

THE NUCLEAR RADIOACTIVE WASTE DISPOSAL DEBATE

When nuclear technology was first introduced to Canada in 1962, nuclear researchers had high hopes that science would eventually find a solution to safely dispose of the radioactive by-product produced from nuclear energy generation. By the 1990s, however, it became obvious that science was not going to develop a magical formula to obliterate radioactive waste. What is Ontario, the Canadian hub of nuclear energy, going to do with its growing radioactive waste? What are Ontario's disposal options? Are there even any options?

First, it is important to understand what nuclear radioactive waste is. High-level nuclear waste is stored in a bundle that is approximately the same size as a fire log. It weighs an average of 43 kilograms (see figure 1). The estimated half-life of the radioactivity is 10,000 years; it takes over 100,000 for all the radioactive material to deplete from the fuel-cell bundle. The radioactive matter in the bundles is highly dangerous for human health and can cause cancer, genetic mutations, and destroy human tissue. As of 2006, Ontario had over 2 million of these high-level radioactive bundles.



Figure 1 (Courtesy of NWMO)

In 1998, the Seaborn Panel, established by the federal government, pursued the various disposal options for nuclear radioactive waste. The panel outlined four options:

1. Reuse
2. Transmutation
3. Surface Storage
4. Deep-geological Burial

Oddly, the panel neglected the option of shooting the radioactive waste to the moon.

Of the four proposed solutions, *reuse* is the most ideal solution. To date, however, no technology or scientific process has been developed to fully reuse the radioactive waste stored in the fuel bundles.

With respect to *transmutation*, the process involves the conversion of the radioactive material to a more stable isotope.

The process is currently being used by France to dispose of its nuclear waste. However, the chemical process produces plutonium as a bi-product, which can be used for the proliferation of nuclear weapons and explosives. Fear of weapons proliferation has rendered transmutation an unacceptable solution for the disposal of Ontario's nuclear waste. The third option, *surface storage*, requires stockpiling nuclear fuel bundles in a self-contained building located near the nuclear facility. This option is considered to be only a temporary solution that stalls the issue of nuclear waste until a better solution is developed. The fourth option proposed is *deep-geological burial*, storing bundles 500m below ground (see figure 2). The bundles are encased in copper and steel containers that will last 100,000 years and are strong enough to withstand pressure from 2km thick glaciers in the event of an ice age. The Seaborn Panel advocated deep-geological burial as the most scientifically sound solution for the disposal of radioactive waste.

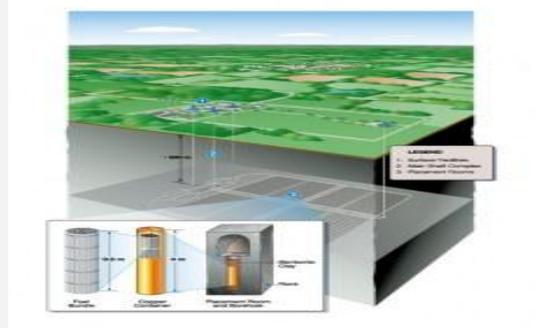


Figure 2 (Courtesy of NWMO)

Twelve years later, the solutions proposed by the Seaborn Panel are still the only tools available for the Ontario government.

Despite advocating deep-geological burial for the disposal of nuclear waste, the Seaborn Panel ultimately rejected the solution because “deep geological disposal has not been demonstrated to have broad public support.”

Despite the Panels conclusion, both the Ontario Atomic Energy Council Ltd (AECL) and the federal-owned Nuclear Waste Management Organization (NWMO) have identified deep-geological burial as the best solution for the fate of radioactive waste. To date, all of Ontario’s nuclear waste bundles are stored in an external facility next to the nuclear facility. However, by 2035 the federal and provincial government are planning to secure a burial site for all of Ontario’s nuclear waste. The Canadian Shield has been identified as the prime landscape because of its distance from ground water table and lack of seismic activity (it is estimated that the Canadian shield hasn’t experienced severe landscape-altering seismic activity for over 450 million years).

The decision to pursue deep-geological burial of radioactive waste has serious economic and social implications. The estimated cost of building the burial site is \$24 billion (originally \$3 billion in 1991). Furthermore, within the first 30 years, an additional \$200/ year will be spent on maintenance of the site.

Both the federal government and the Ontario government will contribute financially to the project.

The government has framed the financial costs of deep-geological burial as a positive aspect for the community that will host the project. The government has stated that the project will create jobs for the host-community and the \$200/years spent will directly benefit the host-community.

The staunch opposition to geological burial nonetheless stems from social concerns over human safety and health. Ontarians are weary of the concept of transporting dangerous radioactive waste from the nuclear facility to the central burial site. The potential of the journey resulting in an accident that will expose the radioactive waste to drinking water or air has made Ontarians hesitant about the project. Furthermore, Ontarians are largely against hosting a burial site in the community over fear of radioactive pollution (via water or air) in their neighborhood.

It is important to note that neither the federal government nor the provincial government can establish a deep-geological burial site without the approval of the local municipality. So far, no municipality has actively inquired about hosting a radioactive waste burial site. It is also most likely that Aboriginal land will be considered for project, since the majority of Aboriginal communities occupy land on the Canadian Shield. There are fears that if the government cannot negotiate a burial site they may resort to more coercive measures.

Source: <http://www.sassweb.ca/3bb3/volume1-0/nuclear-volume1-0/burying-the-evidence-the-nuclear-radioactive-waste-disposal-debate>