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**Written Submission from
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In the Matter of

Ontario Power Generation Inc.

OPG's Deep Geological Repository (DGR)
Project for Low and Intermediate Level
Radioactive Waste

Joint Review Panel

September 2014

**Mémoire de
Gordon Edwards**

In the Matter of

Ontario Power Generation Inc.

Installation de stockage de déchets radioactifs à
faible et moyenne activité dans des couches
géologiques profondes

Commission d'examen conjoint

septembre 2014

Context: The Abandonment of Nuclear Waste

Ontario Power Generation proposes to prepare a site, and construct and operate a facility for the long-term management of low and intermediate level radioactive waste at the Bruce Nuclear site, within the Municipality of Kincardine.

CEAA Communiqué on Additional Participant Funding, July 17, 2014

The Canadian Coalition for Nuclear Responsibility (CCNR) believes that the sentence quoted above seriously misrepresents the proposed Deep Geologic Repository (DGR) project. The DGR project documentation makes it perfectly clear that Ontario Power Generation's (OPG's) objective is not to manage the wastes in perpetuity, but to abandon those wastes forever.

Note to the Canadian Environmental Assessment Agency (CEAA): abandonment is not the same thing as long-term management; in fact it is the exact opposite.

The fifth sentence of the Executive Summary in OPG's Environmental Impact Statement (EIS) declares that the DGR project involves "site preparation and construction, operation, decommissioning, and abandonment". These four phases are referred to several times throughout the EIS. But only three of them are time-limited.

Abandonment is forever. It refers to a never-ending duration; a period of time that dwarfs the span of human history. It is, for all practical purposes, eternity.

The total amount of time taken to build, operate and decommission the DGR, is zero percent of its total lifetime – for the ratio between any finite number and infinity, is "zero". Indeed, any finite amount of time, no matter how long it may be, is perhaps too short to adequately prepare us for eternity.

In the fall of 2013, the Canadian Coalition for Nuclear Responsibility (CCNR) urged the Joint Review Panel (JRP) not to approve Ontario Power Generation's (OPG's) proposal to abandon all of the low-level and intermediate-level nuclear waste from all of its 20 nuclear power reactors in a Deep Geologic Repository (DGR) excavated in a limestone formation less than a mile from Lake Huron.

The fact that "abandonment" is an essential part of OPG's plans for a DGR means that any approval of the DGR project is also an explicit endorsement of the concept that nuclear waste can and should be abandoned.

CCNR believes that if the Panel were to approve OPG's plans to abandon radioactive wastes – materials that will remain inherently dangerous to living things for more than 100,000 years – it will establish a dangerous precedent for North America and for the world. CCNR holds that such a precedent is not justified either scientifically or ethically.

The Canadian Coalition for Nuclear Responsibility (CCNR) believes that the DGR proposal is not so much about managing nuclear waste as it is about abandoning it. The industry has been talking about “nuclear waste disposal” for decades, but no one knows how to get rid of radioactive waste. We do not know how to eliminate radioactivity or render it harmless. We can only move radioactive waste material from one place to another, or shuffle it from one container to another. Under such circumstances, the word “disposal” is really synonymous with “abandonment”.

The nuclear industry has been diligent in devising methods for packaging radioactive waste material so that it will not escape into the environment in unacceptable amounts. But the containers have a finite life-time, and they are susceptible to various failure modes, so there is an ongoing need to monitor, retrieve, and repackage the wastes from time to time. Given the enormously long lifetime of some of these wastes, that responsibility is transgenerational and the cost is unending, though manageable.

CCNR has advanced the concept of Rolling Stewardship of nuclear wastes as an alternative to abandonment. Rolling stewardship refers to an ongoing intergenerational waste management regime rooted in the reality of the situation. We do know how to package and repackage the waste, we do know how to monitor it and retrieve it, provided we do not allow amnesia to set in.

If the waste is neglected, if the containers are allowed to deteriorate unattended, if detailed knowledge of the waste is lost, if massive leakage goes undetected and uncorrected, the results can be dire.

Rolling stewardship is a deliberate policy of transferring the necessary tools and knowledge from one generation to the next so that the management of the radioactive wastes is maintained at a high level, awareness of the potential danger is never allowed to flag, and the search for a genuinely permanent solution to the nuclear waste problem continues unabated. (A genuine solution would be, for example, destruction or neutralization of the waste.)

Given the indestructible nature of the waste at the present time, the only other alternative to Rolling Stewardship is abandonment, thereby limiting the financial and technical liability of the nuclear waste owners. However simple abandonment just transfers the responsibility to future generations without giving them the knowledge or tools to deal with it effectively. Thus abandonment cannot resolve the most significant public relations problems faced by the industry, unless society endorses abandonment as a responsible and fully justified act.

That’s why Ontario Power Generation (OPG), the Nuclear Waste Management Organization (NWMO), and the Canadian Nuclear Safety Commission (CNSC) are so intent on getting the Joint Review Panel (JRP) to approve the DGR project.

TOPICS TO BE ADDRESSED (IN REVERSE ORDER)

Applicability of recent incidents at the Waste Isolation Pilot Plant (WIPP)

The Waste Isolation Pilot Plant (WIPP) is located in Carlsbad, New Mexico. It is the only operational DGR for nuclear wastes in North America.

Thus the WIPP experience is highly relevant to the OPG proposal, as it is the only example of a DGR for nuclear wastes on this side of the Atlantic. In Germany, the only two operational DGR's for nuclear waste are Morsleben (closed in 1998) and Schacht Asse II (closed in 1995). Both of these DGRs have experienced serious difficulties in maintaining the requisite degree of integrity. At Morsleben the salt dome has deteriorated and seems to be collapsing; since 2003, 480,000 cubic metres of salt-concrete has been pumped into the pit to temporarily stabilize the upper levels, and in addition another 4 million cubic metres of salt-concrete will be used to temporarily stabilize the lower levels. At the Asse II site radioactively contaminated brine was leaking out for almost 20 years before authorities were notified of the situation.

The WIPP facility has been closed since February 2014 because of a poorly understood underground incident that released alpha-emitting plutonium and/or americium dust into the underground passageways. Despite being diverted through HEPA filters some of this dust found its way to the surface where 11 workers were located. The radioactive dust drifted downwind, causing very slight but measurable contamination in the town of Carlsbad, some 10 miles away.

There has been speculation that chemical reactions catalyzed by ionizing radiation interacting with organic kitty litter used as a packing material mat have produced hydrogen gas that exploded and blew the lids off some of the containers stored in the WIPP facility. If so, there is a possibility that many other similar containers stored underground may be subject to the same danger.

Like OPG's proposed facility, WIPP is designed to contain radioactive wastes other than irradiated nuclear fuel. Unlike OPG's DGR, WIPP is reserved for military radioactive wastes from the US nuclear weapons complex rather than civilian radioactive wastes from nuclear power reactors. WIPP is licensed to store these nuclear wastes for a period of 10,000 years –an entire order of magnitude less than the 100,000-year time frame that OPG is envisaging for its DGR. 100,000 years is more than 10 times longer than recorded human history and almost 10 times longer than the existence of the Great Lakes.

The unfortunate experiences at WIPP, Morsleben and Schacht Asse II underscore the inability of science to predict all the possible outcomes in an underground nuclear waste repository. Geology is not so much a predictive science as a descriptive one, and in fact it has only been with the advent of research into DGRs for nuclear waste that the

predictive aspects of geology have become a focus of intense research. Nevertheless, predictive geology is still in its infancy and should not be relied upon to justify irrevocable decisions regarding nuclear waste storage.

Adding to the complexity of the geological situation is the complexity of the nuclear waste itself, and the fact that this waste is not inert but chemically and radiologically active. The variety of waste forms intended for OPG's DGR staggers the imagination.

For example, it is still unknown exactly how the segmentation of the 100-tonne steam generators is going to affect the ability of the radioactive species lodged inside the thousands of corroded pipes of the tube bundle to escape. As previously noted by CCNR, over 90 percent of the mass of the radioactive material lodged inside the steam generators is plutonium. And although OPG and CNSC claim that this plutonium cannot easily become airborne, it is a fact that several hundred trade workers inhaled plutonium-contaminated dust over a period of several weeks while carrying out refurbishment activities at the Bruce A plant because the supervisors told them there was no need to wear respirators or other protective clothing.

That incident does not speak well of OPG's ability to foresee radiological emissions.

Implications of revisions to the reference waste inventory

This is yet another example of how fallible our scientific knowledge may sometimes be. Although it may possibly be true that an increase of four orders of magnitude in the estimation of the radioactive inventory may not have major implications in terms of the off-site environmental impact of the repository, it raises more fundamental questions about the conservatism of OPG's calculations in other areas. If such large errors are tolerated in one part of the calculation, may it not suggest that equally significant errors may have found their way into the computer programs that are used to calculate consequences?

Relative risk analysis of alternative means of carrying out the project.

CCNR does not believe that Rolling Stewardship has been adequately assessed as an alternative, given the fact that Rolling Stewardship incorporates ongoing monitoring, intervention and mitigation measures in real time.

In addition, CCNR does not accept that the only above-ground alternative is the existing Western Waste Management Facility.