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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

Pete Roche

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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

Canada

Joint Federal Review of Ontario Power Generation's Proposed Deep Geologic Repository for Low and Intermediate Level Radioactive Wastes

Resumed Hearing – September 2014

DGR Joint Review Panel Hearing Written Submission in Support of an Oral Intervention

Expansion plans for Ontario Power Generation's Proposed Deep Geologic Repository Project and Implications for the Waste Inventory

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July 2014

Prepared for Northwatch

Background

In 2011, Ontario Power Generation filed an Environmental Impact Statement and technical documents in support of an application to prepare a site and construct a deep geologic repository for low and intermediate level wastes arising during the operation and refurbishment of nuclear power reactors operating in Ontario. During hearings held in September and October 2013, it emerged that Ontario Power Generation also intended to place decommissioning wastes in the same underground facility. Following the hearing, the Joint Review Panel issued a number of additional Information Requests, including IR 12-512, directing Ontario Power Generation to provide additional information about their expansion plans for the DGR project, namely the accommodation of low and intermediate level decommissioning waste from the Pickering, Darlington and Bruce Nuclear Generating Station, and to include in their response information about related changes to the anticipated physical layout and sequencing, implications for the short- and long-term safety cases; and on the cumulative effects assessment.

The idea that the inventory of waste to be disposed of into the DGR might now double in volume to around 400,000m^3 after a public inquiry has considered a range of detailed documents in support of and including the Environmental Impact Statement, which are based on an inventory of 200,000m^{3,} runs completely counter to all principles of good governance.

As Northwatch stated in its initial submission in August 2013:

> *"This has all the appearances of Ontario Power Generation engaging in a game of project splitting, seeking an approval for half a project, knowing full well that they intend to seek an amendment to the approval at some later date to double the capacity and potentially more than double the radiological burden and the period of operations."*

Ontario Power Generation has now confirmed in their response to EIS IR12-512 of the "*expectation from OPG*" that the L&ILW from the earlier than anticipated planned decommissioning of the Pickering Nuclear Facility site "*would be placed into the proposed DGR*."

We also learn from Attachment A to EIS12-512 that the possible increase in the planned waste volume capacity of 200,000 m3 to a capacity of 400,000 m3 could arise from **either new operational and refurbishment activities or decommissioning activities**.

So OPG wants to keep open the option of doubling the capacity to use for operational and refurbishment waste from new reactors as well as decommissioning waste.

Despite these revelations OPG is still unable to provide "…*the detailed waste volumes and characteristics*" of any new waste beyond the initial 200,000m^3 "*since the full characterization cannot occur until reactor shutdown and will also depend on decommissioning methods available at that time*". (EIS12-512 Attachment A)

Radioactive Inventory

OPG states that:

"*The waste types arising from decommissioning activities are fundamentally the same as those arising from operations and refurbishment activities, but the amounts of the various wastes will be different*."

Full characterization of decommissioning waste, according to OPG, will depend upon the stations' operating history, life of the reactors and length of radiological decay prior to decommissioning – all things which OPG must be able to make a reasonable assessment of. (Indeed it estimates that the total radionuclide inventory for all the Pickering stations is presently estimated to be about 53,000 TBq at 30 years following shutdown, and the inventory for all reactor units is estimated to be 390,000 TBq at 30 years following shutdown.)

	Decommissioning Waste	**Operational Waste**
Radionuclide content	Higher	Lower
Total amounts of Ni-59, Ni-63, Fe-55, Co-60, (activation products in metal) Cl-36 and Ca-41 (activation in concrete)	Higher	Lower
Amounts of concrete & metal	Larger	Smaller
Total amounts of H3 and C14 **(**most important radionuclides for operational safety for inhalation exposure)	Expected to be less	
Co-60 inventory (With Cs-137 most important radionuclides for operational safety for external irradiation)	Expected to be higher.	Lower
Most important radionuclides in terms of the higher dose scenarios for long-term safety are C-14 and Nb-94	Similar, so adding waste arising from decommissioning to the DGR would result in a calculated post-closure peak dose that is approximately double the dose calculated for waste arising from operational and refurbishment only	Similar

Other radionuclides, notably Ni-59 and Ni-63	Larger inventory, but the increase has limited effect since these are sufficiently small dose contributors for operations and refurbishment L&ILW that their dose contribution remains relatively small.	
Gas Generation Potential	Expected to be larger due to higher metal content.	

A more detailed look at Attachment A, however, reveals some significant differences between operations and refurbishment waste and decommissioning waste. These are summarised in the following table:

The EIS stated clearly that the DGR will accept operational and refurbishment L&ILW. (Section 4.5)
Table 4.51 details ten different types of LLW and Table 4.5.2 shows eleven different types of ILW. Even if restricted to operational and refurbishment waste there is:-

"…considerable variability both across waste categories, and also from package to package within a waste category." (Section 4.5.1)

But "*The characteristics of various waste types have been identified, and information recorded on waste packages in an electronic records system called IWTS, the Integrated Waste Tracking System*."

"*…it is estimated that approximately 53,000 packages representing a total emplaced volume of approximately 200,000 m³ will be sent to the DGR*."

Table 4.5.1-2 gives information about numbers of packages and volumes of different types of waste, and Table 4.5.2-1 gives an estimated radionuclide inventory for operational and refurbishment waste in 2062.

Little of this type of detailed information is available for decommissioning waste.

EIS13-514 concerning recent correspondence between Dr. Frank Greening and the NWMO, raises some serious issues about the accuracy of the existing inventory of operational and

refurbishment waste to be emplaced in the DGR. These are wastes that have been subjected to a relatively thorough EIS assessment.

Yet we are expected to accept OPG's back-of-the-envelope estimate that adding decommissioning waste will "*double the dose calculated for waste arising from operational and refurbishment only*".

Gas Generation

One area of particular concern is the increased potential for gas generation from decommissioning wastes. IR12-512 states that:

"*Preliminary projections for wastes arising from decommissioning indicate that these wastes will contain a larger proportion of metals than in the wastes from operations and refurbishment. This would result in more gas generated from anaerobic metal corrosion within the repository in the long-term.*"

As pointed out in earlier Northwatch evidence by Professor Stuart Haszeldine, OPG's Safety Case relies on the *"proposition that gas generation will keep the repository dry … This depends on accurate and precise understanding of the rates of gas generation and the rates of water ingress."*

Adding decommissioning waste to the DGR inventory at this late stage throws the development of the Safety Case into disarray.[1]

Inventory Principles

The UK's Committee of Radioactive Waste Management highlighted the fact that the creation of more wastes raises "*political and ethical issues* [which are] *quite different from those relating to … unavoidable wastes*"[2]

Accordingly, OPG should be asked to rule out the use of the DGR for waste from new reactors.

[1] See Review of Ontario Power Generation's Safety Case For the Proposed Deep Geological Repository for Low and Intermediate Level Radioactive Wastes, Dr. Rachel Western BA(Oxon) PhD MRSC, Northweatch August 2013

[2] Managing Our Radioactive Waste Safely, CoRWM Recommendations to Government, CoRWM July 2006. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/294118/700_-_CoRWM_July_2006_Recommendations_to_Government_pdf.pdf See para 26 page 13

Conclusions

Frank Greening notes "*OPG's failure to consider the chemical properties of some of it most radioactive waste*." This is a similar point to much of the argument used in the Nuclear Waste Advisory Associates' Issues Register.[3] Uncertainties regarding radionuclide properties detailed by NWAA, such as their solubility and sorption – or even their presence as a gas - could mean estimated contamination levels calculated for a deep geological disposal facility are in error by a factor of 10,000 to 1,000,000 which clearly has implications for the risk estimates.[4]

Given this background, it is totally unacceptable for OPG to seek permission to add to the DGR inventory additional wastes which may come from decommissioning or even new reactors but which have not been properly characterised or subjected to a full Environmental Impact Statement process or even comprehensively listed.

[3] NWAA Issues Register March 2010 http://www.nuclearwasteadvisory.co.uk/wp-content/uploads/2011/06/NWAA-ISSUES-REGISTER-COMMENTARY.pdf

[4] NWAA submission to the House of Commons Energy and Climate Change Committee, "Effective Arrangements for Waste from New Reactors Do Not Exist", February 2010 http://www.nuclearwasteadvisory.co.uk/wp-content/uploads/2011/06/Memorandum_to_HoC_ECCC_Jan10.pdf