APRIL 2020

NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

PRELIMINARY ASSESSMENT OF POTENTIAL SUITABILITY

Initial Borehole Drilling and Testing in South Bruce

DRAFT FOR DISCUSSION WITH COMMUNITIES

In 2012, at the request of the community of South Bruce, the Nuclear Waste Management Organization (NWMO) began conducting a series of increasingly detailed technical and social studies to assess suitability for safely hosting a deep geological repository for the long-term management of Canada's used nuclear fuel.

Before selecting a potential repository site, the NWMO needs to be confident that a deep geological repository can be developed with a strong safety case. A safety case brings together all the information that contributes towards understanding whether or not a repository at the site could safely contain and isolate used nuclear fuel. This information includes Indigenous Knowledge, geoscientific assessments, environmental surveys and monitoring, engineering design studies, and safety assessment analyses.

The focus of early geoscientific studies is to determine if the rock in the area has the potential to satisfy the NWMO's safety requirements for a deep geological repository for the long-term management of Canada's used nuclear fuel.

Geoscientific studies conducted to date have involved desktop studies, which make use of publicly available information about the geology of the area. A next step in the process involves drilling a small number of boreholes to further understand the geology at the potential repository site. These boreholes will be drilled at or near the potential repository site located northwest of Teeswater.

Drilling initial boreholes and associated testing will build upon findings of earlier studies.

Beyond ensuring safety, the NWMO has committed to communities that the project will be implemented in a way that fosters long-term well-being as defined by the community.

Key Steps

To date, the NWMO has completed desktop studies to explore potential suitability of the area to meet the robust technical safety requirements to host the project. The NWMO has shared these findings with people in the area and published reports on its website.

- Desktop studies, using available information, identified broad areas within the community of South Bruce that have potential to host a deep geological repository (2012; 2014).
- Initial studies are designed to better understand the geology of the area. They include seismic reflection studies, and drilling initial boreholes.
- In May 2019, the NWMO launched a Land Access Process and worked with local landowners to determine if a possible site could be identified in the area.
- In January 2020, the NWMO signed agreements with landowners in South Bruce that will allow access to land for studies at the potential repository site northwest of Teeswater.

Selecting a Site for the Long-Term Management of Canada's Used Nuclear Fuel

Canada has a comprehensive plan for the safe, long-term management of the used nuclear fuel produced by its nuclear power plants. The plan includes a process to identify an informed and willing host for a deep geological repository that will contain and isolate the material.

Next steps involve the NWMO and people in the area working together to plan the next set of activities. Together, we will:

1. Share borehole locations that will help advance understanding of the geology at the potential repository site, and provide opportunities to observe drilling activities to learn about the project;
2. Review findings from studies such as borehole drilling and seismic studies, and decide on next steps.

Ultimately, the potential repository site will need to meet robust safety requirements, must foster the well-being of the area as defined by people who live there, and will need to be supported by strong partnerships. The project can only proceed with the involvement of the community, First Nation and Métis communities in the area, and surrounding communities.

What is borehole drilling?

A borehole is a narrow, deep, circular hole made in the ground using motorized equipment (drilling equipment). The process involves drilling the borehole and retrieving cylinder-shaped rock samples, called core. A wide range of testing is performed on samples of the core and in the borehole to investigate properties of the rock.

Examples of core

What is the purpose of the borehole drilling and testing program?

Borehole drilling will provide more information about whether the geology at the potential repository site could be a safe place for a repository. Borehole drilling and testing will help further assess and understand key geological features and uncertainties identified in previous studies. It will provide information of true orientation, thickness and other characteristics of the rock layers, such as whether or not they contain hydrocarbon resources.

Where will boreholes be drilled?

Borehole drilling will take place at or near the potential repository site northwest of Teeswater. In January 2020, the NWMO announced that it had signed agreements with landowners in South Bruce that would give the NWMO access to land to continue our site investigation work.

How many boreholes will the NWMO drill?

The NWMO's initial drilling program involves drilling two boreholes in the area, followed by additional boreholes in the future if the site is selected for detailed site characterization.

How will the NWMO interweave Indigenous Knowledge into initial borehole drilling and testing?

As part of its promise to work collaboratively with First Nation and Métis communities, the NWMO is committed to interweaving local Indigenous Knowledge in all phases of its work.

The NWMO will work together with Indigenous peoples in the area to respectfully apply Indigenous Knowledge of the natural environment and traditional lands, and cultural and spiritual values they may wish to share to guide borehole drilling and testing.

The NWMO will ensure Indigenous intellectual property is protected as agreed to with Indigenous peoples who choose to share that knowledge.

Indigenous peoples have a special relationship with the natural environment, and unique stewardship responsibilities that are part of this relationship. The knowledge that comes from this relationship with the land brings special understanding to the broad range of factors that should be considered in field studies, social assessments, and assessing benefits and effects to be managed.

What permits are required?

The Ministry of Natural Resources and Forestry have advised that permits under the Oil, Gas, and Salt Resources Act are not required for the deep boreholes. The NWMO is applying best practices recommended by the Ministry to the borehole drilling program.

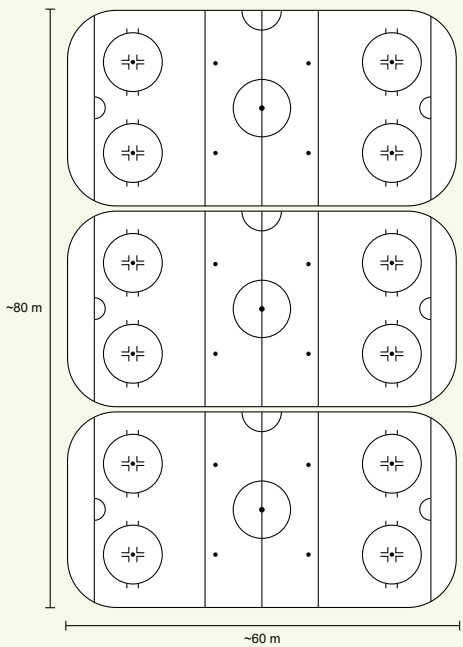
The groundwater wells will be installed by a certified driller, and the well tag will be registered with the Ministry of Environment, Conservation, and Parks.

When will the initial boreholes be drilled?

The contract for borehole drilling and testing was awarded in March 2020, and planning for fieldwork activities is underway. Field work activities, beginning with site preparation, could begin as early as summer 2020, with borehole drilling beginning shortly thereafter.

How much land is needed to drill a borehole?

The footprint required for a drill site is about 5000 square metres, a little bigger than the size of three NHL-sized hockey rinks side by side. The area will be fenced.



Approximate footprint required to drill a borehole

Example of rotary drilling

What equipment is used?

Boreholes are drilled using a conventional rotary drill rig. The drill site will likely need to be prepared and graded using granular materials, such as sand and gravel.

Trailers will be set up at the site for use as field offices, for on-site equipment storage, and for a small field lab for on-site testing and preserving rock core and water samples. Electricity for these facilities will be supplied by power generators or by connection to existing electrical distribution network.

Rock core will be stored in a core storage facility at a nearby location within South Bruce.

Will drilling and testing cause any impact to the environment?

Drilling activities will be managed to minimize impact on the environment. During all stages of fieldwork, the natural environment will be protected.

A source of water and a drill water management system will be required. The drilling contractor will bring water to site, which will be recycled on-site during drilling to minimize use and release to the environment. Drilling water and cuttings will be managed safely in accordance with provincial regulations. This will involve transportation of drilling water and cuttings off-site.

How deep will the boreholes be?

Initial boreholes will be drilled through the entire sedimentary sequence in the area. Given the depth of the sedimentary sequence at the potential repository area in South Bruce, the boreholes are expected to be drilled and cored to a depth of approximately 900 metres.

What kind of testing is conducted?

Findings from testing will be used to develop a better understanding of the general geology in the area.

Testing includes:

- Logging of the rock core, which involves a geologist inspecting the core to find out the main rock types and minerals present, as well as the location and direction of any natural breaks in the core (fractures or faults), and recording this information;
- Geomechanical measurements, which involve testing rock core samples taken from the borehole to provide information about rock strength;
- Geophysical measurements made along the length of the borehole to provide additional information on the physical properties of the bedrock, including true fracture orientations and, potentially, zones of groundwater flow present within the rock;
- Hydraulic conductivity measurements made at selected locations along the length of the borehole will provide information on groundwater flow conditions; and
- Chemical and isotopic analyses of groundwater samples collected from within the borehole, to determine the nature of the groundwater (e.g., whether it is fresh or saline) and to begin to understand how the groundwater has changed over time.

As field studies progress, the NWMO will work with community members to share information and build awareness and understanding.

Example of geomechanical testing

How long will it take to complete the borehole drilling and testing?

For a borehole approximately 900 metres deep, the drilling and testing program can take up to 6 months.

Once borehole drilling and testing is complete, the NWMO geoscience team will work with the drilling contractor to ensure all final data, including results from laboratory analyses, are completed properly and in a timely manner. The geoscience team will work with environmental, engineering, and repository safety specialists, over a period of several months, to review and analyse the data and ultimately integrate the findings into an understanding of the subsurface conditions at drilling location. Results will be shared with an expert group for peer review throughout this process. Once that is complete, the NWMO will share findings with the community. The findings, along with those from earlier studies, will guide the NWMO in working with community members in planning any future study activities.

What happens to the borehole once drilling and testing is complete?

Upon completion of the planned tests, drilled boreholes will be instrumented with long-term monitoring equipment, that allows ongoing assessment of pressure and collection of groundwater samples. If the boreholes are not instrumented with long-term monitoring equipment, they will be temporarily sealed. The NWMO will review findings with people in the area and reflect on whether or not to continue with further studies.

If the decision is taken not to conduct further studies at a borehole location, the borehole will be permanently sealed in accordance with provincial requirements.

When will a site be selected for a repository?

The NWMO expects to identify a safe site by 2023 following progressively more detailed technical, scientific, social, cultural, and economic studies, as well as engagement with the interested community, First Nation and Métis communities in the area, and surrounding communities. The NWMO is conducting studies to explore suitability to host the project in two areas in Ontario, including both crystalline rock sites, such as those found in northern Ontario, and sedimentary rock sites, such as those found in southern Ontario.

Studies conducted over the coming years will allow the NWMO to collect additional information and complete analyses required to assemble a safety case for a deep geological repository at that location.

Ultimately, a repository at a preferred site will need to meet robust safety requirements, must foster the well-being of the area as defined by people who live there, and will need to be supported by strong partnerships. The project can only proceed with the involvement of the community, First Nation and Métis communities in the area, and surrounding communities.

Be Involved

Learn more by attending a South Bruce Community Liaison Committee meeting, dropping by the NWMO community office, or joining in on public events such as open houses.

For more information, please contact:

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