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Oral intervention from

Glenn R. Sutton

In the Matter of

Ontario Power Generation Inc.

Proposed Environmental Impact Statement for OPG's Deep Geological Repository (DGR) Project for Low and Intermediate Level Waste

Joint Review Panel

September 16 to October 12, 2013

Intervention orale par

Glenn R. Sutton

À l'égard de

Ontario Power Generation Inc.

Étude proposée pour l'énoncé des incidences environnementales pour l'Installation de stockage de déchets radioactifs à faible et moyenne activité dans des couches géologiques profondes

Commission d'examen conjoint

16 septembre au 12 octobre 2013

DGR Joint Review Panel Hearing

Written Submission in Support of an Oral Intervention

Glenn R. Sutton P. Eng., PMP

August 12, 2013

Attention:

Debra Myles, Panel Co-Manager
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160 Elgin Street, 22nd Floor
Ottawa ON K1A 0H3

Kelly McGee, Panel Co-Manager
c/o Canadian Nuclear Safety Commission
PO Box 1046, Station B – 280 Slater Street
Ottawa ON K1P 5S9

Dear Ms. Debra Myles & Ms. Kelly Mc Gee

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

Please find below my Written Submission in Support of an Oral Intervention for the proposed long term underground storage of Low Level (LLW) & Intermediate Level (ILW) nuclear waste in an underground DGR at OPG's Western Waste Management Facility (WWMF) at the Bruce nuclear site in the Municipality of Kincardine (MOK).

1) Overview & Summary of Early Stages of The Years Leading Up To MOU & MOK Bylaw

To compliment my two previous submissions I have made to the JRP on this subject, I have attached two powerpoints that I will now briefly go through. They describe the reports back to the Municipality of Kincardine Council by two separate groups of council. European sites were visited in 2002 while American sites were visited in 2003. Each site treated nuclear waste disposal in slightly different but similar ways and the objective was to determine "best practices".

(References 1 & 2 attached).

2) Michigan Senate Motion

On May 22, 2013 the Sate of Michigan passed Senate Resolution No. 58. (Reference 3). Here is text from that substituted resolution:

"Whereas, As part of an effort to protect water quality, Michigan's siting criteria for the disposal of low-level radioactive waste prohibits any site located within ten miles of Lake Michigan, Lake Superior, Lake Huron, Lake Erie, the Saint Mary's River, the Detroit River, the St. Clair River or Lake St. Clair."

Please refer to Appendix A for the actual wording of the State of Michigan Law upon which this substituted resolution was based.

The bolded text below is taken from this Act 202 clause i) :

This subdivision shall not apply to a site that is located at or adjacent to a nuclear power generating facility.

NOTE: this is important as this text was left out of Senate Resolution No. 58.

Why is it that the Senate Resolution No. 58 left out that text ?

In other words, it is permitted in the State of Michigan to have a candidate site for Low Level Radioactive Waste located within 10 miles of Lake Michigan, Lake Superior, Lake Huron, Lake Erie, Saint Mary's river, Detroit river, St. Clair river, or Lake St. Clair if that site is "located at or adjacent to a nuclear power generating facility".

In summary, it appears that Senate Resolution No. 58 is flawed in its interpretation of the Low-Level Radioactive Waste Authority Act 204 of 1987.

Accordingly; as such, that part of this resolution that refers to the "proposed nuclear waste repository", should be ignored. This is because if the same standard were applied in Ontario, as in Michigan, then it would not apply to the underground DGR that would be located between Bruce NGS-A and Bruce NGS-B as both Bruce NGS-A and Bruce NGS-B are located within 10 miles of Lake Huron.

3) USA Comments on Proposed DGR at OPG's WWMF

It must be noted, as well, that the following two statements (Reference 4) were made by USA government organizations when they reviewed the studies and raw data sent both to the US Environmental Protection Agency (EPA): and the Michigan Department of Environmental Quality" :

3.1) US Environmental Protection Agency (EPA):

"In comparison to other international programs, the proposed DGR site at 2,230 feet beneath the Bruce Nuclear site , is the deepest planned facility in the world, **is bounded by the thickest assemblage of low permeable cap rocks**, and **is isolated from surface and drinking water**".

3.2) Michigan Department of Environmental Quality:

"The Department of Environmental Quality reported that it studied the Environmental Impact Statement for the proposed project and related studies and '**has no technical objections to the conclusions reached in the many various studies**'.

It makes one wonder if the Michigan Senators or Michigan Senate research staff ever contacted their own governmental agencies charged with the responsibility of reviewing the associated DGR documentation sent for their review.

4) Great Lakes & St. Lawrence Initiatives (GLSLI) Position

Based on the May 24, 2013 submission from the GLSLI, their concluding statement was:

"However, the limited time to review the record and prepare comments, the limited outreach to the broader Great Lakes and St. Lawrence community, and the consideration of only one site that is one kilometer from Lake Huron leads us to conclude that the project should not move forward at this time".

My own personal comment here is **"Where were these people for the last four or five years"** ? It is hard to believe that the GLSLI, who recently made comments on a proposed shipment of steam generators from the Bruce site to Sweden would not have come across the proposed LLW DGR project during their review of that proposed shipment.

GLSLI's submission also contains two more statements:

a) "The Cities Initiative appreciates the cooperativeness of OPG in arranging a fact finding site visit to the proposed facility for several members of the organization. All of the right people from OPG and others from the Nuclear Waste Management Organization were there and all questions were answered in a very forthright manner. In addition, written material was provided in advance and during the tour to further inform the participants. The Cities Initiative learned a great deal more about the project and is in a better position to provide comments."

From this text, GLSLI acknowledges that they have received information about the LLW/ILW DGR and are in a better position to make comments. Thus a logical expectation would be <u>for GLSLI to please make their comments</u>.

b) "As good as the geology for the site and the engineering for the DGR may be, it is hard to believe that there might not be more appropriate site elsewhere."

From this text, it sounds like NIMBY (Not In My Back Yard) at work. However; from the first half of this statement, it appears that <u>GLSLI recognizes that the geology and engineering are good</u>. That in itself is a significant admission on the part of the GLSLI.

As far as their comment on only one site goes, only one site is considered for this application by the proponent, as the original impetus for the project came from the municipality in which the site is located.

5) Radiochemical Aspects of Nuclear Waste Decay & Disposal

Please refer to Reference 5 for a very detailed book describing radiochemical aspects of nuclear waste decay & disposal. This book was written mainly for HLW but also addresses both LLW & ILW. It is brought to the JRP's attention for their consideration as a technical resource for evaluation of the LLW/ILW DGR.

6) Modelling of DGR

In Reference # 6 Attachment # 1, section # 2.1, mention is made of "Texaco # 6 exploratory borehole, 2.9 km east of the site." I do remember being informed about this borehole during the early years of the project while on council at various committee meetings. As well, this borehole is part of the public record included in the Ontario Oil, Gas and Salt Resources Library Petroleum Wells Subsurface Database. This information is in section 2.1 of Reference # 6 Attachment # 1 . I am mentioning this to illustrate that the modeling completed for this project included data from 341 well records (as per section 2.1 of Reference # 6 Attachment # 1, in the region of the proposed DGR. The analysis was completed for a "35,000 km2 DGR regional scale domain" as per section 2.1 of Reference # 6 Attachment # 1.

I did listen in via the internet when Technical Information Session # 1 was held in Ottawa at the CNSC offices. That session did go through all of the powerpoint slides found in Attachment # 2 of Reference # 6.

OPG staff & consultants who prepared detailed analysis reports were questioned by the JRP for purposes of clarification.

A **summary of a few major conclusions** from Reference # 6 Attachment # 2:

These analyses were done assuming a water well was located on top of the DGR:

"It also includes a water supply well located down gradient from the shaft."

a) slide 23: "The mean life expectancy (MLE), which is a measure of the time that it will take a solute to migrate to a point of groundwater discharge, is estimated to be greater than 100 million years.
b) slide 72: the concentration of Chlorine 36 in the waste was assumed to be "dissolved instantaneously in a fully-saturated system". Also, "In all cases it is clear that radionuclides have not travelled far from the repository, due to the almost total lack of advection in the system. Diffusion is the dominant transport mechanism. This is consistent with the conclusions from the Geosynthesis for the host rock." Both of these quotes are from Reference # 6 Attachment # 1, section # 3.2.
c) slide # 116: the results of the analysis completed by the AMBER DGR model are graphed. From the Quintessa web site, AMBER "is a flexible graphical-user interface based software tool that allows users to build there own dynamic compartmental models to represent the migration, degradation and fate of contaminants in environmental and engineered systems".

   Note that one of the assumptions is "a self-sufficient family farm is located on repository site using the well water and farming all their own food."

Conclusion: "As shown in slide # 116, the AMBER DGR results are consistent with but more conservative than those calculated using the more accurate FRAC3DVS-OPG code."

7) DGR's Near Large Bodies of Water

The question has been raised about a DGR being located adjacent to large bodies of water. A DRG is very similar in design and operation to a mine. This is a valid question; however, there are several examples of DGR's located near (or under) large bodies of water. These include:

a) SFR in Sweden beside (and under) the Baltic Sea (that I toured in 2002).

b) Onkalo repository by the Olkiluoto Nuclear Power Plants in Finland near the Gulf of Bothia.

c) Loviisa repository near the Loviisa Nuclear Power Plants in Finland on the Gulf of Finland .

Many mines are located directly underneath large bodies of water. Locally, in Goderich, Ontario, we have a salt mine that goes under Lake Huron (that I toured in approximately 2005). Of particular note, is this large salt mine (located due south of the Bruce site) is located under Lake Huron. It is also located in strata that are younger, thus, higher than those strata proposed for the DGR.

8) Effect of Climate Change & Ice Ages

8.1 Climate Change: it appears that a greater number of hurricanes & tornadoes are being experienced due to climate change. With respect to tornadoes, it would be safer to have any DGR located below the surface of the earth, than risk the potential damage to above ground storage facilities. This is a general statement.

8.2) Ice Ages: our most recent ice age was about 10,000 years ago. Current estimates of the next ice age indicate that it will be in less than 20,000 years (Reference 5 page 16). This time frame of 20,000 years is at the early stage of the design life for a DGR. Prudence would suggest that a DGR located below the surface of the earth would be more safe from the effects of a new ice age.

9) Summary & Recommendations

9.1 A massive amount of research has been undertaken for this proposed DGR.

9.2 The quality of this research is very high.

9.3 International experts have been consulted.

9.4 Extensive outreach and communications have taken place.

I, as before, again concur with the conclusion that the DGR is not likely to result in any significant adverse residual effects to human health or the environment.

In summary, as before, for additional reasons and new references presented above, I would again urge the Joint Review Panel (JRP) to accept and approve OPG's Environmental Impact Statement (EIS) and the Preliminary Safety Report (PSR) for the LLW/ILW DGR.

Further, that the JRP allow the DGR project as proposed, to proceed onto the next step (s) in the process.

10) Future Participation re The DGR

I would appreciate an opportunity to take part in any future participation that the Joint Review Panel (JRP) may have re the OPG LLW/ILWDGR.

Respectfully Submitted

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Glenn R. Sutton

P. Eng., PMP

References & Appendices:

1) LLW & ILW Waste Management Study Investigation – Municipality of Kincardine/Ontario Power Generation October 26 to November 2, 2002 (Powerpoint).

2) LLW Sates Tour - Municipality of Kincardine/Ontario Power Generation 2003 (Powerpoint).

3) SR-58, As Adopted by Senate, May 22, 2013. Substitute For Senate Resolution No. 58.

4) Kincardine News "Michigan Senate calls for review of proposed OPG DGR", May 29, 2013.

5) The Chemistry of Nuclear Fuel Waste Disposal by Donald R. Wiles, Polytechnic International Press, Chemistry Department, Carleton University, 2002. ISBN 2-553-01025-7.

6) Letter from OPG to Dr. Swanson: "Deep Geological Repository Project for Low and Intermediate Level Waste – Submission for the October 11, 2012 JRP Technical Information Session # 2", October 3, 2012 –

Attachment # 1: OPG's Written Submission for JRP's Technical Information # 2 on October 11, 2012.

Attachment # 2 to Reference # 6 Letter (Powerpoint Slides).

APPENDIX A

State of Michigan

LOW-LEVEL RADIOACTIVE WASTE AUTHORITY ACT (EXCERPT)
Act 204 of 1987

333.26210 Final siting criteria; establishment; minimum requirement.

Sec. 10.

The authority shall establish final siting criteria that at a minimum excludes a candidate site that is any of the following:

(a) Located in a 500-year floodplain.

(b) Located over a sole source aquifer.

(c) Located 1 mile or less from a fault where tectonic movement has occurred within the 10,000 years preceding the effective date of this act.

(d) Not sufficiently large to assure that an isolation distance of 3,000 feet or more from the disposal unit and adjacent property lines is available.

(e) Has wetlands within the boundaries of the candidate site as defined in part 303 (wetland protection) of the natural resources and environmental protection act, Act No. 451 of the Public Acts of 1994, being sections 324.30301 to 324.30323 of the Michigan Compiled Laws.

(f) An environmental area or a high risk area as defined in part 323 (shorelands protection and management) of Act No. 451 of the Public Acts of 1994, being sections 324.32301 to 324.32315 of the Michigan Compiled Laws.

(g) A floodway designated under part 31 (water resources protection) of Act No. 451 of the Public Acts of 1994, being sections 324.3101 to 324.3119 of the Michigan Compiled Laws.

(h) Located where the hydrogeology beneath the site discharges groundwater to the land surface within 3,000 feet of the boundaries of the candidate site.

(i) Located within 10 miles of Lake Michigan, Lake Superior, Lake Huron, Lake Erie, Saint Marys river, Detroit river, St. Clair river, or lake St. Clair. **This subdivision shall not apply to a site that is located at or adjacent to a nuclear power generating facility.**

History**:** 1987, Act 204, Imd. Eff. Dec. 22, 1987 ;-- Am. 1996, Act 68, Imd. Eff. Feb. 26, 1996