



NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
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Canada's Plan for Used Nuclear Fuel

Lambton Area Water Supply System Board Meeting, December 2019

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NWMO: Who We Are

- Formed in 2002 as required by *Nuclear Fuel Waste Act*
- Charged with developing and implementing national solution for used nuclear fuel
- Funded by Canada's nuclear energy corporations
- Project lifecycle cost of almost \$24B for a capacity of 5.2 million used fuel bundles
- Trust Funds established, fully funded for current used fuel inventory
- Board of Directors, Independent Advisory Council

Our mission is to develop and implement collaboratively with Canadians, a management approach for the long-term care of Canada's used nuclear fuel that is socially acceptable, technically sound, environmentally responsible, and economically feasible.



Dry Storage

Adaptive Phased Management (APM)

APM emerged from dialogue with citizens and experts – best met key priorities

A Technical Method

- » Centralized containment and isolation of used nuclear fuel in a deep geological repository
- » Continuous monitoring
- » Potential for retrievability
- » Optional step of shallow underground storage*

* Temporary shallow storage at the deep geological repository is optional and not currently included in the NWMO's implementation plan.

A Management System

- » Flexibility in pace and manner of implementation
- » Phased and adaptive decision-making
- » Responsive to advances in technology, research, Indigenous Knowledge and societal values
- » Open, inclusive, fair siting process – seek informed, willing host community
- » Sustained engagement of people and communities throughout implementation

APM selected by Federal government June 2007

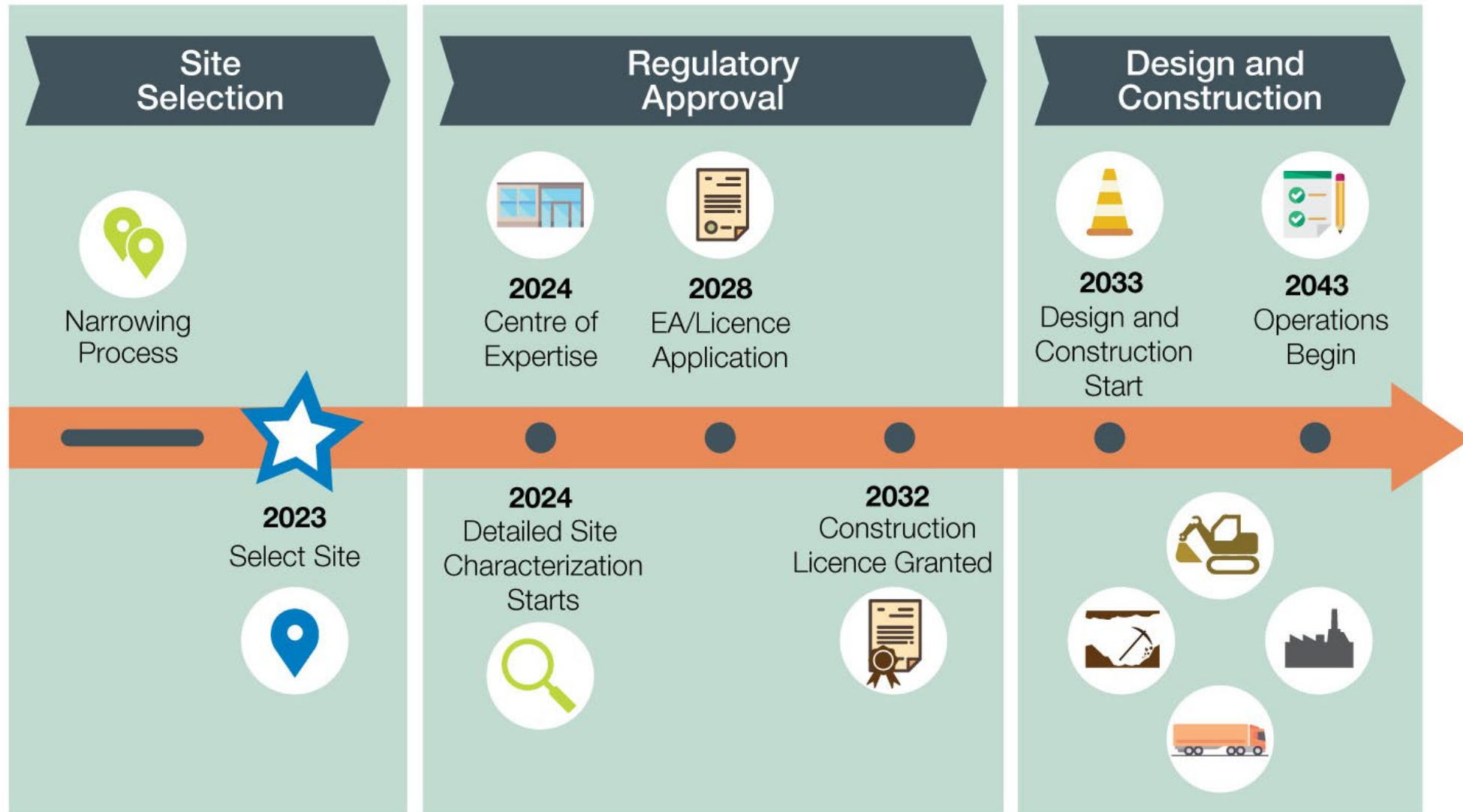
Site Selection Process: Initiated May 2010

Seeking informed and willing host with suitable geology

- Developed through two-year public dialogue
- Multi-stage technical and socio-economic assessment approach
- Phased process over many years
- Communities expressed interest to participate
- Communities can choose to leave the process

The project will only proceed with the involvement of the interested community, First Nation and Métis communities in the area, and surrounding communities, working in partnership to implement it.

Project Timelines



Criteria for Selecting a Preferred Site

Safety

Confidence a deep geological repository can be developed with strong safety case at that location

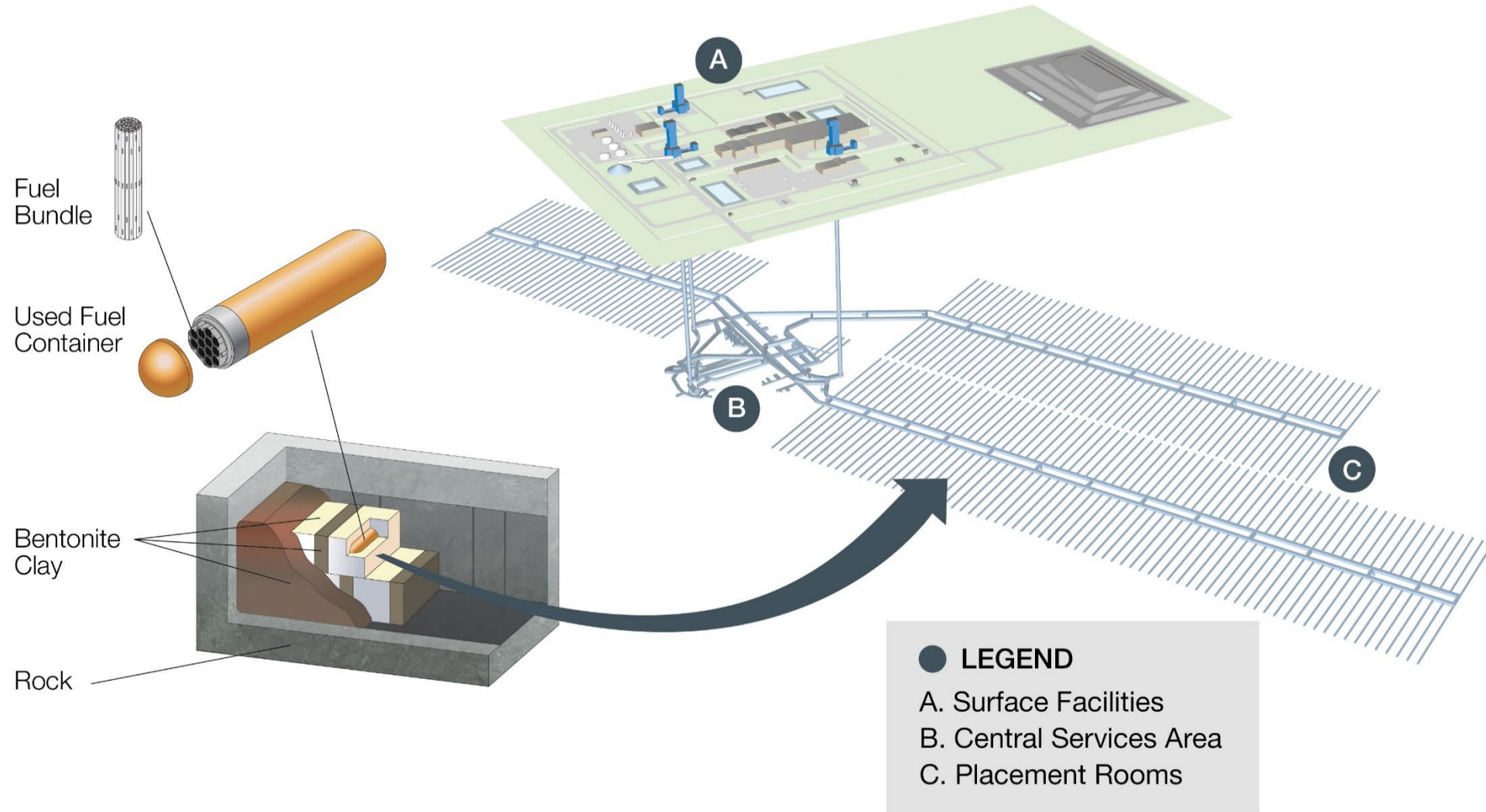
Transportation

Confidence a safe, secure and socially acceptable transportation plan can be developed

Partnership

Confidence a strong partnership can be developed with interested community, First Nation and Métis communities in the area, and surrounding communities

Deep Geological Repository: Ensuring Safety



Used CANDU Fuel

Used fuel bundle

- Uranium oxide fuel pellets
- Zircaloy alloy metal sheath

Durable solid materials

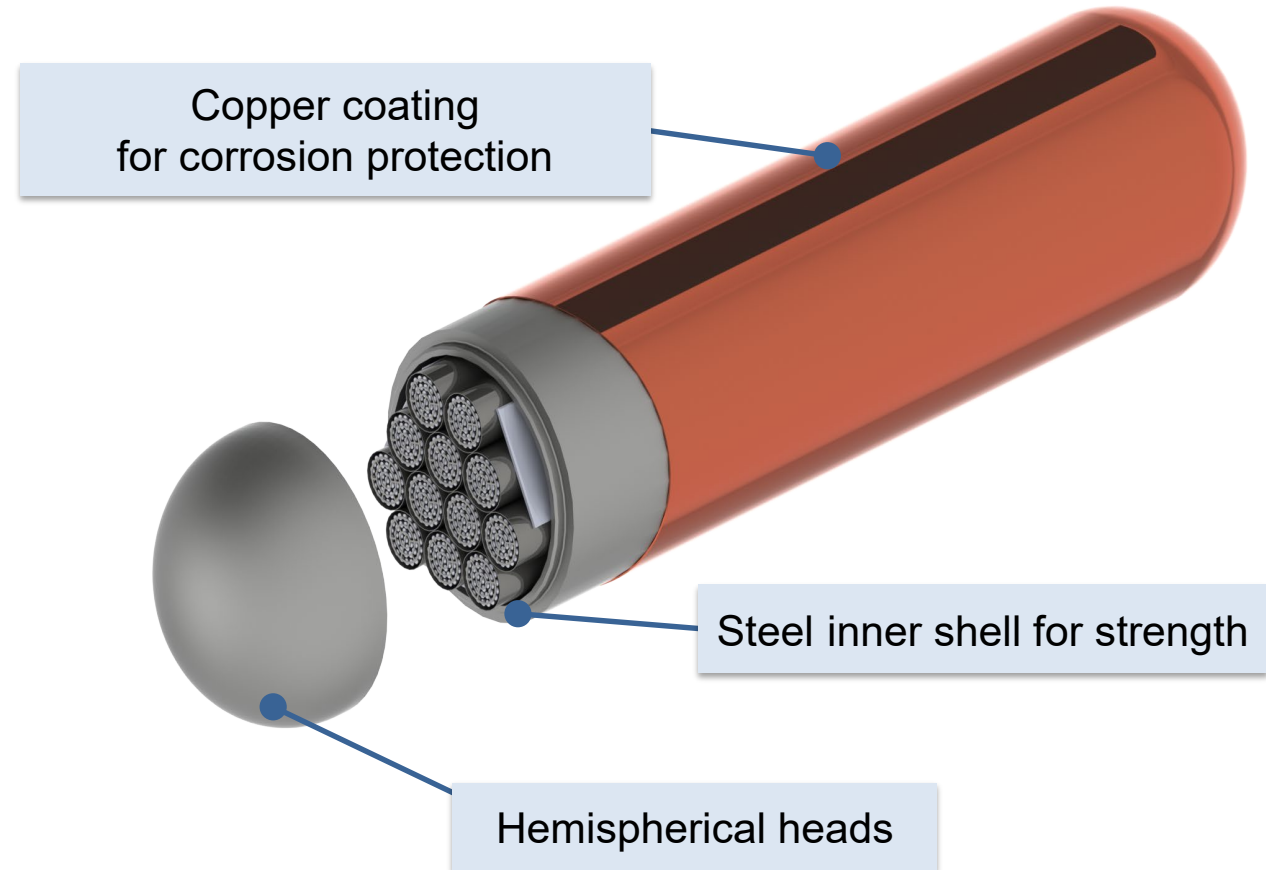
Producing some heat, but does not need water cooling at repository

Initially highly radioactive, decreasing naturally with time

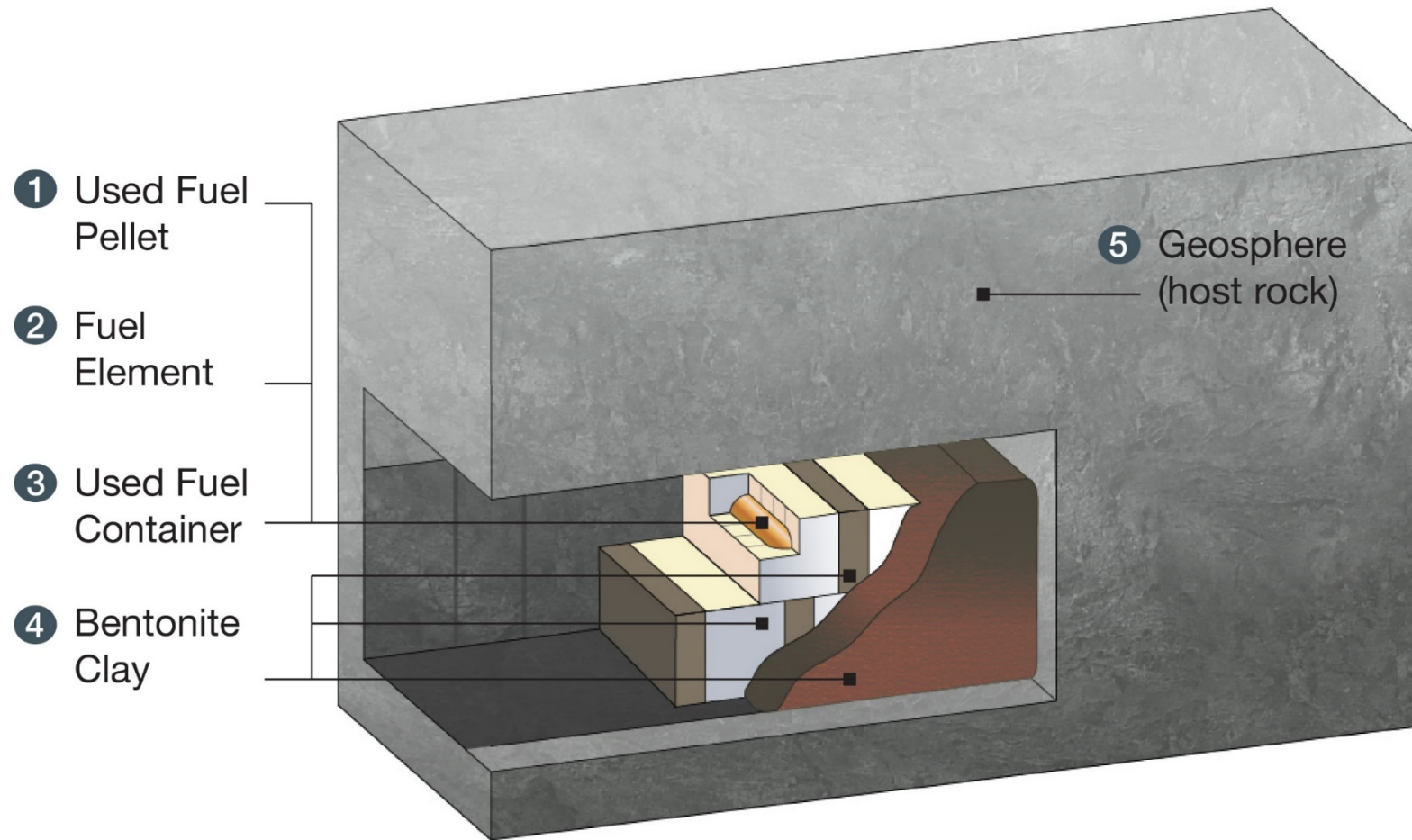


Used Fuel Container

- Designed for present underground loads and future glacial loads

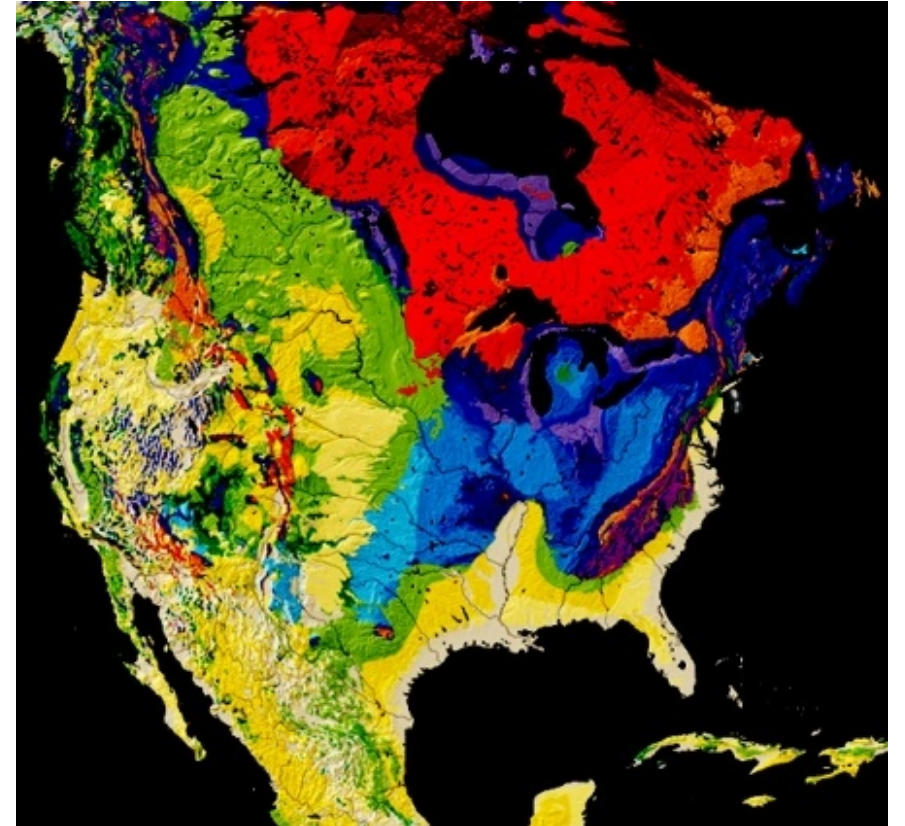


Engineered Barrier System



Key host rock characteristics

- Sufficient volume of competent rock at depth
- Low groundwater movement at repository depth
- Resilience to earthquakes
- Resilience to ice ages
- Resilience to land movement (erosion etc.)
- Favourable chemical composition of rock and water at repository depth

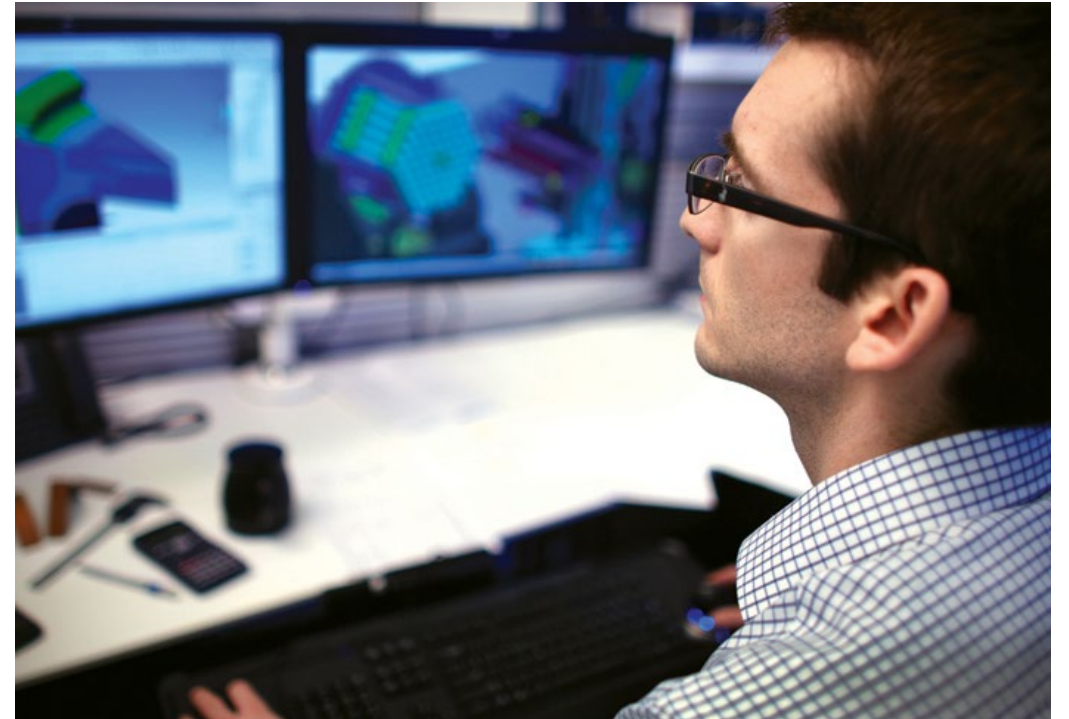


Age of bedrock, from youngest to oldest, is indicated by color: yellow, green, blue, red. Image: U.S. Geological Survey

Monitoring

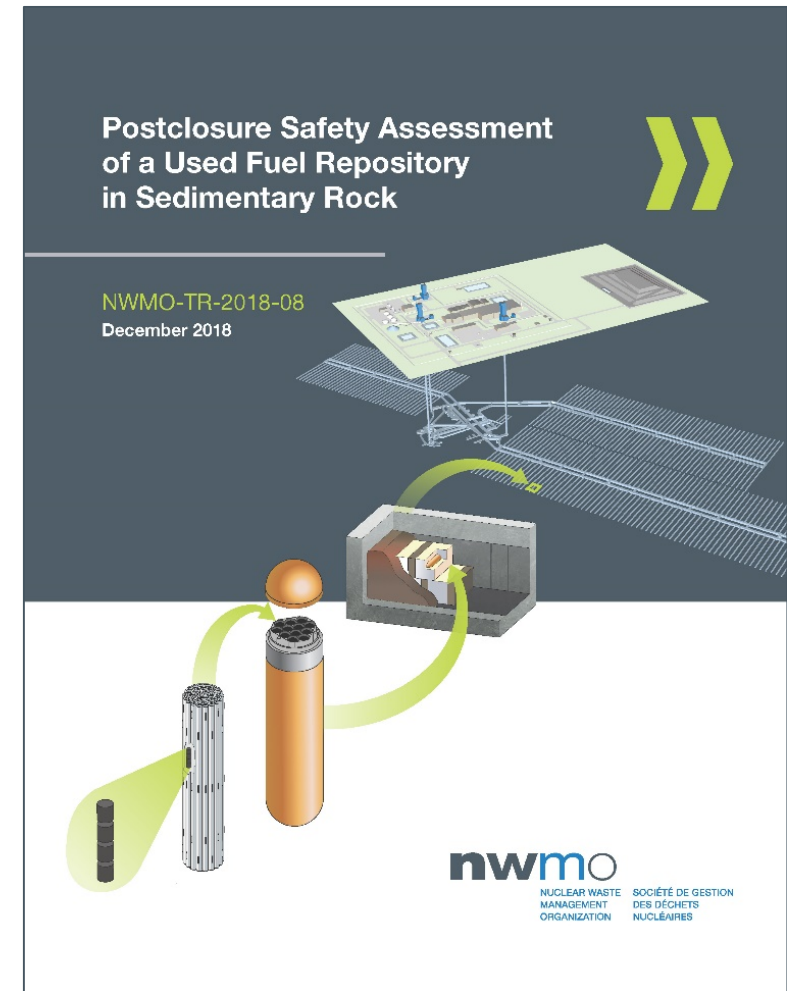
After the repository has been filled with used fuel:

- Extended monitoring period with underground accessible
- Repository sealed; site placed under institutional control
- Monitoring as long as desired, but safety is passive



Long-term Safety Summary

- Durable wasteform
- Robust design and engineered barriers
- Repository depth
- Favourable host rock and site
- Monitoring



Highlights

- ✓ National infrastructure project
- ✓ A deep geological repository provides long-term safety and protection of people and the environment, including bodies of water
- ✓ Funding for the project in place
- ✓ Continuous engagement of people to identify a safe and socially acceptable repository site
- ✓ Advancing discussions on partnership





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