

Nuclear Waste Burial in Canada

Community Briefing Note – Updated June 2025

Since 2010, the Nuclear Waste Management Organization has investigated 22 communities as potential locations for a deep geological repository that would accept all of Canada's highly radioactive fuel waste from nuclear reactors in Ontario, Quebec and New Brunswick. As of January 2020, only two areas remained under investigation. The NWMO had been investigating the Revell area, 45 kilometres west of Ignace in northwestern Ontario for a number of years, and in January 2020 it announced that it had agreements with an aggregate of landowners in the vicinity of Teeswater, in the Municipality of South Bruce in southwestern Ontario and would begin investigations in that area.

On November 28th 2024 the NWMO announced that it had selected the Revell site in the heart of Treaty 3 territory in northwestern Ontario as their preferred location. They have a signed hosting agreement with the Township of Ignace – 45 km east and in a different watershed – but Wabigoon Lake Ojibway Nation has consented only to site characterization. NWMO intends to initiate federal assessment and licencing processes in 2024.

This brief is a summary of background information and has been prepared by Northwatch to support community discussions.

What is nuclear waste?

Nuclear wastes are the radioactive by-products of developing and using nuclear technologies, including nuclear power reactors and nuclear weapons. Nuclear fuel waste is also called "high level" waste and is the most radioactive of the waste products generated by nuclear power production.

What is the nuclear industry looking for?

The nuclear industry - under the banner of the Nuclear Waste Management Organization - is looking for a community willing to become the "host" to all of Canada's nuclear fuel waste – more than 50,000 tonnes to date. The NWMO plan is to place the waste deep underground in a geological repository.

The Nuclear Waste Management Organization calls their plan to bury nuclear waste deep underground "Adaptive Phased Management". The key elements of the plan are to place the highly radioactive nuclear fuel waste in copper coated containers which would in turn be placed in a series of rooms in a repository constructed approximately 500 metres below the surface in one or more rock formations. This approach has been favoured by the nuclear industry in several countries for several decades, but there is no operating deep geological repository anywhere in the world.

A summary of key facts:

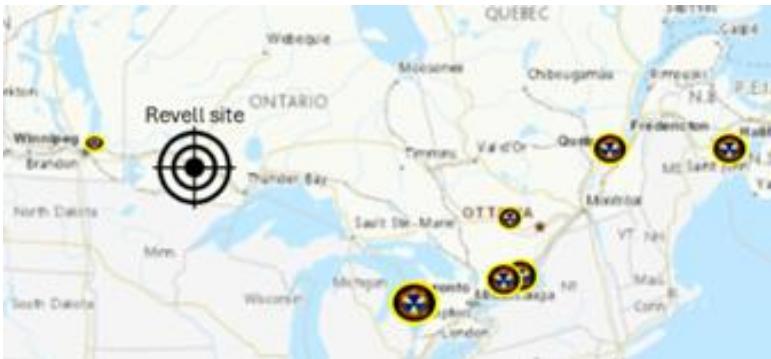
- Nuclear waste from reactors is extremely hazardous now and for hundreds of thousands of years. The radioactive and chemical hazards will outlast the container. Over time the waste - which even the nuclear industry agrees must be strictly isolated from the environment - will be released and make their way into the environment.
- Transportation of nuclear fuel waste will come with its own set of hazards and risks. The practice is relatively unknown in Canada, and the few incidents of highly radioactive nuclear fuel waste being transported in Canada are not comparable to the frequency and volume of transportation that would be required to move all of Canada's nuclear fuel waste to a single location. There are risks of accident, but there are also concerns with "routine" exposure to radiation from the transport of the waste, even without accidents.
- The concept of burying nuclear waste failed an environmental assessment review in Canada. The NWMO's "Adaptive Phased Management" is based on Atomic Energy of Canada Limited's "concept" of burying nuclear waste in the Canadian Shield, developed in the 1980s. After a ten-year review – which included 13 months of public hearings – the review panel concluded in 1998 that the AECL concept had not been demonstrated to be safe and acceptable.
- Many countries are studying the idea of burying nuclear waste and have been doing so for more than 50 years. But no one has done it. The NWMO says that their proposal is similar to that of many other countries, although it differs in several significant aspects, but no other country has actually constructed and begun to use such a facility.

Canada and nuclear waste

Nuclear power production began in the 1970's, before the government or the nuclear industry had any safe means of storing or disposing of the highly radioactive wastes

- In 1977 a 3 month 3-man federal "commission" recommended burying nuclear waste in the Canadian Shield of northern Ontario
- In 1988 the federal government referred the "concept" of burying nuclear waste to an eight-person environmental assessment panel
- In 1998 the environmental assessment panel concluded that burying nuclear waste was not acceptable to Canadians, and recommended that an independent agency be established to do future research into the long-term management of nuclear waste
- In 2002 the federal government passed the Nuclear Fuel Waste Act which directed the nuclear waste owners to create an organization which would then be responsible for researching options and then for the long-term management of nuclear fuel waste. That organization is the Nuclear Waste Management Organization.
- In 2010 the Nuclear Waste Management Organization formally launched its site investigation process
- In 2025 the Nuclear Waste Management Organization selected the Revell site in northwestern Ontario as the intended location of a used fuel packaging plan and deep geological repository for all of Canada's high-level nuclear fuel waste.

The Nuclear Waste Management Organization (NWMO) was created by Ontario Power Generation, Hydro Quebec and New Brunswick Power, the generators and owners of nuclear fuel waste in Canada. The NWMO was directed by the Nuclear Fuel Waste Act to review three "options" for the long-term management of nuclear fuel waste (continued storage at the reactor site, centralized storage, or geological disposal) and report with a recommended option by November 15, 2005.



NWMO and their Adaptive Phased Management Plan

In November 2005 the Nuclear Waste Management Organization submitted its recommendation to the federal government. Calling it "Adaptive Phased Management", the NWMO reports to have combined the three nuclear waste management "options" identified in the Nuclear Fuel Waste Act into a 300-year phased approach moving from storage at nuclear plants, to centralized storage, and finally to a deep geological repository. The federal government announced its acceptance in 2007.

According to the 2005 plan, in the first phase of the NWMO plan, the waste will remain at nuclear plants for 30 years while a centralized site is selected. In the second 30-year phase of the NWMO plan either a shallow underground waste facility will be built at the identified site and waste transportation will begin, or waste will remain at the nuclear plants pending completion of a site research facility and construction of a deep geological repository at the site. In either case, the waste would at some point be moved to the selected site and eventually placed deep underground in a series of "emplacement rooms" reached tunnels blasted out from a central shaft.

The Nuclear Waste Management Organization's plan includes the transportation of the waste, the operation of a "used fuel packaging plant", the placement of the wastes in the underground repository, and after a limited monitoring period the closure, decommissioning and abandonment of the repository. Each stage will result in radioactive releases to the environment. There is no safe level of exposure to radioactivity.

The International Situation

Several countries that use nuclear power have programs to investigate and/or develop a deep geologic repository for nuclear fuel waste and have had for several decades.

- There is no approved or operating geologic repository for high level nuclear fuel waste anywhere in the world
- Yucca Mountain, the proposed repository in the US, lost funding in 2009; a commission appointed by the President recommended a new program be established, that would rely on a "consent-based" process to identify centralized storage sites; a repository may still be considered in the longer term
- A proposal for a geologic repository in Sweden was submitted to the review agency in 2011, but was returned to the proponent for additional work in 2012 and again in 2018; in January 2022 it received a political approval but has still not received full regulatory approval or the necessary permits
- Candidate sites in a "voluntary" process to identify potential locations for geologic repositories in the UK were rejected by County Council in 2013. No additional sites have been identified, and a siting process has again focused in the Cumbria District with similar local opposition
- In 2014 the only operating deep geologic repository in the world – the Waste Isolation Pilot Plant in New Mexico, which is a repository for US weapons waste – was shut down following an underground fire and release of radiation to the surface environment; operational problems persist at the WIPP. It has reopened, with persistent operational challenges.

SUMMARY OF NWMO SITING PROCESS MILESTONES 2010 – 2024

May 2010 The Nuclear Waste Management Organization launched their site search with the release of *Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel* and the announcement of their Learn More Program. The NWMO Learn More Program is the NWMO vehicle for delivering programming and money into communities the NWMO is investigating.

March 2012 The NWMO announced it would suspend the expressions of interest phase of the site selection process on September 30, 2012.

September 2012 Twenty-one communities were being investigated by the time the NWMO closed the list of Learn More communities. On the list were: Arran-Elderslie, Blind River, Brockton, Central Huron, Creighton, Ear Falls, Elliot Lake, English River, First Nation, Hornepayne, Huron-Kinloss, Ignace, Manitouwadge, Nipigon, Township of the North Shore, Pinehouse, Saugeen Shores, Schreiber, South Bruce, Spanish, Wawa, and White River. Red Rock had been released from the NWMO process in June 2011 after an initial screening.

November 2013 NWMO released the preliminary assessment from the first phase of Step 3 of their nine-step process for eight communities. Creighton, Ignace, Hornepayne and Schreiber were identified for further study, meaning they would move to the next of the NWMO siting process. English River First Nation, Pinehouse, Ear Falls and Wawa were not selected for more detailed study.

January 2014 NWMO announced that it had concluded its preliminary assessment of Arran-Elderslie and Saugeen Shores and that early findings indicate both have very limited potential to meet the geoscientific criteria required to host a deep geological repository for used nuclear fuel, although no new geoscience information was referenced.

June 2014 The Township of Nipigon passed a resolution to discontinue its involvement as a potential host community for a repository for nuclear waste. The decision followed review of an interim report, which the NWMO prepared at the request of the Township to report on preliminary assessment work.

December 2014 NWMO released the "preliminary assessment" from the first phase of Step 3 of their nine-step process for three Bruce County communities, shortly after the municipal elections. South Bruce and Huron Kinloss were "identified for further study. Brockton was not selected to be the focus of more detailed study."

January 2015 NWMO released the preliminary assessment from the first phase of Step 3 of their nine-step process for six communities in northern Ontario. Manitouwadge, White River, Blind River and Elliot Lake were identified for further study. Spanish and the Township of the North Shore were not selected to be the focus of more detailed study.

March 2015 NWMO announced that it was "concluding" its studies in Creighton Saskatchewan and Schreiber in northern Ontario.

June 2017 The Municipality of Central Huron and the Township of White River will no longer be considered as potential "host communities" for the NWMO project

December 2017 NWMO announced that the areas around Blind River and Elliot Lake, Ontario will no longer be considered to host the project

January 2018 NWMO announced completion of first borehole drilling in Revell area, 45 km west of Ignace

September 2019 NWMO completion of second borehole in the Revell area

October 2019 NWMO announces plans to drill four additional boreholes in Revell area between Ignace and Dryden in Northwestern Ontario.

November 2019 NWMO announces that the Townships of Hornepayne and Manitouwadge will no longer be considered.

January 2020 NWMO announces that it has signed agreements with landowners in South Bruce, and will no longer consider Huron Kinloss as a potential host

October 2020 NWMO announces that it will undertake borehole drilling in South Bruce in the spring of 2021.

December 2021 – the Township of Ignace decides in a "special" committee meeting that the next council will determine if Ignace is a "willing host". There will be no community vote or referendum.

January 2022 – The Township of South Bruce decides that a referendum will be held during the next term of council on the question of "willingness"

August 2022 – NWMO announces that it is delaying its site selection decision until 2024. Two candidate sites remain: Ignace, the NWMO's proxy decision-maker for the Revell area in northwestern Ontario and South Bruce in southwestern Ontario.

November 2024 – NWMO announces that it has selected the Revell site in northwestern Ontario as their intended location for a deep geological repository