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**Written Closing Remarks from
Algonquin Eco Watch**

**Observations écrites finales de
Algonquin Eco Watch**

In the Matter of

À l'égard de

Ontario Power Generation Inc.

Ontario Power Generation Inc.

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

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

Joint Review Panel

Commission d'examen conjoint

October 2014

Octobre 2014

OPG – DGRP OCTOBER 9TH SUBMISSION

(Mike Wilton – Representing Algonquin Eco Watch)

Thank you for this opportunity to comment further regarding the OPG DGRP. Since I am not an expert, I will express my comments more as questions than as statements.

As stated in our 2 previous presentations, Algonquin Eco Watch is primarily concerned with the possible changes that may affect the long-term health of the shallow and deep groundwater in the vicinity of the site.

The danger is considered to lie in the expectation that the structure will maintain integrity for up to 10,000 years and beyond, in spite of on-site blasting, possible fracking, earthquake(s), continuing post-glacial crustal uplift and global climate changes.

There will necessarily be a huge amount of blasting to create the facility. Will this not create many new cracks and fissures for groundwater to penetrate to new deeper levels? If this is the case, it seems that greater external groundwater pressure will result against the structure itself. In the event that the structure is breached, two new problems emerge. Firstly, the pumping of contaminated water to the surface for long-term treatment of natural pollutants and the presence of radioactivity will be necessary, and secondly, the possibility of the cavern filling with water at which time internal and external pressures will equalize and outward groundwater flow will occur toward Lake Huron.

I was assured at the most recent hearings (September 15th, 2014) that fracking will never be undertaken within “tens of kilometers” of the DGR site. “Never” is a long time, especially when no one can either predict with any degree of accuracy what new technology may enable the future extraction of hydrocarbons, or how desperate future generations may be to utilize such technology. Evidently at the present time, fracking wells can penetrate in excess of 10,000 feet in depth (University of Michigan, 2013) and can also drill horizontally. At any rate, IF fracking were to occur within the proximity of the site, would it not only affect the quantity and quality of groundwater, but also seriously impact the stability of the site itself and the surrounding substrate?

While earthquakes are indeed unlikely in the vicinity of the site, does the possibility of an event similar to the 2010 “Ottawa” quake not cause concern regarding site stability for (at least) the next 10,000 years? Would not a seismic event greater than 5.0 on the Richter scale destabilize the structure as well as introducing changes in groundwater flow?

Tilting of the Great Lakes Region, otherwise known as “Crustal Movement”, “Crustal Uplift”, or “Post-Glacial Rebound” resulting from de-glaciation, has been well documented (Mainville and Craymer 2005, Lee and Southam 1994). It is predicted that a significant relative rise in the earth’s crust north of the Great Lakes Basin and a compensating lowering of the crust south of the basin will occur during the next 10,000 years. Can anyone guarantee that the resulting opposing stresses will not cause fracturing within the rock layers, initiating new cracks and fissures as well as structural damage to the DGR? New cracks and fissures will result in changing groundwater flow.

Consider a hollow rubber sphere or ball similar to a volley ball at xx lbs. /sq. in. internal pressure. The ball is encased in rectangular tiles, each of which is touching its “neighbour” on all 4 sides. If the internal pressure is increased within the ball, it will enlarge and spaces will appear between the tiles. If the pressure continues to increase, so will the space size between tiles. If however, the pressure within the ball is reduced below xx lbs. /sq. in., the tiles will be pressed closer together and will eventually buckle. Attachment 1 illustrates how parallel sedimentary rock “tiles” on the Manitoulin Island have separated with no buckling. In such an instance, one would expect buckling, unless the substrate is expanding to allow ongoing separation of adjacent tiles. This supports the theory of crustal uplift. If this phenomenon were being caused by winter ice forcing the tiles apart, it would likely be accompanied by buckling, since there would be no corresponding expansion of the substrate. Buckling would also be expected if crustal subsidence were occurring, since this would likely be accompanied by substrate contraction. Attachment 2 illustrates probable crustal uplift in sedimentary rock and possible crustal uplift in Precambrian rock

Has the phenomenon of crustal uplift been thoroughly investigated in the DGR vicinity? Is there a likelihood of its increasing, decreasing or stabilizing during the next 10,000+ years? Has depth of post-glacial crustal uplift penetration been established? Distortion of the earth’s crust will undoubtedly give rise to pressure changes, which in turn will likely give rise to increasing cracks and fissures, ultimately causing variations in the penetration of surface and upper groundwater into the lower reaches and increasing the possibility of contamination.

I have tried to understand why locating this structure below ground level would be advantageous. The only reason that I could think of would be in the event of a terrorist attack. In the unlikely possibility that that might happen, I’m sure that the terrorists would be more focused on the reactor itself, (which is located above ground), than the below ground facility containing only low and medium yield nuclear waste. In the very unlikely event that re-glaciation might occur in the unforeseeable future as a result of global climate change, the reactor itself would be swept away and the fact that low and medium waste remains protected below ground would be of little comfort.

In addition to pre-construction blasting, while all the apparent uncertainties within the next 10,000+ years, such as fracking, earthquakes, post-glacial crustal uplift and global climate change may seem remote and unlikely in today’s world, would it not be wiser to build an “earthquake-proof” storage facility above ground whose structural integrity can be monitored and corrected as needed during the long-term future?

Any form of physical, chemical, or nuclear pollution, or even changes that involve groundwater flow patterns, are indeed “forever” and must be guarded against for the sake of future generations.

Mike Wilton (representing Algonquin Eco Watch)
October 7, 2014.

POST GLACIAL CRUSTAL UPLIFT

Hypothesis: Assuming that this Manitoulin Island sedimentary rock shelf was originally contiguous, these parallel cracks must have developed as a result of upward pressure from below and have since widened. This supports the theory of post glacial crustal uplift as the substrate continues to expand and lift. While crustal downshift would also have resulted in stress cracks, that would have caused jamming and “tipping” of the adjacent rock sections.



Showing probable Crustal Uplift in layered Sedimentary rock (left) and possible Crustal Uplift in Precambrian rock (right)

