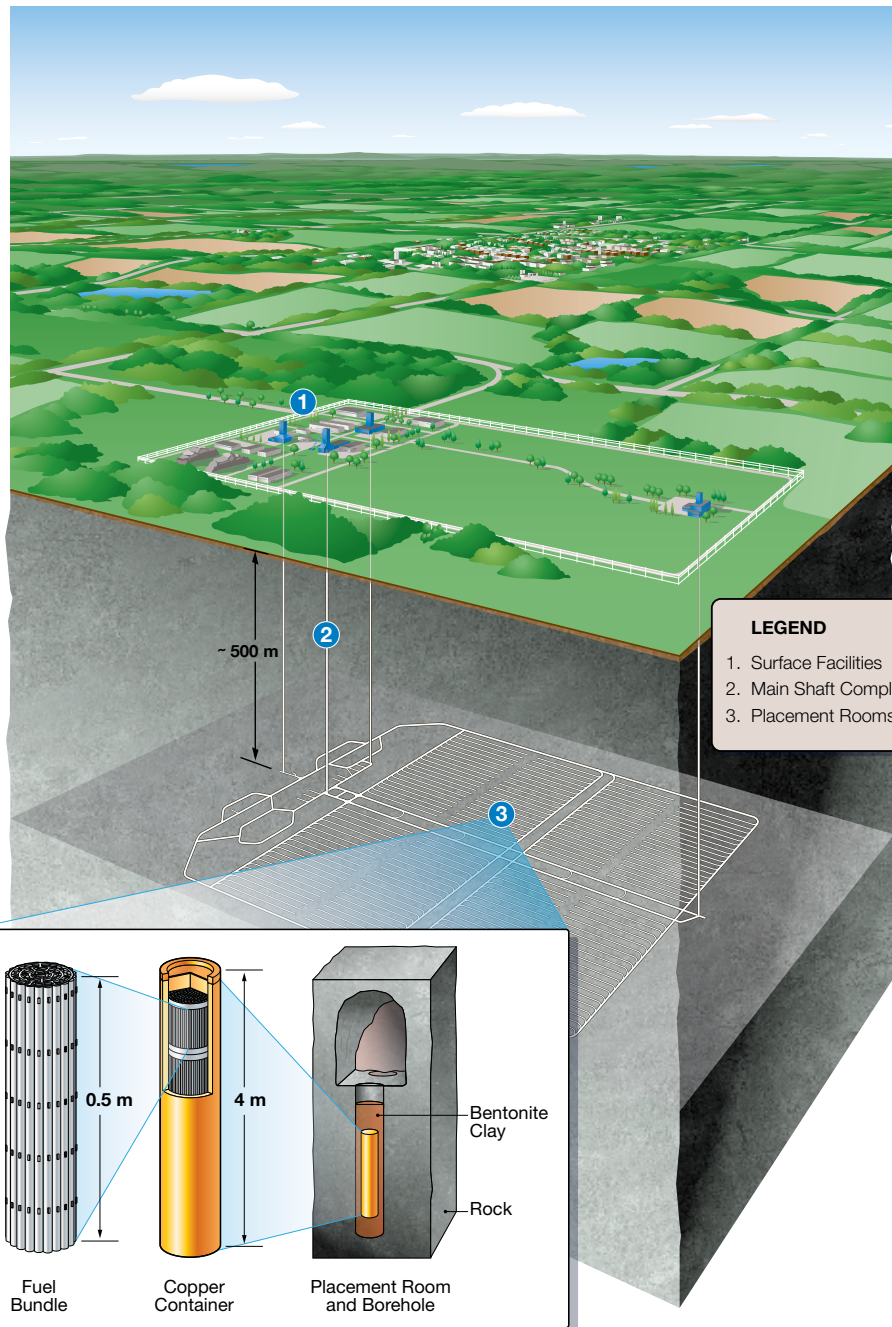




NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES



Project Description of Canada's Long-Term Plan for Used Nuclear Fuel Management





What might a community expect?

This national infrastructure project will involve the development of a deep geological repository for the long-term management of used nuclear fuel and a national centre of expertise. It is a multi-billion-dollar, high-technology project that will provide direct employment for hundreds of people for many decades, plus many more indirect jobs.

The used fuel will be contained and isolated in a deep geological repository consisting of a series of access and service shafts and a network of tunnels leading to placement rooms where specially designed used fuel containers will be placed. A series of engineered and natural barriers provided by the host rock will safely contain and isolate the used fuel from people and the environment for the very long time that it will remain dangerous. The used fuel will be monitored throughout all phases of implementation. It will also be retrievable at all times.

A centre of expertise comprising an active technical and social research and technology demonstration program will be established. This centre of expertise will support the project and serve as a hub for sharing research nationally and with other countries such as Switzerland, Sweden, the United Kingdom, France and Finland, and potentially other countries that are following similar paths.

As a large infrastructure development involving scientists, engineers, construction crews and many others, the project will have an impact on any community in which it is located. It is a multi-generational project that will be developed in phases. The deep geological repository will be sited and constructed over two to three decades; waste will be placed there over a period of three decades, or more, after that and then monitored thereafter. The site will become a national centre of expertise for technical, environmental and community studies associated with the implementation of deep geological repositories. The centre will include the development of an underground demonstration facility and surface facilities such as laboratories, offices, public viewing galleries and exhibits. The centre will bring together a multidisciplinary core group of scientists, researchers and others.

Project implementation will require a long-term partnership involving the community and the NWMO to ensure that the project is implemented in a way that will help the community in which it is located foster its well-being and sustainability, consistent with its own vision for its future. The nature, pace and manner of progressing through the phases of the project will be determined in partnership with the community.

The construction and operation of facilities and the infrastructure associated with the project are expected to have significant economic benefits for a community over many decades. The project also offers significant employment and income revenue to the host region and host province.

With a project of this size and nature there is also the potential to contribute to social and economic pressures that will need to be carefully managed to ensure the long-term health and sustainability of the community. For example, housing and land values may rise at the outset and fall as construction of the deep repository is completed. Additional pressures may arise with the potential influx of temporary workers associated with the construction phase of the repository, possibly increasing demand for social and physical infrastructure services. In order to avoid or minimize social costs of this type, and to assist communities to adapt to the opportunities and challenges linked to the project, the need for assistance in areas such as job training, affordable housing and needed infrastructure would be examined. The NWMO is committed to helping to ensure that the long term well-being of the community is fostered through its involvement in this project.



What are the initial requirements to be considered?

The NWMO is committed to ensuring that any site selected to host the deep geological repository and centre of expertise can safely and securely contain and isolate used nuclear fuel for the long time frames required.

The proposed site selection process, which is currently under discussion with Canadians through 2009, will evaluate the safety of the site over a series of steps using a comprehensive set of safety criteria.

In order to begin the evaluation process, a site would need to meet the following initial screening criteria:

- » Have enough available land to accommodate the surface and underground facilities. (The project requires a surface area of about two by three kilometres of open land. Most of the site surface will be suited to landscaped grounds. The surface buildings that would be constructed would cover a small fraction of the total land area.)
- » Be outside of protected areas, heritage sites, provincial parks and national parks.
- » Not contain groundwater resources at the repository depth, so that the repository site is unlikely to be disturbed by future generations.
- » Not contain economically exploitable natural resources as known today, so that the repository site is unlikely to be disturbed by future generations.
- » Not be located in areas with known geological and hydrogeological features that would prevent the site from being safe.

How will the project be funded?

The planning, development and implementation of the project is funded by the major owners of used nuclear fuel in Canada: Ontario Power Generation, NB Power, Hydro-Québec and Atomic Energy of Canada Limited. As required by the *Nuclear Fuel Waste Act*, each of the four companies has established separate independently managed trust funds (segregated funds) and makes annual deposits to ensure the money to fund this project will be available when needed.

Transportation of Used Fuel

Used nuclear fuel is currently safely stored in federally licensed interim storage facilities at nuclear power reactor sites where it is produced, located in Ontario, Québec and New Brunswick. In addition, small amounts of fuel are present inside university research reactors in Alberta, Saskatchewan, Ontario, Québec and Nova Scotia.

The project will require the transportation of used fuel from these interim storage facilities and research reactor sites to the centralized site for the deep geological repository. Depending on the location of the central site, this may involve the use of road, rail or water (i.e. truck, train or ship). Transportation of this material will need to meet the stringent requirements laid out by Transport Canada and the Canadian Nuclear Safety Commission.



About the project

This is a \$16–\$24 billion national infrastructure project that will be implemented in phases.^{1, 2}

DURING THE SITE SELECTION PROCESS

- » **Initial site evaluation** (initial screening and preliminary assessment) will explore in a preliminary way whether geographic areas identified by the community contain sites that may have the geological characteristics required to safely host a deep geological repository for Canada's used nuclear fuel, and whether the well-being of the community will be fostered by the project. Conducted in collaboration with the community, this work would involve desktop studies based on available geoscientific and socio-economic information. Limited field investigations may be conducted depending on the extent of available information concerning sites. This work is expected to be conducted over a period of 1-2 years.
- » **Detailed site evaluation** will confirm whether the site is suitable in terms of safety and community well-being and support the regulatory approval process. Conducted in collaboration with the community, this work would involve detailed field and laboratory investigations, testing, monitoring and safety analysis as well as socio-economic studies. About 20–40 workers with a wide range of skills, including technical and social scientists, equipment operators and other skilled workers and technicians, would be required at the site. Spending during this phase would be tens of millions of dollars per year for a period of about 5 years.
- » **Establishment of a centre of expertise**, including construction and operation of an underground demonstration facility, will demonstrate the safety of the facilities before they are constructed. This work would involve several hundred workers at the site per year to build and staff the underground facility as well as a centre of expertise, which will operate throughout construction and operation of the project. Spending during this phase would be in the order of 100 million dollars each year for a period of about 5 years.

DURING IMPLEMENTATION OF THE PROJECT

- » **Construction of the deep geological repository** will proceed at a depth of approximately 500 metres and consist of a series of access and service shafts and a network of tunnels leading to placement rooms where used fuel containers will be safely placed. Various surface facilities will also be required to receive, process and re-package used fuel bundles and prepare clay-based sealing materials. Construction activities will involve about 600–800 workers at the site with a wide range of skills, including equipment operators, engineers, scientists, mining personnel, tradespeople, social researchers, financial administrators and public communication professionals, each year. Spending during this phase would be several hundreds of millions of dollars each year for a period of about 5 years. In addition to the on-site employment, there will be significant direct employment opportunities created in the host community for a variety of support services such as transportation, catering and equipment supply. Depending on the host economic region, wealth creation in the form of business profits and personal income throughout the region during the construction phase is expected to be billions of dollars.
- » **Operation of the facilities** would continue as used nuclear fuel is transported from the nuclear stations and placed in the repository. This work would involve hundreds of workers with a wide range of skills, including equipment operators, engineers, scientists, mining personnel, tradespeople, financial analysts and public communication professionals. Spending during this phase would be in the order of 200 million dollars each year for a period of 30 or more years. In addition to this, annual employment in the host community will be created by the many businesses that will be required to support direct ongoing operations at the facility. Depending on the host economic region, wealth creation in the form of business profits and personal income throughout the host region during the operation phase is expected to be billions of dollars.

1: Project costs are estimated to be between \$16 and \$24 billion (2002 dollars); or \$7–\$8 billion in present value terms (January 2009\$).

2: Labour and dollar figures (reflecting cash flows) are estimates provided by AECOM. See "Summary of Economic Benefits Linked to Adaptive Phased Management at an Economic Region Level" on the NWMO website.

For more information, please contact:

Jamie Robinson Director, Strategic Communications
Tel 647.259.3012 Fax 647.259.3007
Email jrobinson@nwmoo.ca

nwmoo

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MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES

Nuclear Waste Management Organization

22 St. Clair Avenue E., Sixth Floor, Toronto, Ontario M4T 2S3 Canada
Tel 416.934.9814 Toll Free 1.866.249.6966
www.nwmoo.ca