

## **Concerns re: Proposed Kincardine Nuclear Waste Repository**

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I was born, raised, educated and employed in Port Hope - a nuclear town with serious nuclear waste issues. Having followed the industry's waste saga over my lifetime and researched the history, I am keenly aware of the challenges, dangers, and problems involved with storage and disposal of nuclear materials.

### a) Location

**No** toxic or radioactive waste facility should ever be located on the shores of one of the Great Lakes. Our Canadian Great Lakes are a globally important treasure (containing 1/5 of the world's fresh water supply), critical habitat to countless species, and primary water source for millions of Canadians and Americans. Any release of nuclear wastes into the Great Lakes, at any point in the future, would be an economic and environmental travesty – for North America and the planet (with our continually shrinking freshwater reserves). Kincardine, on the shore of Lake Huron, is an inappropriate location for a nuclear waste repository.

### b) Limestone Bedrock

The caverns will be dug into limestone, a sedimentary rock that is porous. In certain jurisdictions in North America, people and businesses building or operating in areas with limestone bedrock are required to purchase special 'sinkhole' insurance. Limestone is easily fractured and eroded (many examples of this are seen around the shorelines of the Bruce Peninsula and elsewhere in southern Ontario), and is notorious for developing caverns and fissures, and for leaching materials through the bedrock into groundwater.

Containers housing the wastes will eventually break down or corrode, allowing contents to leak out - eventually into surrounding bedrock, groundwater, and the Great Lakes. Dilution is no solution to pollution, as has been observed repeatedly in the world's oceans, rivers, and lakes. Nuclear pollution of the groundwater and the Great Lakes ecosystems - low level, intermediate level and high level - must be avoided at all costs.

Isostatic rebound, involving uplifting of the earth's crust, continues post glaciation and is currently a major factor causing declining water levels in the middle Great Lakes, according to the IJC's Upper Great Lakes Study Board (2011). This movement of the earth's crust, exacerbated by even slight tectonic activity over time, could damage the integrity of a waste repository dug into limestone bedrock and shale rock formations. It is unlikely that cavern linings will last long enough to protect against eventual toxic leakage into surrounding bedrock.

### c) Groundwater Contamination

This is a potential risk during cavern excavation and after construction. Future contamination could result from aging containers and or liners; and seismic activity could render the 'multiple barriers' ineffective. The wastes will eventually escape any human construct. The Great Lakes ecosystems in the area and downstream must not be at any risk of future contamination. Even very small exposures to radioactive wastes can damage the health of plants and animals (including humans).

### d) Seismic Potential

Tectonic activity has been observed countless times in limestone bedrock. A few months after residents of Port Hope were assured by AECL geologists that there was no potential (for at least 10,000 years!) for an earthquake to occur in Lake Ontario, a significant quake registered across the lake from west to east a short distance offshore, parallel to the Canadian shore near the site of the proposed Port Hope nuclear waste repository caverns. This highlights our human fallibility in predicting earthquakes – and should be of paramount concern when considering the degree of safety of caverns dug into limestone bedrock. (The

proposed Kincardine repository is significantly larger than the one that was planned for Port Hope.)

No human fabricated liner, clay (which cracks when it dries out) or otherwise, is able to withstand a significant seismic event. Such events are predicted to increase in number and severity with the effects of climate change, not just here but worldwide. Earthquakes have been increasing in severity and frequency in Canada and around the world in the past few years. We must plan for such events, and avoid (producing and) storing wastes, especially toxic. Future generations will not thank us for our nuclear garbage dumps, hidden or otherwise.

e) Expense

Creating the caverns, transporting the wastes from sites around the province, placing the wastes in primary and secondary containment underground, and maintaining the facility indefinitely will be an enormous cost to citizens and taxpayers. This is an unfair burden to place on today's citizens and future generations.

An above ground, monitorable, retrievable, accessible, and obvious waste repository seems the only sensible, safe solution while the industry finds ways to recycle, detoxify and neutralize its wastes. All costs should be borne by the industry that produces the waste, not the taxpayer. Making production of waste uneconomical is the only way to achieve a zero waste society.

f) Lack of Independent Peer Reviewed Studies

To my knowledge, there are no independent peer reviewed studies of the safety or practicality of creating nuclear waste repositories in limestone bedrock on the shores of significant freshwater reserves. For a project with this level of risk, such studies are critically important before any shovel hits the ground.

Far too much trust is being placed in the computer modelling that the industry has completed indicating their predictions of safety. The proponent has a vested interest in completing this repository at the least possible cost. This is a case for applying the Precautionary Principle, and for insisting on independent peer review of all aspects of the repository design.

g) Waste Management

Any solution to management of radioactive and persistent toxins must not result in a facility that is 'out of sight - out of mind'. Any nuclear or other toxic waste facility must not be hidden away underground. **All** waste, nuclear and otherwise, should be monitorable, accessible and retrievable; **NOT** hidden in deep rock caverns. It is irresponsible and unfair to burden future generations with toxic waste dumps, especially in difficult-to-access locations.

We need 'cradle to cradle' waste management, **NOT** 'cradle to grave'. We need to find ways to avoid generating waste, not to keep creating dumps to contain ever-growing amounts of waste. The ALARA principle (As Low As is Reasonably Achievable) is unacceptable. There is no safe dose of radioactivity. In order to preserve a healthy planet, we must implement a Zero Waste policy across the board, with **no** production of teratogenic, mutagenic, carcinogenic waste by any industry or activity. (All outputs must be reusable or recyclable.)

Decisions regarding all industries, especially the nuclear industry, must be made so as to protect and preserve the environment, so that future generations of all life forms can be healthy. Common sense must prevail, as opposed to following a nuclear or other economically-driven agenda regardless of the costs to society and the natural world.

We need to apply longterm thinking to all decisions regarding waste management, especially nuclear waste management.

I trust the Canadian Environmental Assessment Agency will provide a leadership role, insisting on peer review of this project, and significant efforts by the nuclear industry to reduce, reuse and recycle its wastes while working toward a zero waste policy before approving this cavern complex.