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Presentation /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



SAVE OUR SAUGREEN SHORES!

SOS
saveoursaugreenshores.org

Save Our Saugeen Shores, Inc. (SOS)

The mission of SOS is to provide public education and raise awareness about the health, environmental, and socio-economic risks of radioactive waste and prevent its deep burial in Saugeen Shores, its neighbouring regions and the Great Lakes Basin.

SOS maintains there should be no DGR for any nuclear waste anywhere in the Great Lakes Basin, due to the potential for radioactive contamination of this precious resource — the drinking water of 40 million people — and the potential for other adverse environmental, social, health and economic impacts from a DGR.

SAVE OUR SAUGEEN SHORES!

The Applications Should Be Rejected

International experts agree that radioactive waste is best stored far from people, animals and water sources.

Ignoring this broadly held and logical conclusion, the plan to construct the DGR on Lake Huron, in a region of picturesque small towns, an area reliant on agriculture and a vacation destination for tourists, defies responsible planning principles.

SAVE OUR SAUGEEN SHORES!

Public Notice Of Hearings, Including Seasonal to Residents - Problematic

We use as an example the case of one of our Directors, who lives permanently in Oakville. She attended the September hearings on the DGR in 2013, her name and address and email were recorded at the hearings. She stood to ask questions during the hearings. However, she did not receive a notice of the additional hearing days through her Oakville address, through the Saugeen Shores administration, her email from the JRP, or at her seasonal residence by way of 'notice in the door.' She heard of the hearing through our network, but the time was too short to provide a submission by the June 23, 2014 deadline.

Residual Adverse Effects are SIGNIFICANT

Panel asked OPG to describe the methodology of determining adverse effect on **geology, hydrology, surface water, terrestrial environment, aquatic environment, radiological conditions, air quality, noise, and vibration.**

OPG Concludes “No Significant Adverse Effect” despite evidence to the contrary.

They indicate that because the EA Act contains “no legislative direction on what constitutes a significant adverse environmental effect...”, that they may interpret FEARO in a way that can only be described as making up their own rules on what would make a residual adverse effect ‘significant’.

They refer to their work as ‘reasoned’ and ‘based on evidence.’

It is neither, as is evident from their work. Nor is it clear, transparent or precautionary.

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What Probability of Reaching a Conclusion of “No Effect” with So Many Unknown Factors?

It is beyond comprehension, reason, and probability, to have reached a conclusion of “no significant effect,” on a project of such extraordinary complexity, scope, and so many remaining unknowns.

One reason that OPG is able to do this is that instead of looking for ‘significance,’ they are looking to find ‘no significance’ of adverse effect.

Insufficiently Evaluated, and Adverse Effect Then Assessed as Not Significant

- Hydrology (surface water quantity and flow)
- Design Size of SWMP, Drainage and Settling Ponds
- Geographic Extent of Areas at Risk
- Effect of Climate : normal and extreme
- Groundwater Damage
- Air Quality Damage
- Noise Effects, and
- Cumulative Effects: not presented

Hydrology, SWMP Size and Geographic Extent

Insufficient affected area if calculating adverse effect

OPG says the geographic extent of the he Site Study Area, *“comprises only a small portion of the local watershed area. The effects do not extend into Stream C or Lake Huron beyond the point of discharge.”*

The Lake is excluded even though radioactive dispersion and dissolution is Predicted!



Normal and Abnormal Climate: Significant Effect Should be Imagined

“While future climate conditions may result in storm events that exceed the current design capacities, such changes in climate are expected to be gradual. This provides time to modify the engineered drainage features such that they will continue to serve their design purpose.”

An isolated super cell tore across the Lake in 2011, setting down in Goderich, connected to us and the Bruce Nuclear plant, by the Lake and Highway 21. Environment Canada was late in advising of the projected landfall: ten minutes warning. Goderich is in a sheltered zone, not usually prone to tornados. **The Bruce site is on a knob of land jutting out into the Lake.**



SIGNIFICANCE: ADVERSE EFFECTS

Effect of Groundwater Quality and Level Change: Significant Change Should Be Imagined

“As described in Section 9 of this response, weathered/fractured tills that could increase vertical connectivity to groundwater are not expected at the site, however, OPG would line the storm water management pond should such conditions be encountered.”

The IEG Report confirms that radionuclides are already being absorbed by the soil under the Bruce Plant and at the above ground storage site. Therefore this statement is false.

Paltry Backup for Predictions of Effect: Relevant Background and Diligence Missing on Key Hydrogeological Subjects

There are no current references provided to back-up evidence, and when you look at the bibliography in the hydrology section, most of the reference texts are OPG-derived, except for three dating from 1889 (American Society of Civil Engineers); 1964 (Dover Publications New York), and 1989 (Introduction to Hydrology, from 1989 Harper Collins, College Division. Glenview, USA).

Air Quality: 30 Years of Significant Degradation

“ ... to have a significant effect on the air quality VEC, the DGR Project would need to result in ambient air concentrations beyond the Site Study Area that exceed relevant established ambient air quality criteria more than 10% of the time.”

There is no evidence that this hypothesis is an adequate gauge of significance, we wish to point out that 10% of 100 years is 10 years. This is a long time. But it is not 10 years; it is 30 years in the expanded proposal (prep/construction/decommissioning).

“Elevated levels of airborne particulates are not uncommon near construction sites and can occur in many areas where human activities occur. Elevated ambient concentrations of airborne particulates have also been monitored in the region.”

So to discount significance, they devalue:

- **existing problems with air quality, and,**
- **chalk up the degradation of air quality to the risk of ‘living near a construction site.’**

Adverse Noise Level Effect

“The only residual adverse effect was a 5dB increase in noise levels at receptor R2 during site prep and construction.” R2 is identified as 4 houses at Baie Du Dore. The Report does not identify the duration of the project noise as 6-10 years, consistently, for three periods. It modestly says, *“the effect will only occur during the site preparation and construction and decommissioning phases.”*

The Report diminishes the analysis of cumulative effect and degrades the locality and its population:

*“The existing area is adjacent to an established industrial site. Existing noise levels are consistent with **typical rural environments** (our emphasis), with noise from the operations at the Bruce Nuclear site audible at some locations.”* Typical rural environments in Bruce County: farm fields, birds, wind, some tractor noise, the sound of farm animals. The hypothesis is incorrect.

Land Use
Characterization EIS
2011 (Post Closure SA
p. 65)

Farmland accounts for around 60% of the land use in the county, with cattle, sheep and pigs being reared and crops such as oats, canola, barley and hay being produced

Around 60% of all Bruce County farms are family owned and operated. Local people also hunt wild animals including deer and waterfowl

Significant Adverse Effects - Conclusion

The OPG conclusion that “*the DGR Project will not result in any significant adverse effects.*” is a misrepresentation of the truth, and demonstrates an arbitrary and dysfunctional approach to analysis.

The conclusion of ‘no significance/not any significance’ is the framework on which this whole project is supposed to rest, but OPG has not demonstrated in this second chance review:

- an understanding of base, local or regional context or boundaries so that they can use the FEARO criteria
- how the significance of each residual adverse effect was determined
- professional logic or reason, or consistent evaluation method
- reliability
- the precautionary principle in their evaluation
- the consequences of being wrong.

Without Precedent/Entirely Experimental but, “Verification will generally be completed during the construction phase to support an operating license”

PANEL SAID Detail must be added on :	OPG RESPONDED The Verification Plan :	OUR OBSERVATION: In addition to not answering the questions
<ul style="list-style-type: none"> • triggers for change • testing below grade before/during/after construction (lateral and vertical) • how studies before/during/after would be incorporated into process • how the new information affects the safety case 	<ul style="list-style-type: none"> • Will be updated as necessary • will ultimately be developed in sufficient detail • triggers will be established/refined at a later date • data gathering...will reaffirm the model based on 'rock mass response' • data gathered...'will reaffirm the model and understanding' • real time info will be provided on rock behavior • activities will be <u>completed or sufficiently completed</u> during construction to support <u>operating license and safety case</u> • long term demonstration experiments • verification to <u>support the intended purpose</u> 	<ul style="list-style-type: none"> • Still only 8 boreholes: geology still unknown • Mostly desktop surveys • Unacceptable levels of risk in safety case • IEG Reports contradict OPG Reports • 2013 Reports are contradicted by 2014 Reports • inadequate comparative analysis • Overconfident approach • No consequences of being wrong included • No application of the precautionary principle • APM process not suitable for project of this magnitude with so many unknowns

“Managing Risks As They Occur”

This is Not a Typical Underground Project

Some of the Unknowns Table 3.1

- the rock mass quality
- the ground water inflow
- the excavation deformation
- the rock loading
- the geo-mechanical qualities
- in situ stress and rock pillar integrity and response
- the geosphere barrier integrity
- the integrity of the Cobourg formation for the model or the expanded DGR in lateral blasting and drilling for 30 or 62 emplacement rooms and tunnels

More Unknowns

They don't know these things, yet they are confident of NO SIGNIFICANT EFFECT!

- never done this before
- don't know what they will find
- don't know how long it will take
- don't know how much it will cost
- don't have a supportable cumulative effects study
- don't discuss WIPP deficiencies present before or after the February 2014 accidents, or the failure of other shallow or deep repositories
- don't know if the ramp construction is possible in the formation below the Cobourg
- don't understand the key relation of the through-geology to Lake Huron, or to its surroundings
- don't mention that Saugeen Shores was recently excluded from the DGR 2 site search due to geology, and this is the same geology (12 km away)

Rock Pillar Unit Is Key To Overall Design Dimensions Unknown/Over-Confident Presumptions

Assumption of Structural Capability of Model Design upon which all size predictions for the 2 and 4 panels are based

“It is expected that vertical stresses in the centre of these thick pillars will be well below the compressive strength of the Cobourg Formation limestone.”

In Table 4.1 we find that *tests will be conducted* to examine whether rock is suitable, if rock can handle blasting at the location of the rock pillars, where there are variations in thickness of Cobourg Formation; how permeable the rock is; what kind of microbial activity there is; how to prevent inability to seal/ seal failure; how to prevent early collapse of the emplacement rooms, etc.

DGR Expansion Plans for Decommissioning Waste: 5 Times the 2004 Model

The 2004 model showed one panel, smaller than the size of one 2012- sized panel.

WHY, if DGRs are not supposed to be built near water sources, agricultural land or populated areas, should an argument be considered for one that is five times the size presented to the public in 2004?

WHY, if the decommissioning waste is the most radiotoxic of ILW, should a DGR for L&ILW be hosting the decommissioning waste?

Effects of “Doubling in Size” from the 2 Panel 2012 Model

The 2014 claim of *no effect by doubling* is doubly deficient in relation to previous claims about ‘*no effect*’.

The significance of effect for two panels of below grade disposal for 200,000 cubic metres of waste has never been adequately described, therefore the ‘*doubling has no effect*’ assertion is unproven.

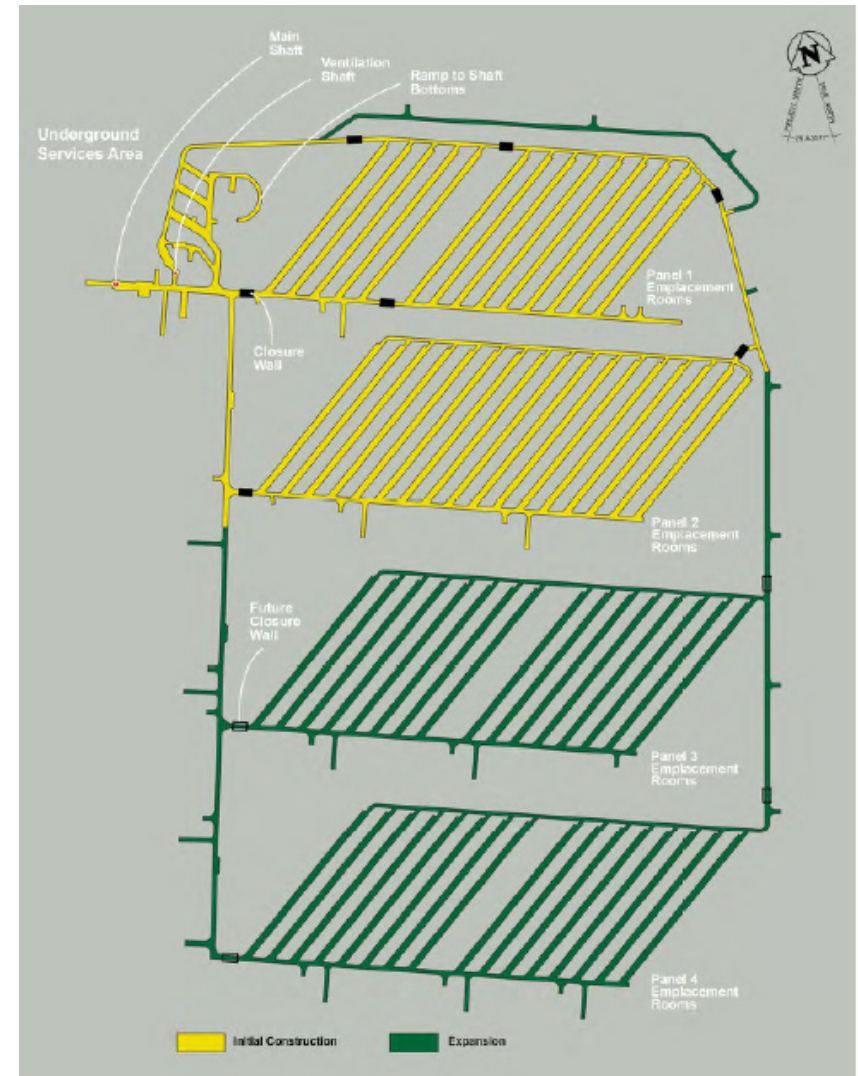


Figure 2: OPG's Deep Geologic Repository for L&ILW – Conceptual Expansion Layout

Only Twice the Size: Unsubstantiated

“The specific repository volume would be adjusted for the amount and nature of wastes arising from decommissioning.”

Claiming that the second phase will be **only twice** the size of Phase 1, OPG consistently avoids definition of above or below ground area in the expansion scenario: there are no clear limits to the expansion of the DGR underground, for above ground storage of decom waste, or other sources of nuclear waste.

OPG’s casual approximation of the conceptual limit of 400,000m³ may increase as OPG decommissions all facilities in Ontario.

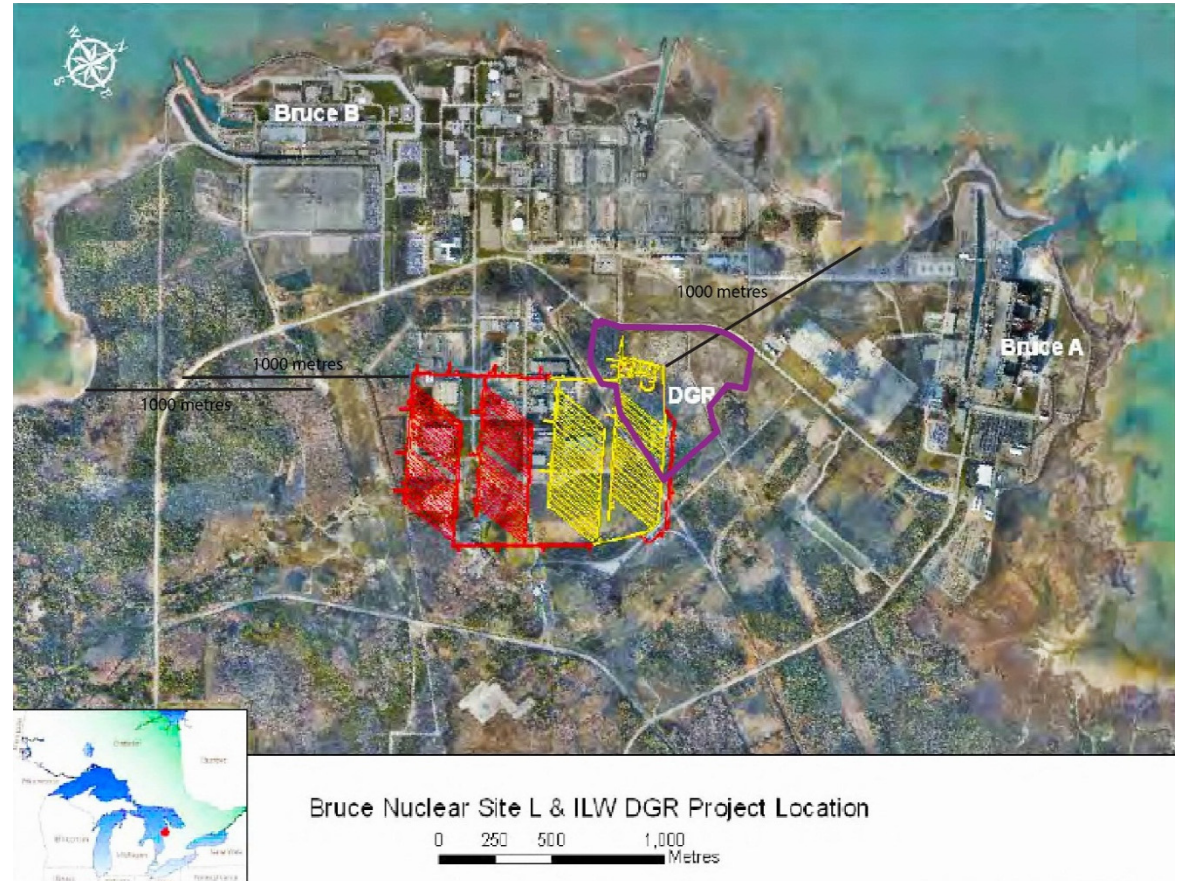
OPG Falters On The Size Of Panels 1 and 2, then again, on 3 and 4

- not confident that the 2 x 1 ratio for the width design of the rock pillar structure that separate each emplacement room is sound (they may have to increase it, once down there to take a look)
- not sure of the effect of gas generation within the emplacement rooms on the emplacement room width, height, and length
- not sure of the quantity of decommissioning waste that will be generated by the dormant nuclear reactors, buildings, equipment and soil.

Any one of these increases, all of a sudden, could have separate and cumulative impacts on the size of the Phase 1, and then on the expanded project.

The DGR Will Not Fit On The OPG Site

The double sized DGR will not fit within the boundaries that were established, and expansion will extend under the WWMF facility and beyond into the Bruce B site. We would describe this expansion, among other things, as **widespread expansion**.



EXPANSION FOR DECOM WASTE

Only Vague Generalizations in Planning for the Expansion to House 400,000 m³

- 'conservatively' assumed to be double the size, 400,000m³ packaged waste volume
- proposed and expanded repository footprint 'on the Bruce Nuclear site'
- actual layout/number of emplacement rooms will be defined later
- emplaced waste will be isolated before construction for Phase 2 begins and no construction during emplacement (but the shaft and tunnels will remain open)
- general features of original layout maintained (despite change in waste type, container size, radionuclide quality)
- no additional shafts, assumption of same geologic formation for repository opening, same minimum distance from Lake Huron (?), same room positioning

Expansion of the Waste Rock Management Area: Permanent and Temporary Monoliths

EIS Chapter 4 indicates that

“waste rock piles, some temporary in nature, for the full excavated volume of rock, will be accommodated on the DGR Project site, within a Waste Rock Management Area.”

The problem is that the Temporary WRM Piles contain more contaminated material in the second round as well.

WRMA (Permanent and Temporary)

If the waste generated exceeds predictions

- Will it be expanded in height and breadth?
- Does the weight of a WRMA over the fractured till affect the water table below?
- Will radioactivity and other contaminants from waste leach into the soil?
- What, in addition to limestone, is the composition of the limestone waste?
- What building codes apply to the creation of a structure of this magnitude;
- What normal and extreme climatic conditions will affect it, including: rain, snow and ice, with freeze thaw cycling? Hurricane and Tornado?
- How will the expanded WRMA be maintained in the greater than 100 year period?
- Where will the temporary contaminated waste rock and sludge go?

The Expansion Of The WRMA Would More Than Double The Following:

- the energy used
- the pollution caused by the trucking (as the dust produced in transport and emplacement, is driven over and piled onto for 10 years, grinding and mixing it up)
- the possibility of accident during the transport and placement of the rock waste
- the surface area for dust disposal over the time
- the maintenance for safety purposes, during normal and abnormal weather conditions.

Twice In A Generation Under Expansion

- agricultural land will be contaminated
- people will get sick
- campgrounds will close
- in extreme weather when you have concentrated wind or precipitation in winter and summer conditions will be worse
- during placement of waste rock, at night, lights and construction will extend over 11 hectares, and for an approximate total of 20 years
- they will have created a double sized monument that is the opposite of a filter: built in broken layers, a water logged object
- **after decommissioning of the DGR, the ditches and SWMP will be filled in, and there will be nowhere for the water to go but into the Lake and groundwater.**

Would The SWMP Be The Same Size?

“Should there be a need to increase the holding area, there is sufficient space adjacent to the proposed SWMP to the southwest to extend the pond.”

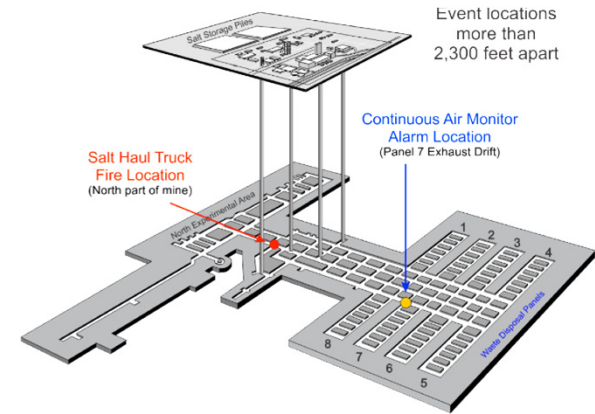
There is no demonstration in a drawing of this, and whether a doubling or tripling of the size, which may be undersized to begin with, is possible within the established boundaries, and at a suitable distance from surface or body of Lake Huron, and the water table before it.

There is no allocation of land for an additional settling pond.

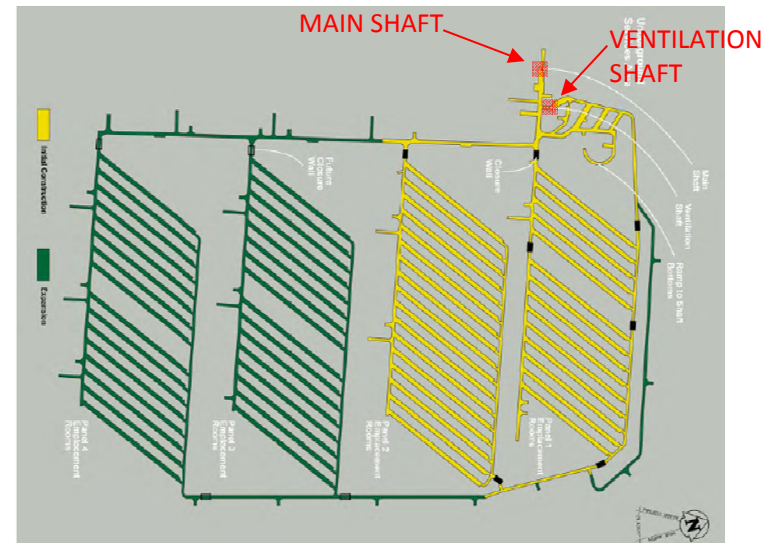
Impact To DGR Operations In The Expanded DGR

There is no explanation of a crucial difference in the expansion over Phase 1 operation: There are still only 2 shafts

The distance to the main shaft and ventilation shaft are now staggering. Neither the emergency evacuation procedures, nor process of emplacement, nor time increases related to below grade movement of materials, and increased risk based on distance are explored in the material we examined.



Even the WIPP DGR had four shafts



Waste Volume Arising from Decommissioning Not Known

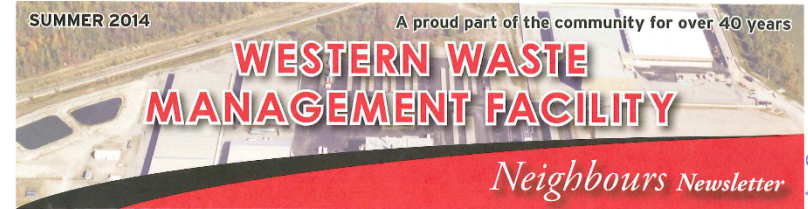
“As decommissioning is not expected to occur for several decades, the detailed waste volumes and characteristics are not currently available since the full characterization cannot occur until reactor shut down, and will also depend on decommissioning methods available at the time.”

“The specific repository volume would be adjusted for the amount and nature of wastes arising from decommissioning.” **Always, the tendency to under-value evidence, or to avoid confronting real questions, resulting in a ‘no effect’ prognosis.**

Coming Clean to the Public

No one could ever say any of the full year or seasonal residents of the County of Bruce, had demonstrated willingness to accept decommissioned waste, at such a high cost, and with measurable and immeasurable risks.

So OPG, the trigger for 'acceptance' is invalid. You have no willing host, and shame on you for sending out that misleading newsletter this summer without telling us 'more'!



IN THIS ISSUE MESSAGE FROM VP OF WASTE NEW MEXICO WASTE EVENT DGR UPDATE OPG IN THE COMMUNITY UPCOMING EVENTS



Raptors Take Flight

Students in grades four to seven from four local schools were introduced to Nova, a Peregrine Falcon. It's one of Canada's endangered birds of prey that the Canadian Peregrine Foundation (CPF) brings to students to help spread the word about the risks raptors face and their need for a safe habitat. OPG has been a proud partner of CPF since 2000. For more information visit www.peregrine-foundation.ca



◀ Matt Nash of The Canadian Peregrine Foundation gave grade four students Connor and Trinity a chance to hold Nova at the Walkerton District Community School.

DGR Regulatory Update

The Joint Review Panel (Panel) for OPG's Deep Geologic Repository Project for Low and Intermediate Level Radioactive Waste (DGR) has scheduled additional public hearing days to begin on September 9 in Kincardine; the hearing will run for approximately two weeks.

The public hearing will give participants, Ontario Power Generation and the Canadian Nuclear Safety Commission the opportunity to thoroughly review and provide their comments on the new information issued by the panel since the close of the fall hearing last year.

Since the fall, OPG has provided detailed responses to satisfy

all of the specific information requests from the panel and our safety case for the DGR remains sound. During the upcoming hearing days the panel will cover the following subjects:

- Methodology used to determine the significance of adverse environmental effects
- Updates to the geoscientific verification plan
- Expansion plans for the DGR project
- Relative risk analysis of alternative means of carrying out the project

(continued on page 5)

** OPG response and position but this is MISLEADING in the content of the hearing which to determine if it is satisfactory*



EXPANSION FOR DECOM WASTE



Elephants in the Room: Will LLW Remain on the Surface?

If the DGR1 Phase 1 is built, and if decommissioned waste is brought to the WWMF in 2040, and if that waste begins to be put into the DGR1, will that waste take priority over LLW (mops and rags) produced at Bruce, from that time forward?

Will the DGR1 be filled, and then another 2 panels required, just to accommodate the ongoing and stored waste from Bruce, and the decommissioning of Bruce A and B?

Will there then be LLW left on the surface in perpetuity?

If no solution to HLW is found, will we find Pickering and Darlington stuffed down our DGR, with the HLW still standing around with the LLW waiting for a home?

There Are Significant Adverse Effects That Are Predictable and They May Be Catastrophic and Widespread and Irreversible

These questions have not been answered, but the ones that have indicate “significant adverse effect” and “high risk”; therefore the plan to consider enlarging a DGR by doubling for decommissioning waste should be prohibited now, and in the future, and new solutions for decommissioning waste from remote sites be found.

Waste Inventory: Problems Abound

The 2006 Inventory was used to draft safety cases; the reports were revised in 2008 (public post) and then further characterization was released to the OPG website in 2010.

The 2010 inventory was used in the reports at the hearing in 2013. OPG says this inventory was *'based on a combination of measurements, models and estimates...some of the inventories had not yet been measured.'*

At a number of points in the Responses, OPG demonstrates a lack of confidence in the calculation of the volume and characterization of the waste.

The New Bulk of the Radioactivity

In Section 5 on Methods of Measuring Radioactivity, OPG states:

the dominant radionuclide in the long-term is mostly in the retube waste; but it is judged not particularly important for the operational safety study and therefore has not been widely studied within the characterization studies.

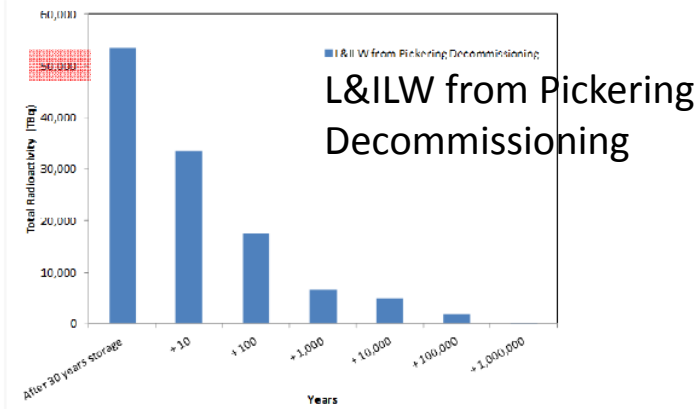
This is hardly an appropriate response to the comments made by Greening and later alterations of quality and quantity of radionuclides. In fact later in the Reports, the negative effect of this waste on inhalation and exposure as a result of normal and abnormal operations is described!

2014 Consolidated OPG Response List – IR Packages 12, 12a, 12b, and 13

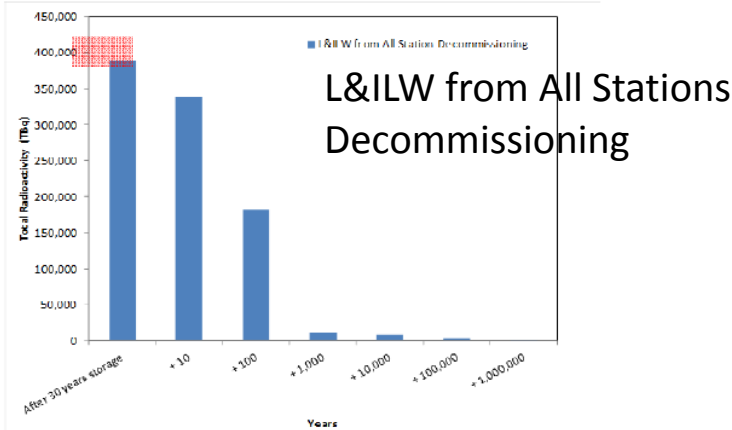
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Consolidated OPG Response List - IR Packages 12, 12a, 12b, and 13
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Total TBq

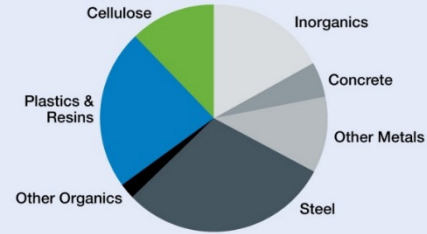


Total TBq

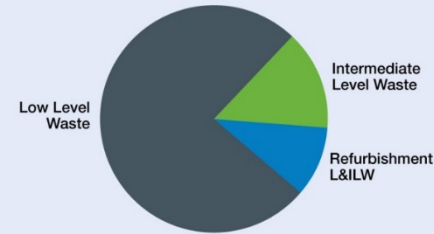


2013 Description of Total TBq

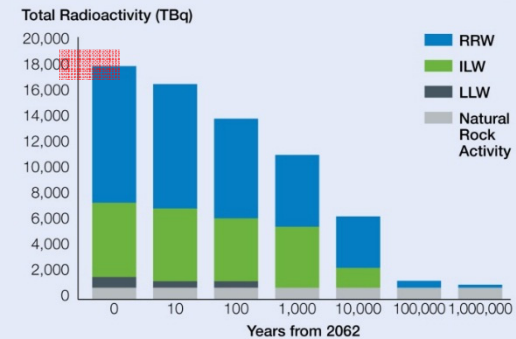
Proportions of main waste materials planned for emplacement in the DGR



The relative proportions of LLW, ILW and Reactor Refurbishment Waste (RRW) waste volumes planned for the DGR



The change in the radioactivity of LLW, ILW and RRW over time is shown below



EXPANSION FOR DECOM WASTE

New Levels of Activity, Ratio of Waste Character, and the Expansion of Inventory Not Correlated

Table 4.1 Summarizes parameters of activity (updated) of LL and IL radioactive waste by 2062.

The Table DOES NOT include or refer to the decommissioning waste that would be present on the site if the site is doubled to accept decommissioning waste.

This is a grave oversight in calculation and method that is not clarified by the Decommissioning Plan in an evaluation of cumulative factors of inventory and total value of activity characterization.

What the Public Knows

Does this not put agreements made with the public bodies at risk? Should they not know that this is the case, and an expanded DGR would cause more than double this activity and risk?



EXPANSION FOR DECOM WASTE

Assessment of Waste Character is Both Over-Confident and Incomplete: Not Clear, Not Transparent, Unsupported

OPG says, that *'a new approach is being developed now.'*

This indicates to us that there is uncertainty in the pre-closure as well as the post closure calculations of inventory and effect.

A lack of robust evaluation and testing is described in: **9.4, Analysis and Integration,**

- *the results of the waste characterization program are analyzed and integrated with prior data and models to provide, for each waste type, a **best-estimate** inventory, an **uncertainty analysis supporting an upper bound inventory value**, and an **estimate** for the total projected DGR inventory'*

Full stop. On to Timeframe.

9.5: Timeframe:

*some waste characterization activities are **presently** underway. Other activities **need to be scheduled** for completion to **support** the application for an operating license.*

*Based on the current projected construction schedule, this means that the activities need to be complete by **end-2021**.*

Pre-closure Safety Implications: Over-Confident, Lack of Diligence

- increased hazard of radionuclide exposure to workers and to the public on the site, and to the public beyond the border of the WWMF, differs substantially from the evidence presented to the public as correct in mid 2000's up to 2013
- inability of the retube waste to meet WAC stipulations for safety may require redesign of packaging and/or increase in duration of the project to allow for cooling off of the waste before entry to the DGR site (beyond 10 years)
- that 10 year delay is not carried forward in the projection of project schedule, methodology, effect or cost in other sections of the Consolidated Responses, (including cumulative effect, or socio economic effect)
- **the precautionary principle is not applied.**

Over-simplification and Over-Confidence: “Just Seal Them Tight”

Without suitable diligence or detail, in indeterminate conditions, with an increasingly radiotoxic material being handled:

Page 5 Paragraph 1 (relying on data from 2006)

*4.1.1 Radiological Assessment of Air and Water Emission from DGR on Workers and Public: During normal operations, the retube waste package arriving at the DGR is **sealed tight** (Section 8.3.3.1 of OPG 2006). **Therefore, radioactive release to air and water and potential exposure to public during normal operations is not expected. In addition, there is no inhalation dose to the workers as the package is air tight.***

Explanation of key subjects lack consistency, diligence, transparency, and clarity

Let alone explanation of cumulative effect

leading us to believe that the issues of public and worker safety, project schedule, cost, logic or cumulative effect have not been dealt with adequately.

For example, on the next slide, ***'not being acceptable,' but still being required*** to be stored, and concerns with human but not environmental exposure, are confused in a tangle of words:

For Example, A Tangle of Words Distract from Clarity,

Page 5, 4.1.2: *“Furthermore, the waste packages would be required to meet DGR WAC package dose rate. These packages with the revised concentrations would not be consistent with the WAC, and therefore either further shielding or further decay would be included before the packages were accepted at the DGR. This is the results presented in table 2 are conservative.*

Since the RWC-PT containers are not stored in the WPRB staging area, the dose rate to the member of the public at the Bruce site boundary (about 1 km distant) due to handling of RWC-PT would be very low even with the revised inventories.”

Why Presumed Intact? Why Not Explosive as described in Greening?

The OPG Report again tells us that the waste package is, “***robust and designed not to fail under accident conditions, including dropping***” (but not fire and explosion), ***therefore breaches “are expected to be minimal.”*** So we have minimal breaches (what does that mean?)

What would happen under maximum breach conditions of multiple packages?

OPG goes on to say, “***Because the package remains intact, potentially only gaseous radionuclides and very fine particulate might be released. Therefore potential impacts due to release of radioactive particulates/volatile species (through inhalation and immersion) are considered only.***”

Breachable – yes.

Particulate and gas released – yes.

Explosive in fire – yes.

And In Conclusion the Report Admits,

For normal operations, the estimated worker external dose rates for the revised pressure tube inventory case are about 4 times higher than those for the PSR pressure tube inventory case with the same package and decay times.

However, such a waste package in reality would not be accepted at the DGR without further shielding or decay if it did not meet the DGRWAC so the actual difference would be smaller.

*For accidents, malfunctions and malevolent acts, the estimate doses for the revised pressure tube inventory case are up to about **twice of those for the PSR pressure tube inventory case.***

Qualitative Risk Comparison Among Four Alternate Means for Managing the Storage and Disposal of Low and Intermediate–Level Radioactive Waste in Ontario (IEG Report, March 25, 2014)

The Report was a window into the flaws in the WWMF site, as well as advantages, in comparison to a granite host.

The *Summary of Differences* provides ample proof that the limestone DGR at the WWMF is not suitable due to its properties.

Surface and Enhanced Storage, as well as the Study Of Granite are Superficial,

- enhanced storage is dismissed by ill-informed researches
- despite the charge of the Panel that they were to consult the body of literature and case studies in mining and geo-science that do exist in abundance.
- Bias and simplification of fact is reflected in numerous examples such as:
granite is internally fractured where the Bruce DGR site has been determined to be of,
- *“exceedingly low permeability, but largely un-fractured, such that there is no evidence of significant groundwater flow flux through the repository for millions of years.”*

Praise of limestone, stratigraphy and geology of the Bruce is over-zealous:

the IEG does not use detached professional language to describe the geology of the Bruce, making us think that they have found a perfect host for DGR 1, or DGR 2.

The Strength of the Bruce rock is overemphasized despite later revelations of its insufficiency and porosity, and the potential for limestone such as this to be fractured

“...because of the strength of the rocks and depth of burial, higher horizontal stresses are most certainly of no consequence to the site stability during or after the construction of the DGR.” Then later on the same page, *“Furthermore (...based on 8 boreholes...) it appears that there is no regionally interconnected natural fracture network in the Bruce DGR location at the depository depth, **even though these sediments are carbonate rocks which are naturally fractured.**”* (our emphasis)

The Comparative Difference Exaggerated:

*“The rocks are **so strong** (our emphasis) and the design of the Bruce DGR is so conservative that there will be no instability over the time the repository is actively being used (and for many hundreds of years thereafter).*

Even OPG admits that they don't know that this is true, and that there is a requirement of untold investigation before, during and after the construction phase to prove the point, or to discover triggers that will stop the project in its tracks.

Transport of Radionuclides Predicted

Chapter 4 cautions that the DGR at WWMF may suffer due to permeability at 180 metres, and that at lower depths there is also danger of permeability through rock mass and diffusion.

Absorption, Dissolution and Dilution of Radionuclides Predicted

Our grave concerns about radionuclide transport are reinforced through the comparison between granite and limestone.

“In both Granite and Bruce site DGR cases, dispersion and dilution will take place in the subsurface (as well as adsorption and retardation of the transport rate of dissolved species) so that water exiting near the surface under a body of water will already be diluted by large factors.”

Radioactive Groundwater Dispersion Predicted

Because groundwater exit points would be most certainly under bodies of water, a further dilution will take place ... the amount of water already in Lake Huron, which as an average depth of 60m, is 100 times larger than the annual rainfall on the lake, over four million cubic metres. Hence, the volumes of the bodies of water available for dilution at the surface are either immense (Great Lake) or actively flowing (rainfall >700mm/yr, active streams and marshlands), so the dilution capacity is significant.”

IEG Summary and Unsuitable Geology 12km Away

- “The sediments at the Bruce DGR are homogenous and thus their properties are quite predictable over large distances, and differences in hydraulic properties ... are almost certainly minimal.”
- Saugeen Shores was ruled out as a candidate for DGR 2 in part because of geology before this report was written. Chapter 4 of the EIS describes the WWMF as equidistant between Kincardine and Saugeen Shores.
- **How could the WWMF site be judged suitable if 12 km away the geology is unsuitable for a DGR?**
- **IEG then says that because granite rocks have an absence of clay minerals, it has a lower capacity to absorb dissolved radionuclides transported by water.**

Summary Differences: because of fractures is a DGR in granite not likely to be built safely for ILW or HLW or Used Fuel?

- has OPG/NWMO abandoned the locations of DGR2 in granite because of the assessment here?
- if not, why not?
- is DGR2 then to be located in Bruce based on acceptance of bad science for DGR1?

Pathways of Harm – Relative Risk Analysis

- over-complicated, difficult to explain to others, non-transparent, obscure, unrepeatable
- no cumulative analysis of combined effects
- biased toward an outcome
- illogical
- not consistent across categories or time frames
- does not risk assess the experimental nature of the DGR

Pathways of Harm and The Serious Revelations

The use of 'evidence and reasoning' bring interesting points to light, as for example in Transport of Released Radionuclides – Advective Water Flow.

- radionuclides are currently transported in shallow sediments at the Bruce site
- radionuclide transport would continue in enhanced storage
- Cobourg host: assumption that radionuclide transport would continue during storage on surface (100+ years), and radionuclides release would be increased through on-site transfer; the assumption that package waste underground would not be exposed for 100 years
- there is currently off-gassing from surface storage but, “massive atmospheric dilution significantly limits any adverse consequences in near-field or far-field (Lake Huron)
- “dilution ... in Lake Huron reduces the potential dose to any receptor”

The Qualitative Risk Comparison has presented some kind of test, but the Test has raised Increasing Doubts about the Extent To Which This Site Is suitable For a DGR

In addition to the failure to properly address and deal with multiple risks, there is an incremental risk caused by OPG's failure/ refusal to realize that they have not answered the questions they were asked.

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DEFICIENCIES IN THE OPG/IEG RELATIVE RISK ANALYSIS OF “COMMUNITY ACCEPTANCE”

Rod McLeod,
SOS Director

Note: Bold numbers in parentheses after headings or speaking points refer to SOS Summer 2014 written submissions on this subject at pp 55-60.

INTRODUCTION (SLIDES 2, 3 & 4)

- (i) OPG MANDATE: JRP asked OPG to have an independent expert group (IEG) do a Relative Risk Analysis (RRA) on the Community Acceptance (CA) component of 4 sites/means: **(1.1 and 1.2)**
 1. status quo at WWMF
 2. enhanced surface storage at WWMF
 3. proposed DGR at Bruce Power site (DGR 1)
 4. conceptual DGR in granitic bedrock of Canadian Shield

- (ii) The RRA was to be qualitative, transparent, defensible and repeatable.

... cont'd on Slide 3

(iii) IEG expressed concern about their ability to perform an RRA of CA but went on to suggest 4 indicators for CA of DGR1 **(2.1 and 2.2)**

A: the 2003 Intellipulse/Golder/Gartner Lee report

B: “Deep Geologic Repository: Public Attitude Research,” prepared by Intellipulse for AECOM Canada in 2009/2010

C: the Kincardine Municipal Council decision

D: letters of support from neighboring communities of Saugeen Shores, Huron-Kinloss, Arran-Elderslie and Brockton in 2004 supporting the DGR option, and reaffirmed by the mayors at the JRP Hearings in 2013

- (iv) No apparent OPG RRA on CA other than that done for OPG by IEG.
- (v) No apparent RRA on CA directed to the other 3 site/means options.
- (vi) No apparent analysis of community acceptance “outside the regional study area”. **(1.2)**
- (vii) SOS THESIS: OPG/IEG’s attempted execution of their MANDATE discloses serious deficiencies.
- (viii) On the facts here, community acceptance of DGR1 is at high risk.

1. **IEG'S Indicator A of Community Acceptance: 2003 Survey/Report** (Slides 5, 6, & 7)
 - 1.1 The primary purpose of the 2003 Intellipulse telephone survey/report was to measure public attitudes re WWMF not DGR1. **(3.1)**
 - 1.2 The NWMO APM for site selection for a used fuel repository (DGR 2) was not announced to the Bruce County public until Fall 2011. Until then, the common belief was that DGR2 was going to the Canadian Shield.
 - 1.3 If the community had known, in 2003 that OPG would later try to locate DGR2 in Bruce County, would responses to the 2003 survey have been the same?

1.4 Statistical and Language Deficiencies - not discussed in IEG report

1. 455 of 751 responders connected to Bruce Power **(3.1.1)**
2. 54 questions; word "radioactive" appears 4 times **(3.1.3)**
3. "WWMF": no indication of "radioactive; name change in 2002 from Radioactive Waste Operations Site **(3.1.4)**
4. Nothing in survey about "intermediate Level waste" that could remain radioactively toxic for hundreds of thousands of years **(3.1.5)**
5. Nothing in survey about de-commissioning waste.
6. After referring to the three Bruce site options, one survey question included the following conclusion: **"All three can be safely constructed and operated at the Western Waste Management Facility"** **(3.1.6)**

- 1.5 IEG'S agent identified three examples of the "nuclear oasis" concept: 'close connections', 'trust in authorities' and 'perceived financial benefit'. But, IEG did no analysis of these examples as they might relate to the regional study area, notwithstanding the available 2013 Bluewater Coalition submission.¹ **(3.1.2 and 6.0)**

- 1.6 IEG and Wiles failed to cite relevant academic references relating to methodological shortcomings of telephone surveys. **(3.1.7 and 3.1.8)**

¹ <http://www.ceaa-acee.gc.ca/050/documents/p17520/93202E.pdf>

**2. IEG'S Indicator B Community Acceptance: The 2009
Intellipulse/AECOM Report "Deep Geologic Repository:
Public Attitude Research"**

2.1 No specifics in IEG report: assume no reliance. (4.1)

3. IEG'S Indicator C of Community Acceptance: The Kincardine Municipal Council Vote, (5) (Slide 9 & 10)

3.1 The Kincardine Council vote should be considered in light of the following chronology:

- a) April '04: Vote, but subject to community consultation.
- b) October '04: Mayor Sutton signed the Hosting Agreement, - before the required community consultation.
- c) Jan/Feb '05: Kincardine community survey showed community approval.
- d) February 28 '05: date by which the Hosting Agreement required Municipalities' agreement.

- 3.2 No apparent OPG/IEG analysis of this chronology.
- 3.3 Nothing in the OPG/IEG analysis showing they looked at Gibbons' 2013 JRP submission disclosing multiple defects in the 2005 Kincardine survey including misleading wording and manipulation of the results.²
- 3.4 Nothing in the OPG/IEG analysis relating to the common occurrence of service by nuclear industry employees, retirees and family members, including Mayor Sutton on Kincardine Council.
- 3.5 Please cross-reference points 1.5 to 1.6 above, relating to "nuclear oasis" and the shortcomings of telephone surveys.

² <http://www.ceaa-acee.gc.ca/050/documents/p17520/93190E.pdf>

4. IEG's Indicator D of Community Acceptance: 2004 Letters of Support From Neighbouring Communities reaffirmed by the mayors at the JRP Hearings in 2013, (5) (Slides 11 to 16)

- 4.1 Nothing in the IEG Report or OPG response to show IEG even knew of, let alone considered, the effect of the 2004 Hosting Agreement **(5.1)**
- 4.2 The Hosting Agreement constitutes a gross distortion of the integrity of the "support" from neighbouring communities. Consider:
 - 1. cash for support
 - 2. peer pressure of 'one municipality's breach means cancel every Municipality's payment' - in the sole discretion of OPG. **(5.2.4)**
 - 3. Saugeen Shores "support" not authorized by Council for 10 years. **(5.2.1)**
 - 4. Bruce County Council voted to support but only after seeking and obtaining a financial benefit from OPG. **(5.2.2)**

4.3 The OPG/IEG report contains no analysis of:

- a) the 2013 Bluewater Coalition JRP submission, including significant references to the content of Bruce County Closed Meeting Complaint filed by SOS and SRA May/June 2013.
- b) the OPG notes of the CCAG,³

both of which were available.

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³ <http://www.ceaa-acee.gc.ca/050/documents/p17520/88483E.pdf>, p. 48-67 of 104

4.4 The OPG notes of the DGR CCAG meetings disclosed, inter alia:

1. OPG and the Mayors discussed the most advantageous time to launch the DGR2 APM in Bruce County, from the perspective of maximizing the Mayors' chances of re-election in 2010,
2. OPG's attempt to impress the Mayors by the appearance of the CEO of CNSC at the September 2009 DGR CCAG meeting,
3. Multiple other indicia of unlawful OPG and Mayoral manipulation and spinning "community acceptance".

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- 4.5 OPG not only misled the community by creating the Host Agreement at a time when its public plan was to put DGR2 hundreds of miles away from Bruce County, but, repeated the deception through CCAG by convincing the Mayors to discuss DGR2 issues without public scrutiny.
- 4.6 Even without the 2 source documents listed in 4.3, the OPG/IEG analysis is seriously deficient for the reasons outlined in 4.1 and 4.2 re the Hosting Agreement.
- 4.7 If one added the 2 missing source documents, the result shows a high risk of community rejection.
- 4.8 Now, in September, 2014, the JRP can also consider the 2014 Municipal Act Independent Investigators' Report to the Corporation of the County of Bruce Regarding the Investigation of Improperly Closed Meetings of Council (the Bellchamber Report)⁴ (attached) (5) as well as the 2014 Save Our Saugeen Shores submission⁵

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<http://www.brucecounty.on.ca/assets/files/Amberley%20Gavel%20Meeting%20Investigation%20>

5 <http://www.ceaa-acee.gc.ca/050/documents/p17520/99619E.pdf>

4.9 The Bellchamber Report concluded:

1. The DGR Community Consultation Advisory Group (CCAG) meetings organized by OPG and NWMO and attended by all mayors were unlawful meetings of Bruce County Council because they were not public and no minutes were kept by Bruce County staff.
2. The meetings advanced the business or decision-making of Council
3. Councillors were as much, if not more, influenced by decisions at CCAG meetings than at proper meetings.

4.10 The legal breaches and irregularities disclosed in:

- a) the 2013 Bluewater Coalition submission to the JRP,
- b) OPG notes of the CCAG meetings, and
- c) SOS and SRA Municipal Act Complaint

were all confirmed in the Bellchamber Report.

4.11 The Bellchamber Report's conclusion that the CCAG meetings were in violation of the Municipal Act, and the reasoning of the Investigator in arriving at that conclusion, support the SOS THESIS: the OPG-IEG analysis of DGR1 community acceptance is seriously deficient, - neither qualitative, transparent, defensible nor repeatable.

Conclusion

The members of Save Our Saugeen Shores thank the Panel for your consideration of our submission.

We believe, in the strongest terms, that the OPG justification for siting a DGR for low and intermediate level nuclear waste is unsupportable, and should be rejected.

We have followed the correspondence that has occurred between the Panel and the Proponent during this past year, and are of the opinion, based on logical and careful review of the material, that no abundant, credible, evidence –based presentation has been made. The new submissions are equally as unclear and non-transparent as the earlier versions, despite the clarity of questions posed by the Panel and the volumes of new writing that has been produced.

In some cases, the ‘decision tree’ methods appear purposefully skewed in favour of a false positive verdict of ‘no significant adverse effect’.

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There is an unacceptable level of bias and discounting of alternative views; there is an over-confidence of approach to the likely success of the DGR despite the highly indeterminate below grade conditions; there is no apology or regret for misleading the public in the expansion of this DGR, and no sense of accountability, or respect for human life and the environment of Bruce County or Lake Huron.

Only a sense of entitlement to proceed with an ill-conceived approach, hatched long ago.

We will not repeat in conclusion the many instances of inconsistent, flawed logic that are apparent in the Consolidate Responses and their follow on answers.

It defies the laws of probability and natural sense that this project would have, 'no significant effect', given all of the indeterminate factors that have been brought to light. If we are lied to about this, we are not guaranteed at any point that there will be truth telling in later stages.

This is a failed experiment. It is time to move on to realistic and well conceived solutions.

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SOS is citizens' group.

We are volunteers.

We have been lied to, as have our neighbours.

We know that what has happened in our County to develop, and then to fan this poorly conceived Plan for the DGR 1, is a most seriously and obviously flawed process. We know that there are not only the stated significant adverse effects, but potentially infinite catastrophic consequences.

We ask the Panel to reject the DGR for LL&ILW in the greater Kincardine area, in Bruce County and on the Great Lakes.

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SOS
saveoursaugeenshores.org