

## **New TIC JRP Submission March/ April 2013**

The Inverhuron Committee represents a group of approximately 300 residents (both permanent and seasonal) of the hamlet of Inverhuron. Inverhuron is the community that is closest to the proposed Bruce DGR and as a result, our Committee is very concerned about the risks associated with the proposed DGR. Many of these residents are the third or fourth generation of their families who have summered at Inverhuron. As a result there is a very keen interest in the preservation of this very unique community and the health of Lake Huron and the rest of the Great Lakes for generations to come. Our concerns are tabled below:

### **1) Risk to the Great Lakes**

Firstly, the Inverhuron Committee would like to support the comments of other respondents with concerns relative to the proposal to build a deep geological repository in the location suggested. Taking into account that we are a vast country with wide open spaces and a scattered population, the Inverhuron Committee feels, as others do, that to situate this repository within a band of the highest population density of Ontario and next to the Great Lakes, a major source of fresh water and the source for drinking water for 40 million people, is not only unwise but fraught with severe risk. Many respondents have mentioned the issue of drinking water and the protection of the Great Lakes. This has to be a number one consideration and of paramount concern.

### **2) NWMO is not leveraging work of the Seaborn Commission.**

Other respondents have spoken about the geology of this area. Originally, the mandate of the NWMO (created in 2002) was to search for a solution to the increasing accumulation of used nuclear fuel that included three options:

1. a deep repository
2. continued storage at the sites
3. centralized above-ground storage

The Seaborn Commission, founded in 1988, recommended that the focus of storage should be on the stability of the granite rock of the shield (Cambrian or pre-cambrian in structure). Following the Seaborn Commission, Securad re-iterated that success would be ensured if an ancient, stable, non-seismic environment was chosen with no water circulation over 150 metres AND an area devoid of human habitat for 100 square kilometres was recommended. Securad, Inc. was formed in 1995 as an independent and privately-owned Canadian firm whose responsibility was to plan, construct and operate a management facility for used nuclear fuel.

Guidelines, based on ten years of research through the Seaborn Commission, give us the best context available for this project and should be integrated by Ontario Power Generation into their search for a site for the low and medium level waste, considering that the **intermediate waste** has the same profile as the high level waste. We need a consistent framework.

We have drifted away from this mandate, however, facilitated by the fact that the Municipality of Kincardine offered to host the deep repository. The Municipality **itself** chose the deep repository option and subsequently, studies have been undertaken to fit the criteria to the host community. With such a crucial project to be undertaken, how can we blatantly shift the criteria from what was studied over ten years and recommended to merely fitting a “welcoming community”??

### 3) Lack of Good DGR Track Record

The other “big picture” issue that is of significant concern to the Inverhuron Committee is the lack of **best practices** in this field. In terms of the low and intermediate level waste, we have some examples of other countries that have experimented with deep repositories. Unfortunately, their experience has been haphazard:

- the Asse II repository built in a salt dome in Germany has been leaking into the airtight chambers since 1988 after merely ten years of operation. The “brine contaminated with cesium -137, plutonium, and strontium” was finally reported in 2008, 10 years after the leakage began (National Geographic, July 8, 2010).
- In Morsleben, Lower Saxony Germany, a low level and intermediate level waste repository has required “that 630,000 cubic yards of salt concrete be pumped into the pit to temporarily stabilize the upper levels” (Wikipedia).
- At Maxey Flats, Kentucky a low-level waste repository operated from 1963-1977. Scientists used computer modeling to predict that the waste would travel half an inch over 24,000 years. However, in less than 10 years the waste was found two miles offsite (Shrader-Frechette, 1993-12-03, Burying Uncertainty). The site was closed in 1977 due to increased concern relative to the migration of radionuclides away from the site.
- As well in the United States, Oak Ridge in Tennessee and Hansford in Washington have faltered according to an NNWPO document (Shrader-Frechette 1993, p.240). This report also cites that “experts know that waste from a permanent, unmonitored and irretrievable repository will escape”. The question is when and how?

The United States has a repository that is operating successfully but it is located in the desert in New Mexico, a very different environment and geology than what is being proposed here in Canada.

We have no best practices in this field and to proceed without a positive history would be foolish as we place this “experiment” irretrievably underground near the largest body of fresh water in the world.

#### 4) No proven support for the geological choice of Argillaceous Limestone.

Every country has a different recommendation as to the geology recommended for DGR's with Canada being the only advocate for Argillaceous Limestone (see attached chart). Notably, several other countries are proposing granite as the solution (similar to the Seaborn Commission). How does the NWMO justify this risk?

Country	Facility Name	Location	Waste	Geology	Depth	Status
Argentina	Sierra del Medio	Gastre		Granite		under discussion[11]
Belgium			high-level waste	plastic clay	~225 m	under discussion
Canada	OPG DGR	Ontario	200,000 m3 L&ILW	argillaceous limestone	680 m	licence application 2011[12]
Canada			spent fuel			under discussion
China						under discussion
Finland	VLJ	Olkiluoto	L&ILW	Tonalite	60-100 m	in operation 1992[13]
Finland		Loviisa	L&ILW	Granite	120 m	in operation 1998[13]
Finland	Onkalo	Olkiluoto	spent fuel	Granite	400 m	under construction[6]
France			high-level waste	Mudstone	~500 m	siting[7]
Germany	Schacht Asse II	Lower Saxony		salt dome	750 m	closed 1995
Germany	Morsleben	Saxony-Anhalt	40,000 m3 L&ILW	salt dome	630 m	closed 1998
Germany	Gorleben	Lower Saxony	high-level waste	salt dome		proposed, on hold
Germany	Schacht Konrad	Lower Saxony	303,000 m3 L&ILW	sedimentary rock	800 m	under construction
Japan			high-level waste			under discussion[14]
Korea	Gyeongju		L&ILW		80 m	under construction[15]
Sweden	SFR	Forsmark	63,000 m3 L&ILW	Granite	50 m	in operation 1988[16]
Sweden		Forsmark	spent fuel	Granite	450 m	licence application 2011[17]
Switzerland			high-level waste	Clay		siting
United Kingdom			high-level waste			under discussion[18]
USA	Waste Isolation Pilot Plant	New Mexico	transuranic waste	salt bed	655 m	in operation 1999
USA	Yucca Mountain Project	Nevada	70,000 ton HLW	Igimbrite	200-300 m	proposed, canceled 2010

Related to this issue of where a safe DGR can be built, the following experts have shared their views. The Inverhuron Committee would appreciate comments on these views that would alleviate our understandable concerns in reading this information.

Allison Mcfarlane, an MIT trained professor of geology and the present Chair of the Nuclear Regulatory Commission in the US said "it is almost impossible to decipher the detailed history of a rock, let alone predict reactions into the geologic future.

Geology has not advanced far enough yet to expect that it can do this..."

"The ability of the limestone and shale rock formations to block or even slow the migration of radionuclides from the repository is unproven. There are no precedents anywhere in the world for burying radioactive nuclear waste in limestone. The repository must function to safely contain the nuclear wastes for over 100,000 years. No scientist or geologist can provide a 100,000 year guarantee."

Independent geologist, Professor J.F. Sykes of the University of Waterloo, in a study done for NWMO 'Characterizing the Geosphere in High Level Radioactive Waste Management' noted that "Beneath the Bruce Nuclear Power Development on Lake Huron, the Ordovician shales of the Michigan Basin are likely to have hydraulic conductivities in the range of 10 to the 11th to 10 to the 14th m/s at depths of 500m (Moltyaner et al 1995). The pore water in the formation is highly saline and stagnant. However, the physical properties of shale can undergo significant irreversible alteration with low or moderate changes in temperature, or stress."

### **5) Payment to the municipalities will not compensate for damage to the Great Lakes – it is a bigger issue**

The Inverhuron Committee would like to look at this issue from a more personal perspective. Most of our constituents are residents of the Hamlet of Inverhuron and, therefore, part of the Municipality of Kincardine. Our dominant concern about the siting process for the repository is the stipulation that a "welcoming host" be sought as the prime criterion for selecting a community. This allows OPG to telescope their approval to a small community instead of following federal and provincial government policies and criteria and of inviting all Canadian citizens to have a voice in the solution.

The welcoming host in this case has been compensated 1.3 million dollars, as of June 30, 2005, to sign an initial agreement (2004). In addition, another lump sum of 1.3 million dollars will be remitted by OPG June 30, 2013 or 90 days after the CNSC has granted a license for the repository. Over the next 30 years, 35 million dollars will be dispersed in the Municipality and surrounding "supporting" Municipalities from Huron-Kinloss to Saugeen Shores. This certainly ensures a bias by all of the political actors on this stage and in fact, this appears to be a conflict of interest for the Council to make further decisions.

In a document written by Matti Kojo of the University of Tampere, Finland and Phil Richardson of Galston Sciences, U.K., (March 2012) they cite Been (1994) as promoting **value added** to a community that is in the siting process. He states, "reward the community for accepting the facility by providing funds or benefits in excess of those required to remedy any harms caused by the facility". The organizations who are seeking a site for the waste try to "mitigate harm" by influencing what should be the pure and knowledgeable consent of the communities involved.

The potential harm to the Great Lakes should not be “mitigated” by a financial contribution of any amount to the political arm of the community. What is the cost if there is contamination of the Great Lakes?

**6) Local community is deemed in support but it really wasn't consulted properly and therefore support may not be what it appears.**

In fact, the hosting agreement, in this case, was signed by the Mayor of Kincardine, even before the community was consulted. This tactic has been referred to as Decide-Announce-Defend (J. Hunt 2001 in the Valdor 2001 proceedings pp 222-229).

The Municipality of Kincardine has declared itself as a welcoming community, substantiated by a survey done in early 2005. Our concern is that the survey was done in a community where there is a strong presence of Bruce Nuclear Power workers (approximately 40%). The residents not only work at the plant but they have family and friends who work at Bruce Power. The small business owners rely on those workers for their bread and butter and, we understand, are feeling pressure to support this initiative.

The Inverhuron Committee is additionally concerned about the fact that the survey was primarily done over the phone with little time for respondents to give a thoughtful answer or ask questions. Moreover the question was very generic without an explanation of low and intermediate waste or about the design of the facility:

*“Do you support the establishment of a facility for the long-term management of low and intermediate level waste at the Western Waste Management Facility?”*

The survey drew a 71 per cent response rate with: 60 per cent – yes, 22 per cent – no, 13 per cent – neutral, and 5 per cent – don’t know/refused to answer. This means while 60% of respondents answered yes to this very non-specific question, this 60% translates to only 42% of the total survey group (less than half). And since only 29% of the seasonal residents responded (since most would not be accessible by phone in the mid-winter) we suspect that a full response by these residents would have indicated a different result.

In the fall of 2012, the Inverhuron Committee did a survey in order to find out how many people in our particular community really knew about this project. We received feedback that 86% of the respondents were NOT in favour of the repository and that 25% were not aware of the project. We found only one family out of over 200 residents that remembered, recognized or responded to the mail-in survey. This gives us a pulse on where this issue stands in the Inverhuron community.

In summary, while we feel that a local survey should not be a deciding factor on a matter that affects 40 million people, the survey process that was undertaken was biased and flawed and does not provide a true representation of local support for the DGR.

## **7) The Lifespan of DGR**

The Inverhuron Committee is concerned about the commitment to monitoring the DGR. The DGR is expected to be used for 35-40 years and then decommissioned and with only passive monitoring for another 300 years. Given that much of what is stored in this DGR could have remain toxic for 100,000 years, how does OPG ensure the protection of future generations from leakage into groundwater, soil and the lake without continued monitoring?

## **8) What happens if the water of the Great Lakes rises? (per [www.maritimehistoryofthegreatlakes.ca](http://www.maritimehistoryofthegreatlakes.ca))**

In the late 19<sup>th</sup> century, Professor G. K. Gilbert concluded that the Great Lakes water levels would rise over the coming centuries. Grove Karl Gilbert was considered by his own and future generations to be the greatest of all American geologists, and a founder of the National Geographic Society.

Professor Gilbert specifically estimated the vertical rise at Hamilton to be six inches per century and the estimated rise of Lake Erie was nine inches per century. While he didn't mention Lake Huron specifically with respect to a water level rise, he also estimated that the rise of the Lake Michigan level at Chicago was to be about one inch in ten years. It is reasonable to expect that, if his prognosis is true, that Lake Huron, as part of the Great Lakes, would see such levels of rising water as well.

While of late, we are seeing water level decreases on the Great Lakes, how do we have assurances that the Great Lakes levels will not rise over the next centuries. If Professor Gilbert was correct, Great Lakes levels could rise by 2.5 feet in the next 500 years. What risk would that pose for the exposure of nuclear waste that is potentially now under water?

## **9) Will the grout (sealant) and the materials used for the lining of the repository shaft be sustainable for the required lifespan of the storage chamber?**

Our understanding is that the type of mining practice to sink the shafts for the DGR is determined from the data collected from the initial boreholes (which we understand has already been completed). We would assume that the results of this would predict the need for a “dry mine”. Our understanding is that, in the case of a “dry mine”, where there is potential for encountering water permeated strata, grouting is used to ensure no water leakage. This grout is injected into boreholes

and spaces to prevent leakage for the life of the mine (International Journal of Mine Water 2006/Grouting for Ground Water Control in Underground Mining). Once the shaft is constructed, a lining is inserted. The permanent lining of the shaft could be reinforced concrete, tubing, monolith concrete or shotcrete concrete in order to create a “dry mine” condition (SME Mining Engineering Handbook, 2<sup>nd</sup> Edition, Volume 2).

The Inverhuron Committee is concerned that the life expectancy of both the grout and lining materials used for the lining of the dry mine will not be long enough to prevent future leakage that could impact the Great Lakes.