storage capacity of 7000m^3.

Annual generation / stored volumes

3,110 m^3/year (Olympic swimming pool is 2400 m^3)

97,946 m^3 in storage

Preventing

Since the beginning of reactor operations, we have reduced LLW volumes by almost 60% - by diversion at source and processing (incineration/compaction) - preventing the need for upwards of **20 storage buildings**.

OPG

Intermediate-Level Waste

What is it?

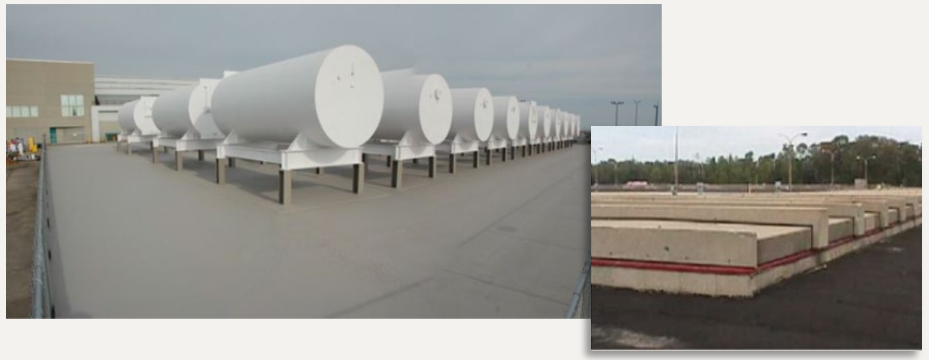
ILW contains long-lived radionuclides and requires isolation and containment for >several hundred years

What does it look like?

Ion exchange resins, ion exchange columns, filter vessels, reactor core components, heat exchangers, etc.

How is it stored in the interim?

In shielded, above-ground and in-ground containers at WWMF, DWMF and PWMF.



Annual generation / stored volumes

198 m^3/year

12,355 m^3 in storage

Preventing / Harnessing

In 2023, we launched a pilot to research technology to minimize resin waste and extract the Carbon-14. This project serves as a demonstration of reducing volumes while also harnessing valuable radioisotopes.

OPG

Used Fuel (High-Level Waste)

What is it?

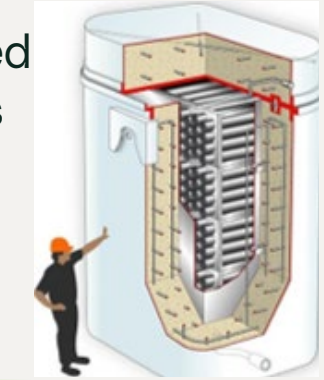
Used nuclear fuel that generates significant heat and radioactivity. Only small portion of rad waste in Canada is HLW (0.6%).

What does it look like?

Metal fuel rods that contain small ceramic pellets of enriched uranium dioxide. These pellets are similar in size to an AA battery.

How is it stored in the interim?

Used fuel bundles get loaded into Dry Storage Containers – free standing, reinforced concrete containers with carbon steel liners and a carbon steel shell.



DSCs are stored in Dry Storage Buildings at the WWMF, DWMF and PWMF.

Annual generation / stored volumes

69,000 bundles/year or 180 DSCs

2,817,690 bundles or 3,748 DSCs = **9 NHL hockey rinks (for all Canada)**

Preventing

OPG prevents HLW by specifying fueling sequences that maximize the use of each fuel bundle before it is removed by the reactor.

OPG

OntarioTech Engineering & Applied Science

Department of Energy & Nuclear Engineering

April 25, 2025

Nuclear @ Ontario Tech University – an update for DNHC

Dr. Kirk Atkinson (Associate Professor and UNENE-NSERC Associate IRC; Director, Centre For Small Modular Reactors)

Addressing the dual threats of climate change and energy security, it cannot be denied that the nuclear industry in Canada, and globally, is entering a second golden age.

With growing power needs, we must build more nuclear, tripling capacity by 2050.

This bold target, whilst achievable, not only requires new ideas; it requires a larger suitably qualified and experienced workforce.

This is where Ontario Tech fits in…

HOME / **NUCLEAR**

Nuclear energy is in our DNA.

We prepare students and industry professionals to lead the future of nuclear technology—building safe, sustainable energy systems and advancing nuclear medicine.

Together with industry, community, academic and government partners, we drive innovation to create equitable access to clean nuclear solutions for everyone.

Nuclear-related academic programs/degrees

Bachelor's

- Nuclear Engineering, BEng
- ***Health Physics & Radiation Science, BSc**
- Energy Engineering, BEng

Master's

- Nuclear Engineering, MASc
- Nuclear Engineering, MEng - Course-based option
- Nuclear Engineering, MEng - Graduate Research Project option
- Nuclear Engineering, MEng - Industrial Research Project option
- Nuclear Engineering, MEng - UNENE administered program

PhD

- Nuclear Engineering, PhD

GDips **Developed for industry**

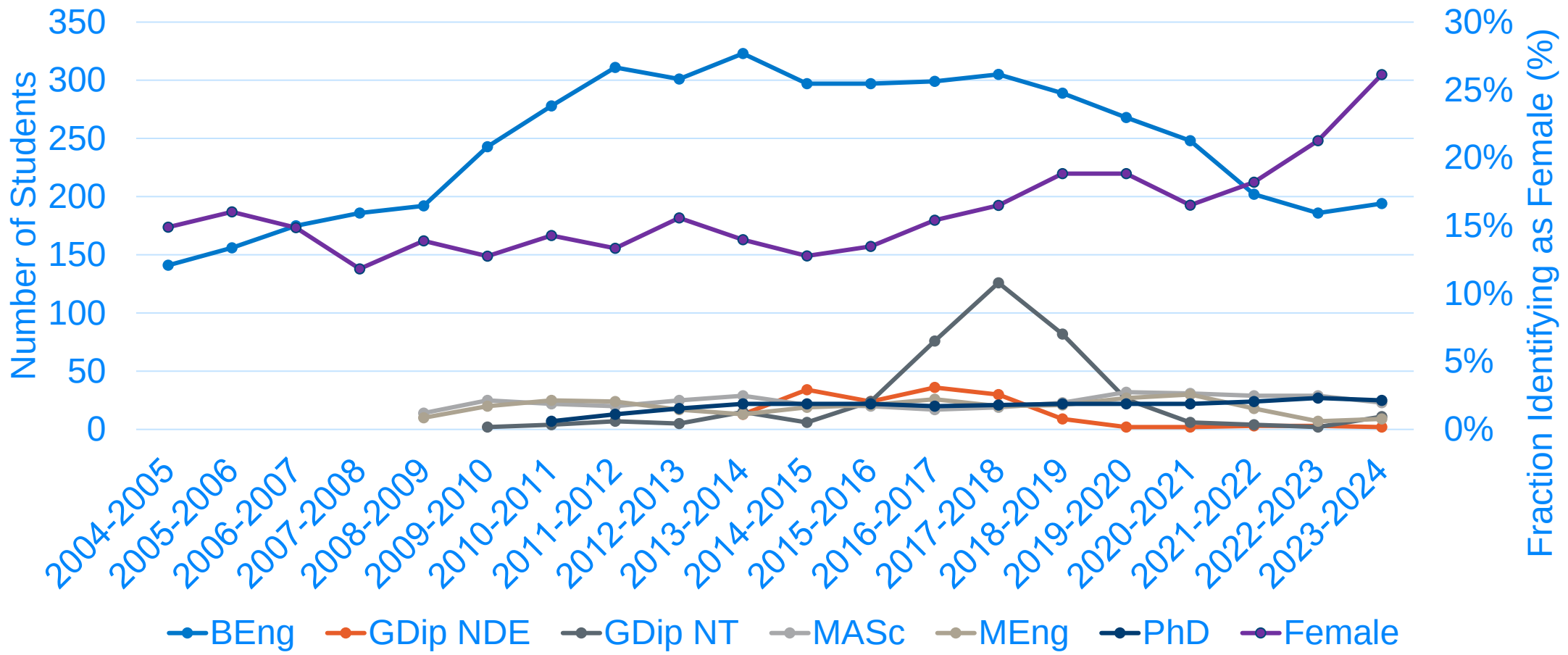
- Nuclear Design Engineering
- Nuclear Technology - Fuel, Materials and Chemistry
- Nuclear Technology - Health Physics
- Nuclear Technology - Operation and Maintenance
- Nuclear Technology - Radiological Applications
- Nuclear Technology - Reactor Systems
- Nuclear Technology - Safety, Licensing and Regulatory Affairs
- UNENE Graduate Diploma in Nuclear Engineering

*Not accepting new students at present

Nuclear enrollment is on the up

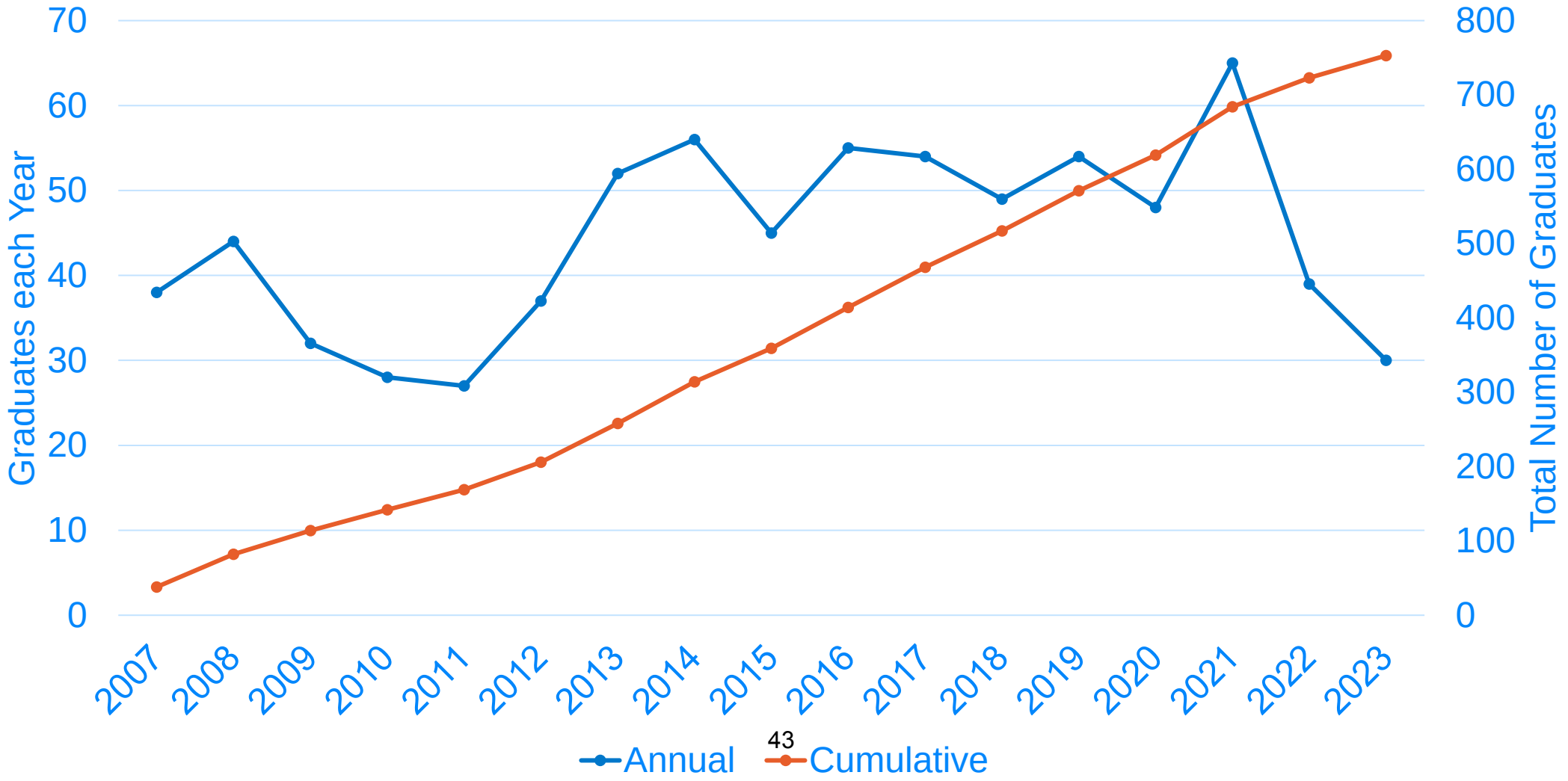
40+ started first year undergrad in Fall 2022
60+ started first year undergrad in Fall 2023
80+ started first year undergrad in Fall 2024

Fall 2025…?



BEng Nuclear Engineering grads

Top 3 largest provider of nuclear engineering undergrads in North America



New Minors available to engineering students

- Sustainability Studies (FSSH)
- Nuclear Technology
  - 2 Core Courses
    - Nuclear Engineering Fundamentals
    - Nuclear Plant Operation
  - 4 Electives, such as
    - Nuclear Power Systems
    - BWR Design and Construction
    - Nuclear Plant Safety Design
    - Nuclear Materials

New Nuclear Career Accelerator

This 12-week hybrid program is designed to upskill mid-career (minimum three-years experience) engineers and technical professionals, from inside or outside the nuclear sector, and prepare them for high-demand roles in the industry. With **tuition subsidized to only $500 per participant**, the program provides accessible, industry-aligned training that includes:

- Asynchronous learning with hands-on sessions at Ontario Tech's state-of-the-art labs.
- On completion, participants earn micro-credentials that stack towards an Ontario Tech certificate.
- Key components:
  - Nuclear Fundamentals
  - Nuclear Systems and Operations
  - Safety and Regulatory Frameworks
  - Project Management

Upskill Canada POWERED BY palette skills

Canada

AECON AtkinsRéalis BrucePower BWXT

ONTARIO POWER GENERATION Westinghouse worley

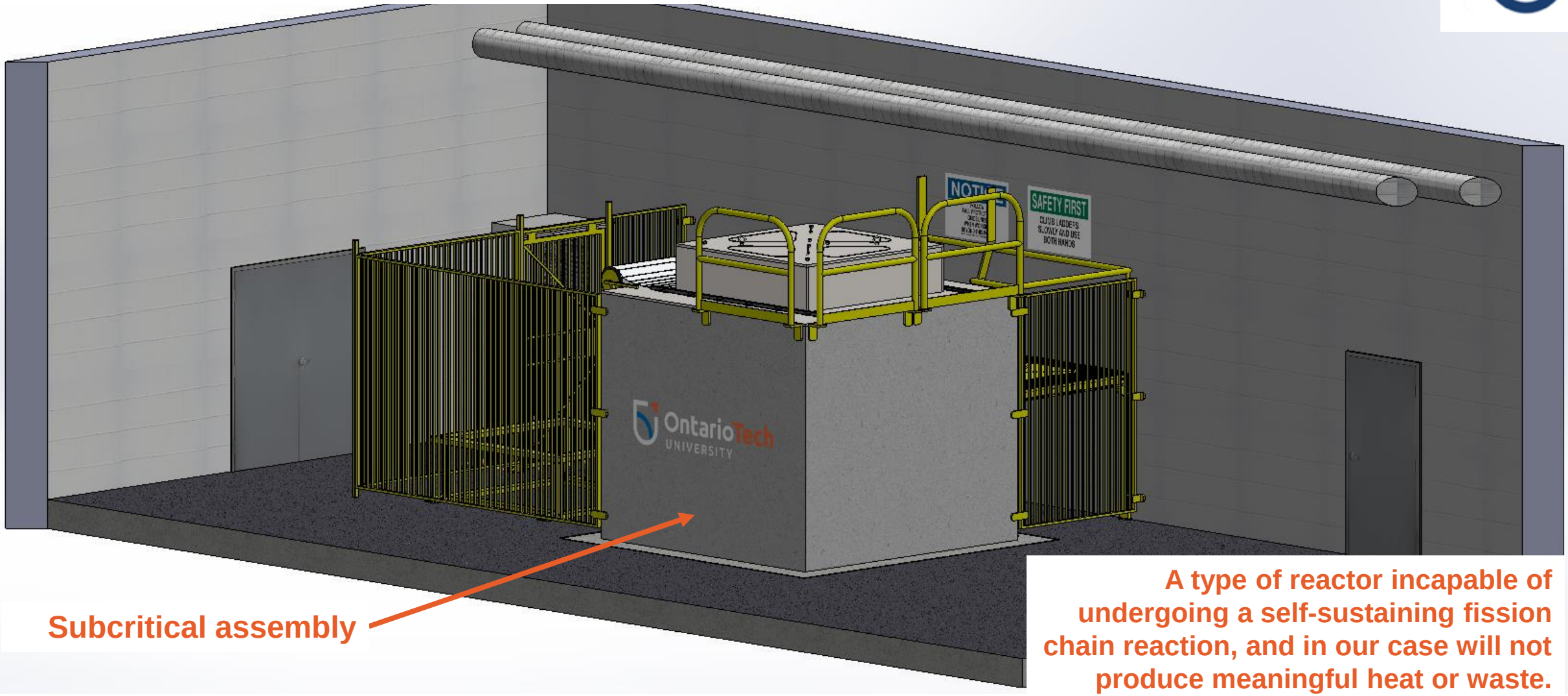
ontariotechu.ca/nca Launches September

OTU @ Canadian Nuclear Association conference, April 2025

New neutron Generator

New Nuclear Research Capabilities

Concept – Design will be finalised in Summer 2025

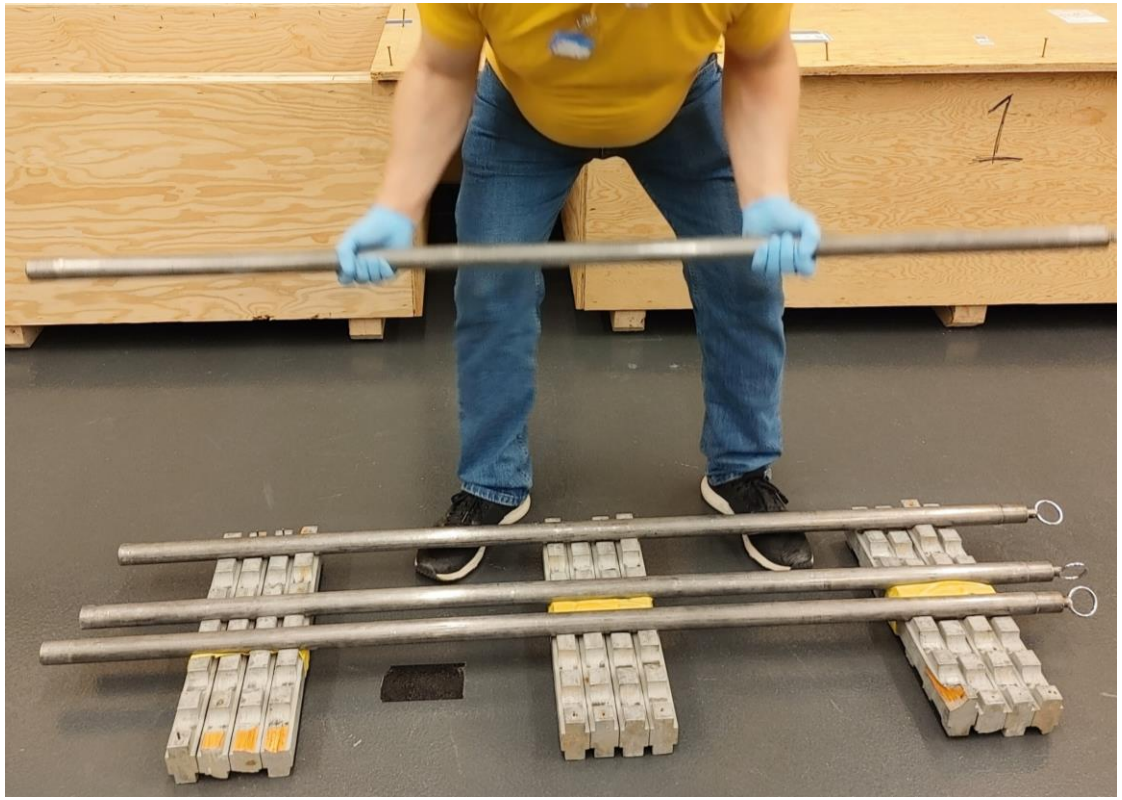


Subcritical assembly

A type of reactor incapable of undergoing a self-sustaining fission chain reaction, and in our case will not produce meaningful heat or waste.

Subcritical Assembly Project (under development)

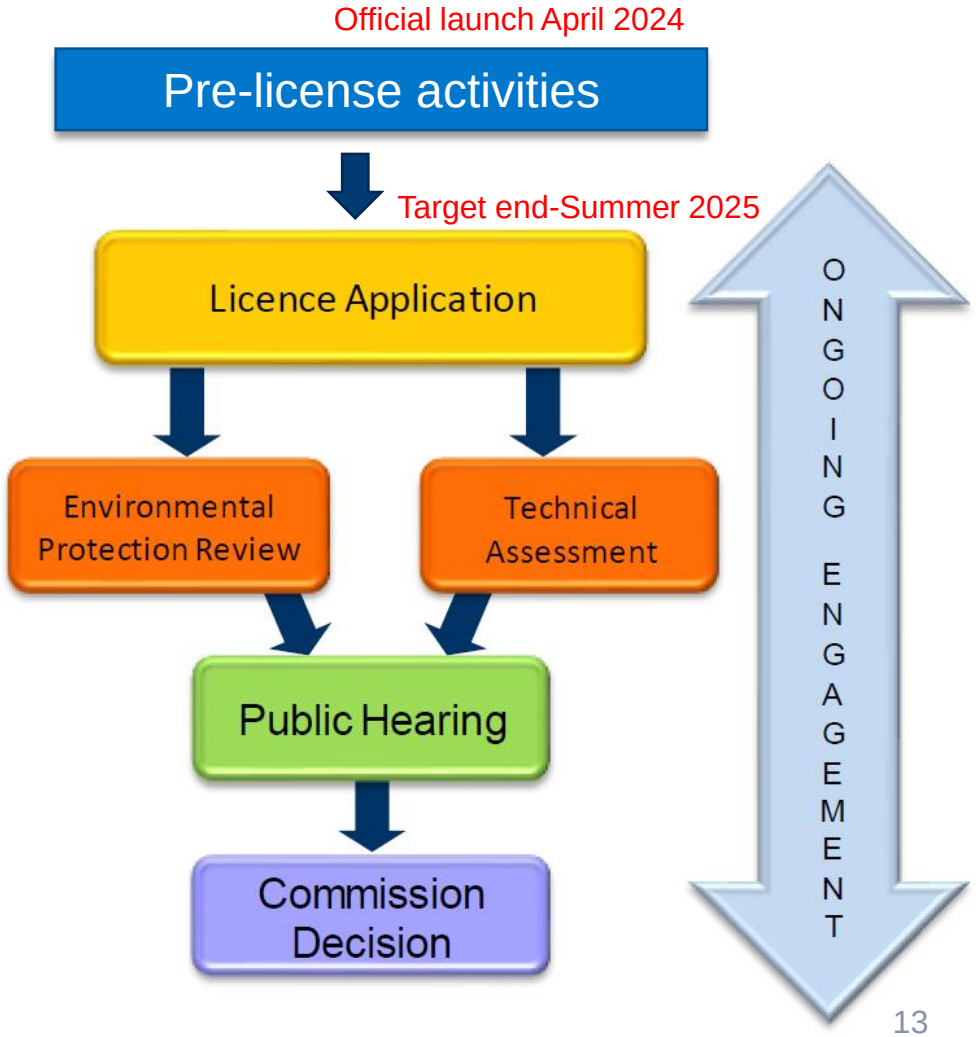
Subcritical Assembly will be unique in Canada



- Assets acquired from **AECL** and Polytechnique Montreal in 2022 with **massive (continuing) assistance from CNL**.
- **Graphite** moderator and (mostly) natural uranium fuel.

Canadian Nuclear Safety Commission licensing process

- A class 1A operating license is required from the CNSC to operate the facility.
  - In accordance with their graded approach, one license incorporating all necessary aspects of EA, preparing site, construction and operation is sought.
- **Having begun in mid-2022, engagement activities are quite mature and writing the licence application has commenced.**
- Commission will consider our application at a public hearing. The public has opportunity to participate.
- Continued participation by Indigenous representatives and the public is encouraged.



Two CNSC licences are currently held by OTU

- NSRD Consolidated Licence
  - Radioactive sources and materials (including uranium fuel)
  - Cat 2 cabinet irradiator
- Class II Licence
  - Irradiation facility containing a neutron generator

- The university operates a robust Radiation Safety Program and is subject to regular CNSC and IAEA inspections to ensure compliance.
  - All inspections passed.

- The university cooperates with municipal/regional organisations and first responders on training activities and exercises.

New Canadian Uranium Energy Bridge – CUEB

Project Arrow for Nuclear, a concept nanoreactor, launched at the G4SR-5 Conference in October 2024.

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OntarioTech UNIVERSITY

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