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ELECTRONIC MAIL

April 5, 2017

Ms. Lise Morton  
Vice President, Nuclear Waste Management  
Ontario Power Generation  
1340 Pickering Parkway, P84, Fourth Floor  
Pickering, ON L1V 0C4

Dear Ms. Morton:

**SUBJECT: Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Project – Results of the Technical Review of Ontario Power Generation's Response to the Ministerial Request for Additional Information**

On December 28, 2016, the Canadian Environmental Assessment Agency (the Agency) received Ontario Power Generation's (OPG) response to the request by the Minister of Environment and Climate Change for additional information relating to the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Project (the Project).

On January 18, 2017, the Agency began a technical review of the new information provided by OPG on the DGR project. The technical review included a comment period to receive the views of the public, Indigenous groups, U.S. Environmental Protection Agency and expert federal departments. Comments were accepted until March 6, 2017 and all of the comments received have been posted online.

The Agency reviewed OPG's response in light of the requirements contained in the Minister's letter of February 18, 2016, as well as the Agency's letter of September 7, 2016. Taking into consideration the comments received, the Agency has determined that additional information is required from OPG to meet the requirements outlined in the Minister's request. The attachment to this letter contains requests for additional information concerning the consideration of alternate locations for the Project, the analysis of the cumulative effects assessment and OPG's commitments with respect to mitigation. This information is necessary to inform the Minister's decision statement that will be issued under the *Canadian Environmental Assessment Act, 2012*.

To assist with work planning, the Agency requests that OPG provide the anticipated timeline for submission of its responses to the information requests.

If you require clarification with regard to these information requests, do not hesitate to contact me at [CEAA.DGR.Project-Projet.DGR.ACEE@ceaa-acee.gc.ca](mailto:CEAA.DGR.Project-Projet.DGR.ACEE@ceaa-acee.gc.ca).



Sincerely,

<Original signed by>

Robyn-Lynne Virtue  
Panel Manager

cc: Donna Pawlowski, Ontario Power Generation

**Table of Contents**

<b>1.0 Study of Alternate Locations .....</b>	<b>2</b>
IR 1.1 Regional Variability .....	2
IR 1.2 Determining Significance of Effects.....	3
IR 1.3 Assessment Methodology .....	3
IR 1.4 Technical Feasibility Criteria .....	4
IR 1.5 Air Quality .....	5
IR 1.6 Surface Water.....	6
IR 1.7 Aquatic Habitat and Biota.....	6
IR 1.8 Radiation and Radioactivity.....	7
IR 1.9 Malfunctions & Accidents.....	8
IR 1.10 Rail Transportation.....	8
IR 1.11 Radiological Risk to Human Health from Transportation .....	8
IR 1.12 Cost Estimate Variance .....	9
IR 1.13 Valued Components .....	9
IR 1.14 Terrestrial Environment.....	10
IR 1.15 Indigenous Interests.....	10
<b>2.0 Analysis of Cumulative Environmental Effects.....</b>	<b>11</b>
IR 2.1 Methodology for Temporal Boundaries .....	11
IR 2.2 Methodology for Types of Cumulative Environmental Effects.....	11
IR 2.3 Accidents, Malfunctions and Malevolent Acts.....	12
IR 2.4 Radiation, Radioactivity and Groundwater Monitoring.....	12
IR 2.5 Species at Risk.....	13
<b>3.0 Mitigation Measures .....</b>	<b>15</b>
IR 3.1 Clarification of MIT-P-02 .....	15

## **1.0 Study of Alternate Locations**

The Minister of Environment and Climate Change requires that Ontario Power Generation (OPG) identify and consider the effects of alternative locations of the Deep Geologic Repository for Low Level and Intermediate Level Waste project (the Project) that are technically and economically feasible. On April 15, 2016, the Agency clarified that the analysis of the environmental effects of the alternate locations should provide a narrative assessment that does not assume that alternate locations in the geologic formation would have the same geographical and hydrological characteristics of the preferred site at the Bruce Nuclear Site.

The Canadian Environmental Assessment Agency's (the Agency) Operational Policy Statement *Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012* (CEAA 2012) should guide the proponent to identify the key valued components potentially affected by each alternative location and to briefly examine the potential effects of those alternatives on each of the valued components. The Operational Policy Statement should also be used in conjunction with other Agency policy and guidance instruments.

An alternative means assessment should objectively and rigorously consider all available options for alternative locations. This assessment should assess all aspects of each alternative throughout a project's life cycle (i.e., from construction through operation, closure and ultimately long-term monitoring and maintenance). A list of conceivable disposal locations should be prepared using threshold criteria to provide a comprehensive list of options to be compared. These alternative locations should be reasonable, conceivable, and realistic within the context of developing a deep geologic repository (DGR). The level of detail for the alternative location identification stage is generally conceptual; however, candidate locations should be developed to a point where meaningful evaluations of the concepts can be made.

Based on OPG's study, the Agency finds that the selection of the preferred alternative locations is based on limited criteria, and that differences among locations that have not been clearly described.

### **IR 1.1 Regional Variability**

#### **Rationale:**

OPG presented alternative locations for the Project based on two geologic regions in Ontario: crystalline rock location within the Canadian Shield and sedimentary rock location in southern Ontario. A regional approach has resulted in evaluating potential alternatives located in areas that encompass a range of environmental conditions. A clear understanding of the methodology used to account for regional variability is required to validate OPG's conclusions on potential environmental effects for each valued component (VC).

#### **Information Request:**

- Discuss how OPG has accounted for the variability in environmental conditions in each geologic region.

- Discuss how OPG has managed uncertainty in its environmental effects assessment given the regional approach taken.

## **IR 1.2 Determining Significance of Effects**

### Rationale:

The Agency's operational policy statement on *Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012* recommends that the approach for determining significance includes considering whether the predicted environmental effects are adverse, significant and likely. The operational policy statement recommends characterizing adverse effects based on the following key criteria: magnitude, geographic extent, timing, frequency, duration, and reversibility, with consideration of the ecological and social context within which the potential residual adverse environmental effects may occur.

The Agency notes that OPG does not use consistent terminology when characterizing potential adverse environmental effects or a consistent approach when determining if a potential residual adverse environmental effect is likely to be significant. In order to evaluate the validity of OPG's conclusions, it is necessary to understand how the terms are used.

In OPG's technical document "Environmental Effects of Alternative Locations", Table 6-1, the analysis for each alternative location generally outlines which VCs could potentially be impacted but it does not describe the environmental effects and the mitigation measures that apply to reduce the potential effect of alternative locations as required by the Agency's guidance.

### Information Request:

Using Agency guidance, update Table 6-1 to identify:

- the environmental effects for each VC for all three potential locations in order to make a comparison;
- the mitigation measures which may address potential environmental effects;
- whether there are residual effects and provide the benchmark used to determine whether the residual effects are significant;
- consider the ecological or social context as an additional criteria for the determination of significance; and
- indicate if the methodology used in evaluating the environmental effects of all three potential locations is the same and if not, explain why.

## **IR 1.3 Assessment Methodology**

### Rationale:

In its assessment of alternative means, including alternate locations, the Agency considered the proponent's ability to demonstrate that several key criteria were considered, whether the analysis of each of the key criteria was defensible and the extent to which an individual criterion influenced the preferred location. The assessment of alternatives and the identification of a preferred option requires that all technical and economic feasible alternatives be

compared, before deciding upon a preferred option, to ensure that all aspects of the potential locations are equally and directly considered.

OPG presents three technical and economic feasibility criteria to identify two alternative locations. OPG states in its “Description of Alternatives Locations” Report (page 3) that the main technical objective of the DGR is safety and that safety is achieved by a combination of physical features of the site. Although there is no ideal number of criteria, additional criteria will help demonstrate why a specific location is preferred over others. For example, physical features that are necessary to construct, operate and monitor the Project may include minimum distance to a major waterbody or land availability.

Other than identifying the technical and economic feasibility criteria in the report, OPG discusses the timeline associated with the alternative locations, environmental effects associated to selected VCs, cost and risk for packaging and transporting waste to alternate locations, incremental project costs unrelated to transportation, and social licence. OPG does not state explicitly whether these topics serve as criteria towards selecting the preferred location and, if they are criteria, to what degree do they factor into the decision-making process for preferred location.

Although the criteria appear adequate and are generally acceptable, it remains unclear how the comparative assessment of the alternate locations demonstrates why one location is preferred over the other.

#### Information Request:

Provide a summary table that identifies and compares the alternative locations and the preferred site, including the following:

- Use a systematic approach (e.g. weighting, scoring and/or qualitative lines of reasoning) that clearly demonstrates the relative importance of the relevant criteria (feasibility criteria, risk, cost, and environmental effects) to the conclusion about the preferred location.
- Discuss whether other criteria could inform the location-selection process and incorporate them in the comparative analysis summary table if applicable. These criteria can include but are not limited to:
  - Indigenous Interests (e.g. current land and resource use, traditional territory, access)
  - Implications related to the later operational start of the Project at alternate locations

### **IR 1.4 Technical Feasibility Criteria**

#### Rationale:

OPG identified the following technical feasibility criteria in its “Description of Alternative Locations” report (page 3):

- The host rock is geologically stable and resistant to expected geological and climate change processes,

- Threshold: The rock has been stable for times that are long compared to the main hazard in the low and intermediate level waste, and has been resilient to past glacial and seismic events (older than 1 million years); and,
- The depth and volume of competent rock is sufficient to host and enclose a DGR,
  - Threshold: Minimum depth of 200 m and a minimum bedrock thickness of 300 m.

With respect to geological stability, OPG defined its threshold as “older than 1 million years”. However, focusing the threshold on seismicity rather than age may allow OPG to refine the area included within the alternate locations to those of low seismic hazard.

With respect to minimum depth, subject matter experts suggested that gas pressure would be a feasibility constraint for the DGR. The anticipated maximum gas pressure generated in the DGR must be lower than the overburden pressure to prevent host rock damage, which could lead to enhanced gas migration. It is unclear whether the selection of a depth of 200 m accounts for the anticipated maximum gas pressure generated in the DGR.

Information Request:

Provide a discussion to clarify whether the alternate locations could be refined based on seismicity and gas pressure. OPG should consider adapting the range of environmental conditions for VCs based on these additional criteria.

**IR 1.5 Air Quality**

Rationale:

Table 3-1 of OPG’s “Environmental Effects of Alternative Locations” report (page 7) outlines the incremental works and activities for the Project at alternative locations which may cause temporary increases in emissions of combustion products, dust, and other compounds such as volatile organic compounds and acrolein. As a baseline, the report provides the predicted peak increases in ambient air quality indicators for activities at the Bruce site (NO<sub>2</sub>, SO<sub>2</sub>, CO, SPM, PM<sub>10</sub>, PM<sub>2.5</sub>). However, the report does not discuss whether incremental activities will result in increases in magnitude, frequency, and duration of potential effects on air quality using these indicators. The Agency notes that while acrolein is used in the EIS (section 7.11) as an indicator for air quality and human health, it is not presented as an air quality indicator in the environmental effects assessment of alternate locations.

In addition, Table 3-1 of OPG’s “Environmental Effects of Alternative Locations” report states that site preparation activities will include works related to the supply of power to the site. Accordingly, it is expected that all activities would need to make use of temporary power generation until the time that the site is connected to the power grid. However, the Report does not discuss the need for the use of fossil fuels for incremental works and activities at alternate locations, or the potential for environmental effects from additional emissions, including GHGs.

The “Environmental Effects of Alternative Locations” report also identifies the difference in rock density at the crystalline location versus the sedimentary location due to the granite formations of the Canadian Shield. The Report predicts that an increased volume of rock will need to be excavated in the crystalline location to account for additional engineered barriers that will be

required due to vault design versus the sedimentary location. These factors are expected to require additional effort during site preparation, excavation and construction activities. However, the report does not indicate how these factors were taken into account in the assessment of the potential environmental effects on air quality.

Information Request:

Provide a discussion to supplement the analysis for the potential environmental effects on air quality at the alternate locations and the applicable mitigation measures, addressing:

- Emissions of acrolein;
- Incremental GHGs emissions from the use of fossil fuels for power generation;
- Incremental air emissions related to the requirement to excavate a higher volume of rock at the crystalline location; and
- Identify assumptions, including applicable calculations, data or references.

Consider IR 1.0 and IR 2.0 in framing your response.

### **IR 1.6 Surface Water**

Rationale:

Section 5.2.1 of OPG's "Environmental Effects of Alternative Locations" report states that it is assumed that waste rock in the crystalline alternative location would not be acid generating. However, the Ontario Ministry of Natural Resources and Forestry ecozone and ecoclassification system (Crins et al. (2009)) indicates that, of the 9 ecoregions identified within the Ontario Shield ecozone, all but one are characterized by a geologic substrate that has low to moderate acid buffering capacity.

Information Request:

- Provide a comparative analysis for the risk of acid generation and metal leaching in the sedimentary and crystalline geologic locations.
- Given the variability of environmental conditions in both alternative locations, discuss whether there is a potential for environmental effects from acid generation or metal leaching of waste rock beyond those assessed in the EIS. If yes, identify any additional mitigation measures necessary beyond those identified in the EIS.

### **IR 1.7 Aquatic Habitat and Biota**

Rationale:

OPG's "Environmental Effects of Alternative Locations" report indicates that there would be waterbodies at each alternative geologic location that would include cool to cold freshwater habitat. Based on the effluent characterization, it is anticipated that effluent discharge from the water management systems will be warmer than the receiving water temperatures. If warmer effluent discharge is released into a cold water habitat, it may be potentially result in adverse effects to the freshwater biota. The Agency notes that the report does not discuss the incremental effects to freshwater species caused by warm water effluent discharges into colder waterbodies.



### Information Request:

- Provide a discussion clarifying whether environmental effects are anticipated from the water management systems on thermally sensitive aquatic species at the alternate locations, characterize the potential adverse environmental effects and describe any applicable mitigation measures.
- Clarify whether project works and activities may impact floodplains.

## **IR 1.8 Radiation and Radioactivity**

### Rationale:

The Agency notes three areas that require clarification in the assessment of the radiation and radioactivity component for alternate locations.

First, the “Environmental Effects of Alternate Locations” report states that radiological effects of the sedimentary and crystalline geologic locations are predicted to be similar to those at the Bruce site, other than incremental exposure due to waste handling, packaging, and transportation. In the EIS, however, the Bruce DGR regional study area included the radiological impacts from the existing Bruce Power stations and other nuclear operations in the vicinity of the Bruce site. It is unclear whether the baseline radiation from the existing Bruce Power stations has been taken into account in the comparative analysis of alternate locations.

Second, in the crystalline location, it is noted that higher uranium levels in granitic rock could lead to elevated levels of naturally occurring radon. The report also states that appropriate mitigation measures would be implemented to mitigate effects on workers. No consideration of the potential effects of naturally occurring radioactive materials on non-human biota is presented.

Finally, in the alternate sedimentary location, the presence of unchartered and abandoned oil and gas wells is not discussed in the report as a potential risk to radionuclide containment.

### Information Request:

Clarify whether the following factors have been considered in the comparative assessment of potential effects of radiation and radioactivity at the alternate locations and provide a discussion of how they were considered, if appropriate:

- The baseline radiation doses at the Bruce site, including sources of radiation from the Bruce power stations and other nuclear activities in the vicinity of the site.
- The presence of naturally-occurring radon, its effects on non-human biota, and potential for additional mitigation measures.
- The presence of unchartered and abandoned oil and gas wells, and whether there is a need for additional mitigation measures with respect to any such abandoned wells.

## **IR 1.9 Malfunctions & Accidents**

### Rationale:

The Agency notes that the “Environmental Effects of Alternate Locations” report does not discuss malfunctions and accidents beyond the consideration of risks related to offsite transportation on human health.

### Information Request:

Provide a discussion with respect to malfunctions and accidents to inform the comparative analysis among alternate locations. The discussion should include the following:

- Describe the differences among disruptive scenarios;
- Discuss the potential environmental effects from accidents and malfunctions during all phases of the project on-site and during off-site waste transportation; and
- Provide a description of the disruptive scenarios (including inadvertent human intrusion, undetected major fracture, and shaft failure) in relation to post-closure safety for both sedimentary and crystalline locations.

## **IR 1.10 Rail Transportation**

### Rationale:

OPG’s technical document “Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations” provides the following statement as a footnote on page 6 states:

“Experience has shown that for large long duration transport campaigns such as this, transport of nuclear waste by rail would require dedicated trains, rail siding construction on both sites to facilitate direct rail access and staging of multiple railcars, and potential upgrades to secondary railroads (if mainline rail routes are not available). Alternatively, intermodal trucking between the nearest viable railhead to both sites would be required.”

This statement suggests that additional project components would be required, but does not explain whether rail transportation is excluded based on criteria such as cost, risk, and environmental effects.

### Information Request:

Provide a discussion to clarify the key criteria that support the selection of road over rail transportation and clarify whether there would be important differences in cost, risk, and potential environmental effects.

## **IR 1.11 Radiological Risk to Human Health from Transportation**

### Rationale:

OPG’s technical document “Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations” considers annual individual and collective doses resulting from normal routine transportation. These doses are adapted from a study by the U.S. Department of

Energy. However, OPG does not explain how the data from this study applies to the DGR Project.

Information Request:

Provide a discussion regarding the study by the U.S. Department of Energy that:

- Clarifies how the study's receptors and exposure pathways apply to the DGR and the study of alternate locations; and,
- Explains how the doses have been scaled to correspond to shipments of low and intermediate-level waste for the DGR.

**IR 1.12 Cost Estimate Variance**

Rationale:

OPG's technical document "Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations" uses a methodology based on the Association for the Advancement of Cost Engineering International guidelines for a conceptual cost estimate (Class 5). This reference stipulates that the variation for a conceptual cost estimate can range from -20% to -50% at the low end and +30% to +100% at the high end.

OPG's technical document uses adjustment factors and a management reserve to account for levels of uncertainty pertaining to certain components of the transport and packaging cost estimates. The variation in accuracy for the final numbers presented is not explicitly stated in the technical document or in the main study of alternate locations.

Information Request:

Provide a discussion to clarify the range in variation for the cost estimates presented in the technical document, taking into account the adjustment factors and the management reserve.

**IR 1.13 Valued Components**

Rationale:

OPG's "Environmental Effects of Alternative Locations" report (page 4-5) states that the list of VCs considered in the alternative means analysis includes the environmental components as defined in section 5(1)(a) of CEAA 2012 and that constructing the Project at an alternate location may affect VCs within the socio-economic environment.

However, the report does not make any explicit reference to the environmental components as defined in section 5(1)(c) of CEAA 2012. Although OPG states that the change in environmental conditions has the potential to affect health, socio-economic conditions, cultural heritage and land use, it has not provided a discussion on the potential environmental effects of the Project on VCs other than traditional and non-traditional land and resource use. The report indicates that many socio-economic effects would be beneficial, and may serve to enhance community well-being.

### Information Required:

As per the Agency's draft technical guidance "Assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA 2012", and taking into account the input provide by Indigenous groups, identify the potential effects of any change caused to the environment for each alternative location and provide a comparative qualitative analysis on:

- health and socio-economic conditions,
- physical and cultural heritage,
- the current use of lands and resources for traditional purposes, or
- any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Provide a discussion of whether constructing the Project at an alternate location would reduce the risk or harm on potentially affected Indigenous groups in the preferred Project area.

### **IR 1.14 Terrestrial Environment**

#### Rationale:

OPG's "Environmental Effects of Alternate Locations" report (page 29) states that no measureable changes to soil quality, groundwater quality or groundwater flow are likely outside the immediate footprint of the DGR at the sedimentary location. Given that the preferred location at the Bruce site it is an existing Nuclear facility, it can be reasonable concluded that there may be no measurable changes to these VCs. However, given that the alternate sedimentary location would have to be cleared and excavated, it is difficult to understand that there would be no changes.

#### Information Request:

- Provide a brief discussion on the potential effects of the terrestrial environment as a result of clearing and excavation at the sedimentary location.
- Discuss how increased fragmentation of the sedimentary location will affect traditional land use in the area.

### **IR 1.15 Indigenous Interests**

#### Rationale:

The concepts of land removal, current land use activities and access are important to understanding potential impacts to Indigenous rights and interests. Despite the range of environmental conditions presented for the two alternate locations, the description of land and resource use in the "Environmental Effects of Alternate Locations" report is nearly identical.

#### Information Request:

Provide a description of the land and resource uses for the alternative locations that highlight the unique characteristics of these locations from the perspective of Indigenous peoples (e.g. land availability for traditional uses, access, etc.).

## **2.0 Analysis of Cumulative Environmental Effects**

### **IR 2.1 Methodology for Temporal Boundaries**

#### **Rationale:**

Figure 2-2 on page 7 of the “Updated Analysis Cumulative Environmental Effects” report provides timelines for the Project at the Bruce Site and the Adaptive Phased Management (APM) DGR project for the disposal of used nuclear fuel. Given that the Project is in the engineering designing phase and the APM DGR project is in the pre-feasibility stage, there could be a large degree of overlap and variability in the timelines for each project. For example, OPG’s analysis found that there is a potential for geographic overlap of effects between the Project and the APM DGR project. However, OPG states that it is likely that activities that generate air emissions associated with each project will occur at the exact same time due to the anticipated infrequent nature of air emissions across the phases of the projects. OPG further states that it is also unlikely that the air emissions will persist in the atmosphere for the same duration and therefore concludes no residual adverse cumulative effect on air quality.

In order to better predict the range of potential cumulative environmental effects of both projects, there must be an understanding of the variability for the project timelines and where there could be additional overlapping activities.

#### **Information Request:**

Provide a description of the variability in the timelines (upper and lower estimates) during all phases of the Project.

- Based on that variability, identify the activities that have the potential to overlap with the APM DGR project, and the potential cumulative effect on VCs, and;
- Where the site preparation and construction activities of the Project overlap in time with the APM DGR project, the Western Waste Management Facility or the Project’s expansion at the Bruce site, provide a description of the potential cumulative effects to all VCs, including air quality.

### **IR 2.2 Methodology for Types of Cumulative Environmental Effects**

#### **Rationale:**

It is important to consider the various ways cumulative environmental effects may interact and manifest themselves in order to meaningfully predict, monitor and mitigate them. On page 15 and 33 of the “Updated Analysis of Cumulative Environmental Effects” report, radiation and radioactivity, including radiological emissions during all phases of the Project, were deemed to have the potential for additive cumulative environmental effects with the APM DGR project; however, OPG did not consider compensatory, masking or synergistic types of cumulative environmental effects in its discussion of all VCs.

On page 8 of the “Updated Analysis of Cumulative Environmental Effects” report, OPG describes the residual adverse effects from the Project. However, on page 10, OPG lists all the

VCs for which there are no residual effects adverse effects from the Project. Using the same methodology as in the EIS, OPG considers the cumulative effects assessment of the residual effects identified for the Project at the Bruce site on each VC and the potential for effects of past, present, and reasonably foreseeable projects and activities to affect the same VCs within the same spatial and temporal boundaries. Though this is a reasonable approach, smaller and potentially incremental effects of other VCs, such as those listed on page 10 of the “Updated Analysis of Cumulative Environmental Effects” report, when combined with other projects, could also have the potential for a greater environmental effect over time.

Information Request:

- Provide a discussion of other types of cumulative environmental effects as a result of the interaction between two or more effects or activities from the APM DGR project and the Project; and,
- Discuss the potential for smaller, incremental effects from both projects, when combined, to have the potential to have adverse effects over time.

**IR 2.3 Accidents, Malfunctions and Malevolent Acts**

Rationale:

OPG states on page 36 of the “Updated Analysis Cumulative Environmental Effects” report that several disruptive or “what if” scenarios (i.e., inadvertent human intrusion, shaft seal failure, poorly sealed borehole, and vertical fault) are unlikely to occur, so the risk of occurrence remains low for those locations. Although the probability of occurrence of a hazardous event may be low, the magnitude of the impact on the environment or human health can still be high. A risk assessment should include the magnitude of the event and the probability of occurrence in order to understand the overall risk.

The Agency also notes there is a limited discussion on the potential long-term release of contaminants should remediation or emergency response not occur in a timely manner (e.g staff no longer on site, resource not available, etc.).

Information Request:

- Provide a risk assessment that discusses the severity (catastrophic, severe, moderate, low, minor, none) and the probability of occurrence (very unlikely, unlikely, possible, very possible, certain) of accidents, malfunctions and malevolent acts.
- Discuss the potential effects on the environment and human health of a possible long-term release of other radionuclides via water sources if the failure of both the APM DGR project and the Project at the Bruce site occurs, due to a common or unrelated cause(s).

**IR 2.4 Radiation, Radioactivity and Groundwater Monitoring**

Rationale:

The updated assessment of cumulative environmental effects is limited to those VCs for which residual adverse environmental effects from the Project are predicted. The “Updated Analysis Cumulative Environmental Effects” report describes the potential adverse effects resulting from

the APM DGR project in one of the nearby host communities. Within section 5.8.1 of the report, OPG states that during all phases of the Project, the APM DGR project has the potential for radiological emissions. These radiological emissions from the APM DGR project may have additive radiation effects on the emissions resulting from the Project at the Bruce site.

When effects of the two projects overlap in time and in space there is potential for cumulative environmental effects. These effects are assessed and mitigation measures are identified in the “Updated Analysis Cumulative Environmental Effects” report; however, the report concludes that any cumulative adverse environmental effects related to post-closure migration of radionuclides in deep groundwater systems would be unlikely. The report also identifies a potential for adverse cumulative environmental effects for the environment components of radiation and radioactivity related to deep ground water systems. Specifically, radionuclide diffusion from the two repositories could eventually reach more active ground water systems in the Cambrian sandstone and Guelph Formation, which are connected across the region. The consequences of such movement could have potentially adverse effects. Taking this into consideration, it is unclear why VCs directly related to geology and hydrogeology were not assessed further in the cumulative environmental effects assessment.

Further, an assessment of the ecological risk due to C-14 and H-3 on a number of terrestrial species with large habitat ranges, including mammals, such as white tailed deer and resident bird species such as wild turkey, was not conducted.

Information Request:

Discuss measures that are available for identifying and monitoring potential effects on groundwater quality from post-closure migration of radionuclides.

Provide a narrative discussion of the potential cumulative effects from the APM DGR project and the Project on appropriate non-human biota VCs.

**IR 2.5 Species at Risk**

Rationale:

As part of the site preparation and construction activities of the Project, wetland 3 would be infilled. Snapping Turtles have been observed in this wetland, and Environment and Climate Change Canada (ECCC) advised that it could be possible for Eastern Ribbonsnake and Eastern Milksnake individuals to move into the Bruce DGR site. These potential residual effects from the Project were not assessed in combination with the potential effects from the three proposed APM DGR sites.

Information Request:

Provide an assessment of the potential cumulative environmental effects on the terrestrial environment that includes impacts on wetlands and species at risk, specifically the Snapping Turtle, Eastern Ribbonsnake and Eastern Milksnake.

## **IR 2.6 Residual Cumulative Environmental Effects**

### Rationale:

According to OPG's "Updated Analysis of Cumulative Effects" (page 10), the residual adverse effects on radiation and radioactivity were not identified in OPG's EIS [OPG 2011] for the Project at the Bruce site, however, radiation and radioactivity have been included to allow for the consideration of potential cumulative effects in the updated analysis of cumulative effects. This same consideration was not provided for Indigenous interests.

### Information Request:

Provide a rationale as to why the potential interaction between the APM DGR and those environmental components under 5(1)(c) of CEAA 2012 was not considered in the updated cumulative effects assessment and discuss the potential for cumulative effects related to Indigenous interests.

## **IR 2.7 Cumulative Effects –Indigenous Interests**

### Rationale:

OPG states that its updated cumulative environmental effects assessment builds on the results of effects of the Project at the Bruce site as described in section 7 of the EIS [OPG 2011a]. These results are summarized in Table 3-1 of OPG's "Updated Analysis of Cumulative Environmental Effects" report.

It appears that Indigenous interests were not included in the updated analysis of cumulative effects. Section 7.9.2.2 of the EIS [OPG 2011a] states that the Project is likely to diminish the quality or value of activities undertaken by Aboriginal peoples at the Jiiibegmegoong burial site located at the Bruce nuclear site. This occurs as a result of changed aesthetics, noise and dust. However, the assessment of the overall local enjoyment of the area does not discuss factors other than increased ambient noise, which was previously discussed in section 5.5 Noise Levels of OPG's "Updated Analysis of Cumulative Effects" report, and focuses on the Baie du Dore residences in particular.

### Information Required:

- Provide a definition of the term 'Local Enjoyment of the Area' that reflects the environmental component Cultural Heritage (Indigenous Heritage Resources).
- Provide a discussion on the potential environmental interactions identified for the APM DGR project that could act cumulatively with the residual effects identified for Indigenous interests.



### **3.0 Mitigation Measures**

The Minister of Environment and Climate Change requires OPG provide an updated list of mitigation commitments. After reviewing OPG's Mitigation Measures report, the Agency finds it requires the following clarifications.

#### **IR 3.1 Clarification of MIT-P-02**

##### **Rationale:**

MIT-P-02 indicates that "All underground facilities (office, tunnel, emplacement room) will be constructed in accordance with the seismic requirements of the latest edition of the National Building Code at the time of the construction."

Given that there are no specific seismic requirements in the National Building Code for underground facilities, this statement is ambiguous.

##### **Information Request:**

Provide a revised version of MIT-P-02 to clarify how in-design mitigation measures for underground facilities will integrate seismic requirements.