May 24, 2012

Albert Sweetnam
Executive Vice President
Deep Geologic Repository Project
Ontario Power Generation
700 University Avenue
Toronto, ON M5G 1X6

Subject: Information Request Package #3 from the Deep Geologic Repository Joint Review Panel

Dear Mr. Sweetnam,

In the attached documents, please find the latest information requests from the Deep Geologic Repository Joint Review Panel (the Panel). These requests follow the Panel's intital review of the Environmental Impact Statement (EIS) and Preliminary Safety Report submitted by Ontario Power Generation in April 2011.

The Panel expects that some of the attached information requests will require the collection of new data. However, the Panel does not anticipate that a prolonged period of data collection will be required. These new data must be analyzed, interpreted and then integrated into the previously submitted information. The submission of additional design and operational detail will provide greater clarity and certainty. As submitted, the EIS does not contain sufficient information to allow the Panel to fully assess such matters as adaptive management during construction, contingency plans for unforeseen events and analyses that demonstrate rigour and data quality objectives.

The Panel requires Ontario Power Generation to address the information requests and provide responses in a complete and timely manner. Responses must reference the applicable volume, section and sub-section number(s). To ensure a consistent approach, the responses should follow the Panel's numbering system and framework as set out in the attached documents.

The evaluation of information received will include, but not be limited to, a determination of compliance with the Environmental Impact Statement Guidelines and applicable legislation, an assessment of the reliability and appropriateness of the supporting data and analysis submitted, the clarity and completeness of the information and, where applicable, the proper application of scientific principles and engineering practices. The Panel's review will include

Ontario Power Generation's calibration, verification, and if possible, validation of models used in the assessment.

If you require clarification with regard to these requests, do not hesitate to contact either of the Panel's Co-Managers. The Panel would appreciate receiving confirmation with respect to the anticipated date of your responses as soon as possible.

Sincerely,

<original signed by>

Stella Swanson
Chair, Deep Geologic Repository Joint Review Panel

c.c.: James F. Archibald, Joint Review Panel Member
Gunter Muecke, Joint Review Panel Member

Frank King – Vice-President and Chief Engineer, Nuclear Waste Management Organization
Allan Webster – Senior Manager, Licensing, Ontario Power Generation

Enclosure

Attachment 1
Deep Geological Repository Project
Joint Review Panel EIS Information Requests
Package 3 – May 24, 2012

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-44	▪ Section 2, Guiding Principles. ▪ Section 11.1, Effects Prediction; ▪ Section 11.3, Significance of Residual Effects	▪ *EIS:* Section 7.1 Assessment Methods, pages 7-1 to 7-3. ▪ Table 7.1-1 Effects Criteria and Levels for Determining Significance, page 7-3.	Provide a detailed explanation of how each of the criteria and definitions presented in Table 7.1-1 embody the Guiding Principles for the assessment as described in the EIS Guidelines. • Describe how the precautionary approach was applied to the development of the effects level definitions; • Explain how sustainability principles were used to derive the five criteria (magnitude, geographic extent, timing and duration, frequency, and degree of irreversibility) as well as the effects level definitions; • Provide an explanation of how the criteria and levels for determining significance include consideration of traditional knowledge and understanding of significant effects in light of Aboriginal culture and values; and. • Describe how the three Guiding Principles were incorporated into effects criteria and levels for determining significance. o Descriptions must be discipline-specific because the rationale will vary. For example, effects level definitions for air quality may address sustainability principles differently than those used for the aquatic environment. Identify areas of similarity and differences among the disciplines.	The criteria and levels for determining effects and significance presented in Table 7.1-1 are fundamental to the entire assessment. Therefore, the criteria must embody the requirements for the use of the precautionary approach. The EIS guidelines state the following with respect to the precautionary approach: "The Precautionary Principle informs the decision-maker to take a cautionary approach, or to err on the side of caution, especially where there is a large degree of uncertainty or high risk." The criteria must also embody sustainability principles as stated in the EIS Guidelines: "A project that is supportive of sustainable development must strive to integrate the objective of net ecological, economic and social benefits to society in the planning and decision-making process and must incorporate citizen participation." The criteria must incorporate the use of traditional knowledge. The EIS Guidelines state: "Traditional knowledge, in combination with other information sources is valuable in achieving a better understanding of potential impacts of projects. It may also contribute to project siting and design, identification of issues, the evaluation of potential effects, and their significance, the effectiveness of proposed mitigation, cumulative impacts, and the consideration of follow-up and monitoring programs." Section 11.1 of the EIS Guidelines state: "The consideration of views from the public and Aboriginal groups, including any perceived changes attributed to the project, should be recognized and addressed in the assessment method."

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				Section 11.3 of the EIS Guidelines state: "The EIS must clearly explain the method and definitions used to describe the level of the adverse effect (e.g., low, medium, high) for each of the above categories and how these levels were combined to produce an overall conclusion on the significance of adverse effects for each VEC. This method must be transparent and reproducible."
EIS 03-45	▪ Section 2.2, Public Participation and Aboriginal Engagement; ▪ Section 2.3, Traditional Knowledge; ▪ Section 6, Public Participation ▪ Section 9.1, Spatial Boundaries and Scale	▪ *EIS:* Section 5.1, Spatial Scale pages 5-1 and 5-2. ▪ Section 6.2.1, Geology Spatial Boundaries. ▪ Section 6.3.1, Hydrology and Surface Water Quality Spatial Boundaries. ▪ Section 6.4.1, Terrestrial Spatial Boundaries. ▪ Section 6.5.1, Aquatic Spatial Boundaries. ▪ Section 6.6, Radiation and Radioactivity Spatial Boundaries.	a) Provide the detailed analysis that justifies all of the Regional Study Area boundaries. In addition, detail how these boundaries represent reasonable spatial limits for the cumulative effects assessments. b) Clarify whether input from Aboriginal groups, government agencies (federal, provincial and municipal) and community groups was obtained with respect to definition of the regional, local and site study areas. If input was received, clarify how this input was used to derive the overall study boundaries and to amend them for each of the specific disciplines. c) Provide the rationale for the Regional Study Area for the aquatic environment to extend 4 km offshore in Lake Huron and for the Local Study Area to extend "approximately" 2 km. d) Explain why the study area boundaries do not reflect, at least in part, prevailing winds	a) Section 9.1 of the EIS guidelines state that: "the area within which there is the potential for cumulative biophysical and socio-economic effects. This area includes lands, communities and portions of Lake Huron around the Bruce nuclear site that may be relevant to the assessment of any wider-spread direct and indirect effects of the project." Section 5.1.1 of the EIS states: "The Regional Study Area (Figure 5.1.1-1), generally adopted for the EA corresponds to Bruce County with the exception of the peninsula communities of the Town of South Bruce Peninsula and the Township of Northern Bruce Peninsula." b) The EIS guidelines also require that Aboriginal groups and stakeholders have an opportunity to provide input to the assessment of effects of the DGR Project. The definition of spatial boundaries is a pivotal step in the assessment, affecting all subsequent analysis. Explicit incorporation of public knowledge and concerns into the definition of spatial boundaries adds to the completeness and defensibility of the assessment. c) There is no explanation for the regional study area 4 km boundary offshore in Lake Huron and the approximate 2 km local study area boundary. Do these boundaries correspond with particular offshore biophysical features in Lake Huron? Do they correspond with socio-economic factors such as

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		▪ Section 6.7.1, Climate, Weather Conditions and Air Quality Spatial Boundaries. ▪ Section 6.8.1, Noise Spatial Boundaries. ▪ Section 6.9.1, Aboriginal Spatial Boundaries. ▪ Section 6.10.1, Socio-Economic Spatial Boundaries		commercial fishing grounds, Aboriginal claims, etc.? d) The strictly rectangular Local and Regional Study Areas do not incorporate consideration of prevailing winds. The explanation for the lack of any consideration of prevailing winds will is required to evaluate the defensibility and appropriateness of the assessment.
EIS 03-46	▪ Section 2.3; Traditional Knowledge; ▪ Section 6.1; Aboriginal Peoples; ▪ Section 9.3, Valued Ecosystem Components	▪ *EIS:* Section 6.9.2.2. Aboriginal Traditional Knowledge, page 6-19; ▪ Table 6.9.2-1 VECs Selected for the Aboriginal Interests, page 6-192.	Provide an explanation for why the traditional Ojibway spiritual worldview that includes the “rock of the earth” as the first order of creation was not included as a VEC (Table 6.9.2-1).	Section 6.9.2.2. of the EIS states: “The traditional Ojibway spiritual worldview is that the physical world, including the rock of the earth, is the first order of creation upon which the other orders of creation – the plant world, the animal world and the human world – depend upon for sustenance and existence.” The rationale for not including the interests related to the traditional spiritual worldview of the Ojibway people is required to evaluate the completeness of the assessment of effects on Aboriginal interests.

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EIS 03-47	▪ Section 2.3; Traditional Knowledge; ▪ Section 6.1; Aboriginal Peoples; ▪ Section 9.3, Valued Ecosystem Components	▪ *EIS:* Section 6.9 Aboriginal Interests, pages 6-183 to 9-191; ▪ Table 6.9.2-1 VECs Selected for the Aboriginal Interests, page 6-192.	Describe the process used to screen the Aboriginal interests listed in Section 6.9 in order to select the Valued Ecosystem Components (VECs) in Table 6.9.2-1. Provide evidence of Aboriginal input to the final selection of VECs as presented in Table 6.9.2-1. Include evidence that there was an opportunity to review and comment on the VECs. Explain any changes or additions that were made on the basis of that review and comment by Aboriginal communities	The table of VECs for Aboriginal interests is supported by information presented in the EIS (pages 6-183 to 6-191) as well as the Aboriginal Interests TSD (pages 30-45). There are implicit links between this information and the VECs in Table 6.9.2-1; however those links are not made explicit, nor is there any discussion of how a longer list of interests was screened and honed down to the list in Table 6.9.2-1. For example, it is not clear how the indicators for each VEC were selected and why others do not appear (such as quality of life indicators for Aboriginal communities). Furthermore, it is not clear that the final list of VECs was produced with input from Aboriginal communities. Information on the rationale for VEC selection and the role of Aboriginal consultation in the process of VEC selection is required to evaluate the defensibility, completeness and appropriateness of the assessment of effects on Aboriginal interests.
EIS 03-48	▪ Section 2.5; Precautionary Approach; ▪ Section 6; Public Participation	▪ *EIS:* Table 6.10.2-1 VECs Selected for the Socio-economic Environment, pages 6-219 to 6-224.	Describe the process of screening the VECs in Table 6.10.2-1. Provide evidence of stakeholder input (including Aboriginal input) to the final selection of VECs as presented in Table 6.10.2-1. Include evidence that there was an opportunity to review the VECs and provide comments. Explain any changes or additions that were made on the basis of that review and comment by stakeholders and Aboriginal communities.	The table of VECs for the socio-economic environment is supported by information presented in the EIS (pages 6-225 to 6-268) as well as the Socio-Economic TSD (pages 50-146). There are numerous implicit links between this information and the VECs in Table 6.10.2-1; those links, however, are not made explicit, nor is there any discussion of how a longer list of interests was screened and honed down to the list in Table 6.10.2-1. For example, the criteria used to select the indicators for each VEC are not clear. Furthermore, it is not clear that the final list of VECs was produced with input from stakeholders (including Aboriginal communities). Information on the rationale for VEC selection and the role of stakeholder and Aboriginal consultation in the process of VEC selection is required to evaluate the defensibility, completeness and appropriateness of the assessment of effects on the socio-economic environment.

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EIS 03-49	▪ Section 7.3; Alternative Means of Carrying out the Project	▪ *EIS*: Section 3.4, Alternative Means of Carrying out the Project	Provide a detailed description of the alternative means options analysis, including the rationale for not including weighting of the factors. Provide the logic of the scoring system used for all of the alternative means analyses.	Tables 3.4.2-1 to 3.4.10-1in the EIS present multi-criteria evaluations involving a number of factors and constraints. In the provided tables it is unclear how the factor scores are standardized.
EIS 03-50	▪ Section 7.3; Alternative Means of Carrying out the Project	▪ *EIS:* Section 3.4, Alternative Means Of Carrying Out The Project ▪ Section 4.12 Abandonment And Long-Term Performance Phase	a. Provide an evaluation of the alternative means “no institutional control necessary" that includes measures to prevent human intrusion after abandonment. b. Provide an analysis of alternative means of dealing with combustible waste, waste that is moist, and waste that will generate methane and/or hydrogen. Consider means that would either eliminate or reduce gas production, corrosion, or combustibility. Measures considered must go beyond those detailed in the EIS and must meet current regulations. c. Provide an analysis of alternate means of treating the chamber walls before waste emplacement. The analysis must include documented quantitative information on the degree of waste retention offered by each method	Section 7.3 of the EIS Guidelines specify that alternative means of carrying out project components require a full and defensible evaluation. The Panel has identified several aspects of the project for which alternate means are feasible and which need consideration: a. The decommissioning phase is to be followed by institutional controls lasting up to 300 years. The alternative means "no institutional control necessary" must be fully evaluated. b. Waste forms to be placed into the Bruce repository include active liquid waste (ALW), resins, sludges & combustibles. (EIS Table 4.5-1 & Table 4.5-2) packaged in 100 or more different types of containers. Some of the waste is anticipated to generate hydrogen and methane. Alternate means to treat the waste and eliminate potential problems prior to emplacement must be evaluated. c. The walls of the emplacement chambers can provide one of the barriers to isolate the waste from the biosphere. A number of alternatives exist for finishing treating the walls that may enhance wall barrier effectiveness. An analysis of such alternatives must be provided.

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EIS 03-51	▪ Section 7.3; Alternative Means of Carrying out the Project	▪ *EIS*: Section 3.4, Alternative Means of Carrying out the Project	Provide an analysis of alternative means of permanent storage of the different waste forms to be placed into the depository.	The alternative means analysis does not include a number of issues that could be addressed using distinctly different approaches. In some cases such alternatives are being used by other nations in deep geologic depositories for LLW & ILW. For example, waste forms to be placed into the Bruce depository include ALW, resins, sludges & combustibles. Other jurisdictions will only store non-combustible solid waste.
EIS 03-52	▪ Section 7.3, Alternative Means of Carrying out the Project ▪ Section 8.2, Site Preparation and Construction	▪ *EIS*: Section 3.4.7, Underground Construction Methods.	Provide quantitative data and a discussion that evaluates the magnitude of the overbreak for the two excavation methods. Considerations should include, but not be limited to, the density of fractures, their depth of penetration, and surface morphology. The physical properties of the rock mass involved should reflect those of the Cobourg Formation at 680m depth. In considering the magnitudes of overbreak, include citations to relevant research conducted in the Local Study Area.	An alternative to drill and blast for lateral development is the use of a roadheader. It is acknowledged that blasting results in overbreak and the development of an extended fracture zone in the rock around the excavation perimeter. Induced fracturing is a major concern in the evaluation of the long-term integrity of the depository.
EIS 03-53	▪ Section 8, Description of the Project	▪ *EIS:* Section 1.2.3.2, Underground Facilities, page 1-11. ▪ Section 4.4.2, Description of Underground Facilities, page 4-10.	Provide additional details regarding the Panel room development procedures, including the timing of access and exhaust drift, and room development to provide multiple entry/egress capabilities at all stages of development. Provide the timing of room filling and closure that will leave only single path entry/egress at some stage of room life while worker presence is required.	In the underground DGR facilities, each of two panels of rooms will have two access drifts, one at each end, to provide flow through ventilation and two-path access/egress. On page 1-11, the EIS states: “End walls may be erected at the room entrance once the rooms are filled.” This indicates that the two ends of any single room may be sealed at different times, creating the possibility that workers using the rooms for development or waste placement may not have available a double pathway for entry/egress at all times. More detail concerning the timing of drift development to permit two points of access/egress is needed to confirm that single entry conditions will not exist.

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EIS 03-54	▪ Section 8, Description of the Project	▪ *EIS: Section 6.2.5,* Overburden Geology ▪ *Geology TSD:* Section 5.4, Overburden Geology. ▪ Figure 5.3.1-1,Study Area with Locations of Monitoring Wells, page 43	Provide specific information on the spatial distribution of surficial deposits found under the DGR Project Area that is not an extrapolation from test holes outside of the project area. Include data on the disposition of the water table, any perching of the water table, and the sand aquifer noted in adjoining areas. Describe and discuss the level of confidence in the expectation that the Middle Sand unit does not exist within the area where the DGR shafts will be located. Produce a revised Figure 5.3.1-1indicating the locations of the Waste Rock Management Area (limestone, shale, dolostone, unsuitable overburden materials), shaft, monitoring well locations and the locations of deep bore holes 2 through 6.	The surficial deposits beneath the Western Waste Management Facility (WWMF) and the former Heavy Water Plant have been studied extensively using shallow drill hole data. These studies are used in the EIS to provide a generalized overview of the nature of the surficial geology of the Project area. The stratigraphic cross sections south and west of the DGR Project Area (*Geology TSD* Figure 5.4.1-5 & Figure 5.4.1-7) show there is considerable variation in bedrock topography, unit continuity, lithology, unit thickness, and water table level over short distances. Other notable features are the presence of a sand aquifer and a perched water table. Only one monitoring well (US-7) is located in the DGR Project Area and no overburden stratigraphy is available for this well (Figure 5.3.1-1). As a result of the above noted variability, it is not possible to extrapolate the spatial distribution of the surficial deposits into that region. The location of the water table, shallow ground water movement, infiltration rates, solute transport etc, all of which depend on nature of the surficial deposits, can therefore not be evaluated in the areas of the proposed DGR infrastructure and the waste rock management areas. The EIS states on page 6-16 that: "....the Middle Sand unit is considered to be an important layer to the groundwater flow system beneath the Project Area." and "This unit is not expected to exist within the area where the DGR shafts will be located." The confidence associated with the latter quotation requires explicit discussion, since any intersection with an active groundwater flow system by the DGR shaft would have significant implications to the performance of the DGR Project. There does not appear to be a discussion of uncertainty associated with this issue in the Postclosure Safety Assessment.

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EIS 03-55	▪ Section 8, Description of the Project ▪ Section 11.1 Effects Prediction	▪ *EIS:* Section 7.2.1.2, Overburden, Shallow Bedrock, Intermediate Bedrock and Deep Bedrock Solute Transport, page 7-9.	Provide an explicit assessment of the potential for effects from dewatering and the construction and operation of the Waste Rock Management Area on the marsh at the northern end of the Project Area or the swamp in the southeast corner of the Project Area, as identified on page 7-75 of the EIS.	According to the EIS, page 7-9: "It is not likely that the zone of influence will extend beyond several meters in radius from a given foundation trench(es)" and "This perturbation of very localized transport direction is expected to only extend several metres from the sealed shaft walls, and will not be noticeable within the scale of the Project Area or Site Study Area". Construction and operation of the Waste Rock Management Area will affect the location of the water table and direction of flow of near surface groundwater. In the text, no mention is made of the marsh at the northern end of the Project Area or the swamp in the southeast corner of the Project Area (see page 7-75 of the EIS). Therefore, clarification is required with respect to whether the hydrogeological assessment considered these two wetland areas.
EIS 03-56	▪ Section 8.1, General Information and Design Description	▪ *EIS*: Section 4.4.1.5, Stormwater Management System, page 4-10	Provide information regarding the following aspects related to the stormwater retention pond: • Effect of the pond on groundwater quality; • Provision for prolonged retention; and • Ability for rapid deployment of water treatment, beyond oils, greases and grits/sediments., when and if required (e.g., treatment of elevated nitrogen concentrations)	Provision of detailed information with respect to the listed aspects of the stormwater retention pond design will allow evaluation of the defensibility and appropriateness of that design. This information request is posed in consideration of the responses to LPSC-01-12, LPSC-01-13 and LPSC-01-27.
EIS 03-57	▪ Section 8.1, General Information and Design Description	▪ *EIS:* Section, 6.2.7.1, Shallow Groundwater System	Provide an evaluation of the effects of the waste rock management area (WRMA) and the stormwater management pond on the elevation of the ground water table and local ground water flow regime.	The limestone waste rock pile will elevate ground level by 15 meters by the end of the construction phase. The stormwater management pond is not lined and will increase the infiltration. Both of these features may result in mounding of the water table and a local alteration of ground water flow directions.

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EIS 03-58	▪ Section 8.1, General Information and Design Description	▪ *EIS:* Table 4.5.1-3: Summary of Waste Acceptance Criteria	Provide a more detailed definition of “ignitable wastes”, as used in the category of excluded wastes in Table 4.5.1-3.	In Table 4.5.1-3 ignitable wastes are listed as an excluded waste. Amounts of wastes that can be incinerated are of concern in evaluating the possible consequences of an accidental fire in the repository.
EIS 03-59	▪ Section 8.2, Site Preparation and Construction	▪ *EIS:* Section 4.5, Waste to Be Placed in the DGR, page 4-18 ▪ Table 4.5.1-3, Summary of Waste Acceptance Criteria	Provide information regarding the system to be used for confirmation that waste is either low level or intermediate level. Provide the activity concentration range of the ILW to be emplaced in the DGR.	The descriptions of low level waste and intermediate level waste on pages 4-18 and Table 4.5.1-3 do not include clear and unambiguous descriptions of the ranges of radioactivity to be used to categorize each type of waste. Furthermore, the text does not include an explanation of how the categorization of each container will be confirmed. The ILW is described in terms of categories, volume, radionuclide inventory etc. However, there appears to be no data on the activity concentration of the different waste forms.
EIS 03-60	▪ Section 8.3, Operations ▪ Section 11.5.6, Human Health	▪ *EIS:* Section 4.4.2.2 Underground Services, page 4-12	Provide the rationale behind contingency planning measures for potential placement of portable refuge stations in underground locations other than the main and ventilation shaft stations.	On page 4-12, the EIS states that: “…amenities (in close proximity to the shafts) …include a lunchroom/refuge station” and “In addition, there is a provision for placement of portable refuge stations in the panel access tunnels.” This indicates that there will exist two refuge stations, each close to one of the two shafts. Any accident that may result in closure of either access tunnel could potentially block off retreat by personnel to shaft-located refuge stations, or even upstream-located access tunnel sites where portable refuge stations may be located.

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EIS 03-61	▪ Section 8.3, Operations ▪ Section 11.5.6, Human Health	▪ *EIS:* Section *4.4.2.4, Emplacement Rooms* ▪ *EIS:* Figure 4.4.2-1: Preliminary Layout of the Underground Repository, page 4-11.	The room dimensions appear to been chosen only on the basis of the stacking and placement capabilities of the transport equipment and sizes of the packing containers. Provide detail concerning the use of inferred ground stress conditions (magnitudes and orientations) and planned excavation dimensions/geometries for the selection of safe structural design features of emplacement rooms. Provide justification for the selection of emplacement room dimensions, and potential variance in width and height features by up to 1.4 m and 1.2 m, respectively between such rooms	On page 4-12, the EIS states: “Emplacement rooms are arranged parallel to expected stress conditions and are dimensioned to maximize packing efficiencies … The dimensions of the emplacement rooms vary 1.4 m in width and 1.2 m in height with nominal dimensions being 8 m wide and 7 m high.” If the dimensioning of rooms is highly variable, large differences in post-mining stress concentration can develop about these excavations that could also result in variability in the size of the Excavation Damage Zone about the emplacement rooms and the types of damage/failure within the rock that could develop.
EIS 03-62	▪ Section 8.3, Operations ▪ Section 11.5.6, Human Health	▪ *EIS:* Section 4.4.2.4, Emplacement Rooms, pages 4-12 & 4-13 ▪ Figure 4.4.2-1, Preliminary Layout of the Underground Repository, page 4-11	Provide information relating to the emplacement strategy for “large and heavy packages into the first three emplacement rooms of the panel” as referred to in Section 4.4.2.3, page 4-12 of the EIS. Describe the planned sequence of placement of Low Level and Intermediate Level Waste, both temporally and spatially, within the two Panels of the DGR.	Section 4.4.2.3 of the EIS, on page 4-12 states: “A portion of the Panel 1 access tunnel will have rail embedded in the concrete floors to allow movement of rail carts loaded with large and heavy packages into the first three emplacement rooms of the panel.” The layout illustration (Figure 4.4.2-1, page 4-11) indicates that Panel 1 will be comprised of 14 emplacement rooms while Panel 2 will be comprised of 17 rooms.
EIS 03-63	▪ Section 8.5, Decommissioning ▪ Section 8.6, Abandonment	▪ *EIS:* Section 4.11.4.2 Construction of Shaft Seal, page 4-77. ▪ *Postclosure Safety Assessment:*	Explain in more detail the basis for the selection of an asphalt mastic mix as a secondary shaft seal and provide an analysis of the additional chemicals of concern that may be produced by the seal and migrate to groundwater (to deep saline groundwater or upwards to shallower groundwater zones). Include information of potential chemicals of concern and migration in an evaluation of the current uncertainty analysis of the postclosure assessment, including the assumptions used with	Page 4-77 of the EIS states that the placement of a 60m thick asphalt column over a length of the Georgian Bay Formation to just above the Queenston/Georgian Bay contact was apparently selected because “it has the ability to flow and make good contact with host rock.” There is no explanation of why this particular section of the shaft requires a secondary asphalt seal. The uncertainty analysis of the postclosure assessment requires a discussion of the fate and

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		Section 4.2.4. Safety Relevant Features, page 43 ▪ Section 4.2.5, Uncertainties, page 43. ▪ Section 3.6 Treatment of Uncertainties, pages 19-21. ▪ Table 3.5, Confidence Building Measures and Attributes, page 23.	respect to any migration of chemicals of concern from the asphalt. Re-evaluate with respect to the so-called "confidence building" assumptions as per Table 3.5.	potential transport of the hydrocarbon-related chemicals of concern in asphalt. Furthermore, alternatives to the use of an asphalt seal must be discussed.
EIS 03-64	▪ Section 8.5, Decommissioning ▪ Section 8.6, Abandonment	▪ *EIS:* Section 4.11.4.2, Construction of Shaft Seal, page 4-77. ▪ *Postclosure Safety Assessment:* Section 4.2.4, Safety Relevant Features, page 43 ▪ Section 4.2.5,	Assess the durability of concrete bulkheads (in shaft seals and repository rooms), asphalt seals, and bentonite sand seals for the duration of the operational phase and extending into the postclosure phase. Include references to experience in other relevant settings. Include these estimates in an evaluation of the current uncertainty analysis of the postclosure assessment. In particular, explain how assumptions used with respect to the life-span of these materials contribute to the confidence in the postclosure assessment as per Table 3.5.	The purposes of the materials in the shaft sealing design include structural support and prevention of movement of poor quality, saline groundwater from the lower Salina Formation and other sources into the upper fresh water aquifer (EIS: page 4-77). These purposes are important – particularly during the period required for a tight shaft seal to be produced (this period is unspecified in the EIS). Evidence is required to demonstrate that the bulkhead integrity would be sufficient to manage risks associated with migration of poor-quality groundwater until such time as a tight seal has been produced.

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		Uncertainties, page 43. ▪ Section 3.6, Treatment of Uncertainties. ▪ Table 3.5, Confidence Building Measures and Attributes, page 23.		
EIS 03-65	▪ Section 9.3, Valued Ecosystem Components	▪ *EIS:* Section 5.3.2. Identification of VECs pages 5-12 to 5-16. ▪ Table 5.3.2-1 page 5-13. ▪ Table 6.4.2-1, pages 6-89 to 6-93. ▪ Table 6.4.7-1, pages 6-115 to 6-116. ▪ Table 6.4.7-2, pages 6-117 to 6-119.	List the criteria used to evaluate and screen the proposed list of VECs in the EIS Guidelines as well as additional VECs suggested via the public consultation program or via input from the assessment team. Explain how these criteria were used to produce the final list of VECs for each discipline (presumably from a longer candidate list). Explain if different sets of criteria were used for different disciplines and if so, the rationale for the specific sets of criteria/discipline. Provide the evaluation of the suggested VECs for each discipline in a table and/or narrative text. Provide an explanation for the absence of provincially significant plants or wildlife in the list of terrestrial VECs presented in Table 6.4.2-1 of the EIS.	Section 9.3 of the EIS Guidelines states: "The EIS must describe the general criteria used to identify VECs that may be affected by the project. This list of VECs should be modified as appropriate by the proponent in the EIS, following consultations with the public, Aboriginal people, federal and provincial government departments and relevant stakeholders, including those comments received by the Canadian Environmental assessment Agency and the Canadian Nuclear Safety Commission during the April 4 to June 18, 2008 comment period." The EIS does not provide general criteria used to identify VECs, nor does it provide any discipline-specific screening of VECs from a longer list of potential VECs derived from public consultation and professional judgment. The usual practice is to produce long-lists of VECs according to criteria such as relative presence or abundance in the study area, potential for exposure to stressors, sensitivity to stressors, knowledge base about the VEC that would allow confident assessment of effects, and social/cultural/spiritual/economic importance. It is noted that the rationale for each VEC selected is presented in the EIS and/or TSD for the various disciplines. This information request refers to further

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
				description of the process leading to the final list of VECs. It is common practice to include listed species among the VECs used in an assessment in order to ensure that the assessment covers the special considerations associated with these species (including provisions of the *Species at Risk Act* and the *Migratory Birds Act*). Therefore, an explanation for the absence of listed plants or wildlife species and how the assessment accounted for any special considerations related to these species is required to evaluate the defensibility and appropriateness of the assessment.
EIS 03-66	▪ Section 10, Existing Environment ▪ Section 10.1, Biophysical Environment	▪ *EIS:* Table 6.1.2-1. Field Studies Undertaken in Support of the DGR Project, page 6-2 and 6-3. ▪ *Terrestrial Environment TSD,* Section 5.3. Field Programs, pages 41-54. ▪ *Aquatic Environment TSD:* Section 5.1.2. Field Studies, page 36. ▪ *Hydrology and Surface Water*	Provide detailed information on the rationale for the field studies conducted for the Terrestrial Environment, Hydrology and Surface Water Quality and Aquatic Environment. This information is to include: ▪ objectives; ▪ rationale for selection of sample sites; ▪ rationale for sampling effort in terms of specific data quality objectives (which can be described in terms of performance criteria such as confidence that minima, maxima and means adequately capture natural variability); ▪ rationale for chemical analysis performed on the samples (if applicable); and ▪ rationale for any statistical analysis used in interpretation of the data set (which would include newly-acquired field data plus existing data if applicable)	The descriptions of field studies contained in the TSDs for the Terrestrial Environment, Hydrology and Surface Water Quality and Aquatic Environment are very brief and do not include any information on the rationale and data quality objectives for the sampling that took place. It is impossible to judge how the data obtained during these field studies add to confidence in the description of the existing environment, including: identification of sensitive habitat features; presence, relative abundance and status of populations of VECs; evidence of past impacts from human activities; presence of important confounding variables that would influence the effects from the DGR Project; verification of spatial boundaries for the assessment; identification of the most appropriate indicators of effects for each VEC; and, natural variability of the indicators of effects. The defensibility, reliability and scientific credibility of the field studies require documentation.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
		Quality TSD: Section 5.4.3 Surface Runoff and Drainage, page 38. Section 5.5.2.1. Surface Water Quality Sampling Program, pages 57-58		
EIS 03-67	▪ Section 10.1 Biophysical Environment ▪ Section 10.1.6, Ambient Radioactivity ▪ Section 11.4.6, Radiological Conditions ▪ Section 11.5.6, Human Health	▪ *EIS:* Section 4.5.2. Total Radionuclide Inventory of Waste, ▪ Table 4.5.2-1 Estimated L&ILW Radionuclide Inventory at 2062, pages 4-26 and 4-27; ▪ Section 6.6.5 Radioactivity in the Environment, ▪ Section 6.6.6, Radioactivity in Surface Water, ▪ Section 6.6.7,	Indicate whether there was a formal cross-check between the estimated low level and intermediate level waste radionuclide inventory (EIS Table 4.5.2-1, page 4-27) and the radionuclide analyses conducted on environmental samples from the Project, Site, Local and Regional Study areas. If there was no cross-check, explain why this was not considered necessary. If there was a cross-check, provide details of the results and the rationale for the list of radionuclides analysed in each of the environmental media (air, surface water, sediment, fish, groundwater, soil, vegetation, and milk).	The available baseline information for radioactivity in the environment focuses on tritium, gross beta, and carbon-14. There is also information on some other radionuclides (e.g. cesium-137, cesium-134, cobalt-60, potassium-40, strontium-90) but analysis for these radionuclides has not been as frequent and has not been conducted across all environmental media. The EIS and TSD do not present any information on whether sampling plans for radioactivity in the environment were reviewed in the context of the radionuclide inventory for the low level and intermediate level waste (EIS Table 4.5.2-1, page 4-27). Table 4.5.2-1 lists other radionuclides that will occur in large amounts and are relatively long-lived. “The results for the assumed repository decommissioning date of 2062 indicate the total radioactivity will be dominated by tritium (H-3), carbon-14, niobium-94 and nickel-63” (EIS, page 4-27). The monitoring program for radioactivity in the environment appears to have been built upon what already takes place for the Bruce A and B operations. While this is a logical starting point, cross-referencing between the existing program’s list of analyses and the list of radionuclides in the waste inventory is required to

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
		Radioactivity in the Aquatic Environment, ▪ Section 6.6.8, Radioactivity in the Terrestrial Environment, ▪ Section 6.6.9, Radioactivity in Groundwater, pages 6-136 to 6-156 ▪ *Radiation and Radioactivity TSD:* Section 5.5, Radioactivity in the Atmospheric Environment, ▪ Section 5.6, Radioactivity in Surface Water, ▪ Section 5.7, Radioactivity in the Aquatic Environment, ▪ Section 6.8, Radioactivity in the Terrestrial Environment,		increase the rigour of the baseline program and allow a more thorough examination of the program's defensibility, completeness, reliability and appropriateness.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
		▪ Section 5.9, Radioactivity in Groundwater, pages 54-109		
EIS 03-68	▪ Section 10.1.1, Geology and Geomorphology	▪ *EIS:* Section 1.7.1, Organization of the EIS ▪ *Geology TSD:* Section 5.9, Geomechanics page 185-189 ▪ *Preliminary Safety Report:* 4.2.2, Geomechanical Properties: Rock Strength and Deformation, page 117-121	Provide more detail concerning DGR geosphere rock mass characterization. Specifically, a) Provide further explanation of variability in core strength behaviour between DGR-sampled rock cores versus regional rock cores from the Cobourg Formation (Geology TSD, page 188-189) with focus on variables such as sampling depth, mineralogy, sample preservation and/or quality of laboratory testing. How are conclusions concerning structural performance to be drawn where variation in geomechanical parameters may be due to differences in testing, procedures or other handling? b) Provide further explanation or description of variability in core strength behaviour between DGR sampling boreholes DGR-2 through DGR-6 (Geology TSD, page 188) relative to "induced damage during drilling – as a result of sampling (unloading) from great depth, and local platen interference and/or other boundary effects during laboratory testing." c) Validate the conclusion made in the NWMO Geosynthesis Report, Section 3.2.1.1, page 110, that "the UCS values appear to be uniform across the Bruce nuclear site." Describe the spatial distribution of strength tests results and their spacing/location across the DGR site at depth of the 67 total samples tests made that were recovered in the Cobourg Formation from five holes (DGR-2 through DGR-6) from which these strength results were determined. d) Validate the conclusion on page 110 of the NWMO	The geomechanical site characterization information presented in the EIS and Technical Support Documents is not sufficient to assure that the analysis is defensible, complete, reliable, or scientifically credible. a) The intact rock strength of the caprock (Queenston and Georgian Bay Formations) is based largely on 14 and 11 sample strength tests from only 3 local boreholes (Geology TSD, page 186). These tests are used to infer major mechanical characteristics such as UCS, Young's Modulus and Poisson's ratio parameters used for geomechanical design and numerical modelling justification of the support capabilities of the future repository. It is also stated that: "Regional UCS data of both rock formations are also presented, and it is clear that both data sets lie within the same range." b) The range for Georgian Bay Formation data, in particular, is quite large relative to regional test data, and thus it is uncertain that close correlation between regional and local strength data is a valid conclusion. The number of tests is small and subject to large spatial variation in values and no description of sample dimensions and therefore compatibility of test results has been presented to justify that strengths and other parameters are directly comparable between boreholes locally and between local and regional boreholes. c) The Geology TSD, page 188, states: "… the (DGR results) have a considerably higher average peak strength value (Figure 5.9.2-1). This strength increase is likely attributed to different sampling depths, mineralogical variation …, improved

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
			Geosynthesis Report, Section 3.2.1.1, that: "For the overlying Collingwood member, the mean UCS based on testing of 5 samples is 107 MPa." Provide justification that a reasonable sample population size was obtained from which this conclusion can be made. e) The NWMO Geosynthesis Report, Section 3.2.1.1, page. 112-113, states that: "Eight laboratory specimens from Boreholes DGR-2 to DGR-4 were tested to determine the Brazilian or indirect tensile strength of the Cobourg Formation rock material." Provide justification that this number of tests would provide adequate tensile strength characterization. f) The NWMO Geosynthesis Report states in Section 3.2.1.1, page 113, that: "With the twelve compression tests conducted on core samples retrieved from boreholes DGR-3 and DGR-4, the triaxial compressive strength of the Cobourg Formation was determined. Combining these test results with the aforementioned UCS data allows for determination of the strength parameters for the Hoek-Brown failure criterion …" Provide a justification for the sample population size used to assess triaxial strength character of an entire rock formation. Discuss the effect that spatial distribution of samples have on estimated strength parameters. g) Justify the test sample population used to infer shear strength properties of this same rock formation as described in the NWMO Geosynthesis Report, Section 3.2.1.1, page 115. h) Identify the sections of the Geosynthesis Report, or other documents, in which determination of Poisson's ratio parameters, as used for modelling of panel-scale stress and displacement conditions described in Section 6.4.5, have been described and tabulated. Define what units have been used to describe the Poisson's	sample preservation methods, and/or the quality of the laboratory testing." For the Cobourg limestone sample testing, a greater number (67) of borehole (local) sample specimen tests were performed that permits better assessment of the formation strength and other mechanical parameters, and also demonstrates that local strength character is higher than demonstrated by regional sample tests. d) The conclusion that the Cobourg Formation DGR sample strengths are greater than similar formation regional sample strengths is opposite to that claimed for the Georgian Bay Formation above. The Geology TSD, page 186, states: "both data sets lie within the same range" which would indicate that strengths are similar. The conclusion may relate to the smaller test population of samples for the higher elevation formation, and the variable testing, depth-related and handling procedures mentioned. The disparity in conclusions based on rock mechanical analyses of core specimens and the need to obtain additional accurate, reproducible and more spatially extensive/representative data on rock parameters within the repository site boundary zone has significant implications for repository design (stability, longevity, size limits), and thus must be addressed further. e) Under discussion of tensile strength of rock formations, the NWMO Geosynthesis Report, Section 3.2.1.1, page 112, states that: "Tensile failure is the primary cause of stress-induced spalling around excavation openings and is also associated with roof instability in underground openings in sedimentary rock masses .. thus .. is of prime importance for evaluating the potential overstressing developed along … a room roof." It is also stated that "Eight laboratory specimens from Boreholes

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
			ratio parameters shown In Figure 6.2.9-1 on page 6-53 of the EIS.	DGR-2 to DGR-4 were tested to determine the Brazilian or indirect tensile strength of the Cobourg." On page 114, it is stated that formation tensile strength, due to the presence of weaker bedding partings, is substantially less or even negligible and that, in laboratory tests that evaluate the material strength between the parting layers, Brazilian tests would most likely overestimate tensile strength by 30-40%. f) Under discussion of Triaxial Compressive Strength of rock formations, the NWMO Geosynthesis Report states in Section 3.2.1.1, page 113, states that: "With the 12 compression tests conducted on core samples retrieved from boreholes DGR-3 and DGR-4, the triaxial compressive strength of the Cobourg Formation was determined. Combining these test results with the aforementioned UCS data allows for determination of the strength parameters for the Hoek-Brown failure criterion …" The number of triaxial tests performed is quite low in order to be able to characterize the overall strength behaviour of a large rock formation. Test data would show considerable variability if not measured from core specimens obtained in very close proximity to one another. Failure locus determination according to the Hoek-Brown criterion is appropriate if UCS and triaxial samples are all closely spatially associated (i.e. - if UCS and triaxial test specimens are recovered from the same length of drill core), as strength variation can be large over even small distances of core separation g) In the NWMO Geosynthesis Report, under discussion of Shear Strength of Rock and Thin Shaley Bedding Planes on page 115, it is stated that (for the Cobourg Formation): "Ten intact sample and two samples with a detachment along the shaley bedding surfaces of the Cobourg Formation were selected for testing."

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
				In Figure 3.8 (page 115), a total of sixteen (16) peak/intact strength assessments are plotted and used to determine the direct shear strength failure locus. Why are these numbers of tests contradictory? h) In the NWMO Geosynthesis Report, Section 6.4.5, page 353, modelling of panel deformations at the (global) panel scale through multiple glacial cycles is used to predict deformation of the rock mass above the panels under various configurations (i.e.- large and small barrier pillars between panels etc.). It is stated that "The horizontal in situ stress and Poisson's ratio are two parameters that can have significant effect on prediction of yielding and damage in the cap rock …" Values for the Blue Mountain Formation are presented in Table 6.8 on page 353. The determination of the Poisson's ratio parameters is not explicitly mentioned nor described in any other section of the Geosynthesis Report (notably Chapters 3 and 6) where detailed characterization data for strength testing and the like are provided.
EIS 03-69	▪ Section 10.2; Socio-economic Conditions; ▪ Section 11.5.6; Human Health	▪ *EIS:* Section 6.11.4.1 Air Quality, page 6-271 ▪ Figure 6.11.4-1, Human Health Receptor Locations, page 2-273.	Explain which of the three human receptor location categories would best represent Métis communities and present the reasons why.	Section 6.11.4-1of the EIS (page 6-271) states: "Potential human receptors were identified as people who live in or use areas in the vicinity of the DGR Project. The following receptors were identified and are considered to be present at the locations indicated on Figure 6.11.4-1 as follows: local residents (AR1, AR2, AR3); members of the nearest Aboriginal communities (AR5, AR6); and seasonal users (AR2, AR4)." The EIS describes Aboriginal communities as members of the SON. Members of the MNO and HSMC are not mentioned on page 6-271. Explicit recognition of the Métis communities and how their locations and activities are recognized within the Regional and Local Study Areas is required to evaluate the completeness of the assessment.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-70	▪ Section 10.2, Socioeconomic Conditions ▪ Section 11.5, Socioeconomic effects.	▪ *EIS:* Section 6.10.8 Public Attitudes Toward Personal and Community Well-Being, page 2-263. ▪ *Socio-Economic Environment TSD:* Section 5.9, Public Attitudes Toward Personal and Community Well-Being, pages 135-144.	For all socio-economic survey data involving public attitude research, provide an analysis of errors and confidence levels. Provide the protocol, questionnaire, dates and responses for the Community Well-Being Survey.	Public attitude research results are quoted throughout the EIS as percentages of respondents who have provided a particular answer to a question. All such values are associated with a number of possible errors, most notably Sampling Errors and Non-Response Errors. Therefore, the confidence in the data is central to the evaluation of the defensibility and reliability of the assessment.
EIS 03-71	▪ Section 10.2, Socioeconomic Conditions	▪ *EIS:* Section 6.10.8 Public Attitudes Toward Personal and Community Well-Being, page 2-263. ▪ *Socio-Economic Environment TSD:* Section 5.9.1 Feelings of Personal	Provide the public attitude research questionnaire and the results of that questionnaire. Justify and reference the questionnaire methodology. Explain the percentage (45%) of “don’t know/refused” responses to questions regarding personal health or the sense of personal safety reported in the EIS Table 6.10.8-2, page 6-265 and Table 5.9.1-2 of the TSD, page 137.	Evaluation of the reliability and defensibility of the assessment of effects on feelings of personal health and safety will be aided by the provision of the detailed methodology as well as an explanation for the relatively high percentage of “don’t know/refused” responses for this component of the Public Attitude Research (PAR).

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
		Health and Sense of Personal Safety, pages 136-137.		
EIS 03-72	▪ Section 10.1.1, Geology and Geomorphology	▪ *Geology TSD*: Section 5.8, Geomechanics	Provide information on the inclinations of the test bore holes and substantiation for the conclusion, on page 190 of the Geology TSD, that: "the Cobourg Formation … has few inclined to vertical joints …"	This conclusion, relating to the overall integrity of the Cobourg Formation and existence of potential release pathways (fractures) to higher formations or the surface, has been based on limited borehole observation (two boreholes) and the potentially misleading assumption that the two inclined boreholes could/would intersect all possible existing inclined/vertical joints within the DGR site zone at depth. If the borehole inclination is parallel or near parallel to existing fractures, the possibility is high that no intersection would occur and that such fractures would not be observed.
EIS 03-73	▪ Section 10.1.1, Geology and Geomorphology	▪ *EIS:* Section 3.4.3.1, Repository Horizon	Provide justification for the conclusion, on page. 3-27 and 3-28, Section 3.4.3.1 of the EIS, that limestone durability within the Cobourg Formation, relative to that of the shale horizon above, would provide "improved constructability because of greater geomechanical stability" and "… during operations, including roof, floor, shaft sump and rock loading pocket stability" and "(better) long term safety, including potential for progressive failure"	Section 3.4.3.1 of the EIS, on page 3-28 states: "The specific depth within the Cobourg limestone formation was determined taking into account: • geomechanical stability during operations, including roof, floor, shaft sump and rock loading pocket stability • long-term safety, including potential for progressive failure…" No justification beyond construction experience elsewhere in Ontario has been provided.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-74	▪ 10.1.1, Geology and Geomorphology	▪ *EIS*: Section 6.2.7.4, Environmental Heads and Hydraulic Conductivity	Provide data on the time-period over which the formational pressure measurements were obtained and how representative they are of undisturbed conditions.	In low permeability strata the long equilibration times for the collection of meaningful pressure measurements can only come from monitoring over a long-term basis. Pressure measurements made outside this context cannot be shown to be representative of undisturbed conditions within the formation.
EIS 03-75	▪ Section 10.1.1, Geology and Geomorphology	▪ *EIS:* Section 6.2.10, Regional Seismicity	Provide any available information on the depth to focus for earthquakes in the Bruce Region.	The EIS provides information on the spatial distribution and magnitude of earthquakes recorded within the Bruce Region. Ground motion due to seismic events depends strongly on the depth to the focus.
EIS 03-76	▪ Section 10.2, Socioeconomic Conditions	▪ *EIS:* Section 6.10.3.1, Population and Demographics	Provide tabular information showing the number of households residing within 1 km distance intervals from the project site to the Local Study Area boundary. Include permanent and seasonal residents	The effect of many vectors (dust, noise, traffic etc.) on the general population depends largely on the distance from the project site. A compilation of the number of households found within defined distance intervals from the project site is required to evaluate this parameter.
EIS 03-77	▪ Section 10.2, Socioeconomic Conditions	▪ *EIS:* Section 5.1.2, Local Study Area ▪ *Socio-economic Environment TSD:* Appendix C, Protocols for Stakeholder Interviews	Provide the rationale of restricting the Site Neighbor Survey to spatial boundaries different from those used in the EIS for the other Local Study Areas and Regional Study Areas..	In the EIS, the immediate neighbourhood to the project site is defined by the Local Study Area that extends roughly 10 km from the project site. The protocol of the Site Neighbour Survey confines the survey to adjacent properties and their next neighbour. As a result, the survey has a total of 8 respondents.
EIS 03-78	▪ Section 10.1.2, Surface Water ▪ Section 10.1.6, Ambient	▪ *EIS:* Section 6.6.6 Radioactivity in Surface Water,	Provide information on the details of the drinking water sampling program conducted by Bruce Power, including the rationale for: • the three water supply plants sampled in the Regional Study Area;	The sampling program conducted by Bruce Power forms a major portion of the baseline for drinking water. Therefore, a greater understanding for the basis of the sampling design is required to evaluate the defensibility, completeness, reliability and

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
	Radioactivity	pages 6-146 and 6-147 ▪ *Radiation and Radioactivity TSD:* Section 5.6.1 Radioactivity in Surface Water, pages 73-81 ▪ *Hydrology and Surface Water Quality TSD:* Appendix E, 2007 and 2009 Surface Water Sampling Results	• not including other drinking water supplies that may not undergo as much or any treatment; • the radionuclides measured in each sample; • and the supporting information collected for each sample. Provide the data quality objectives for the sampling plan; i.e. the planned precision and accuracy and the tolerable decision error if statistical analyses are used on the data (e.g. trend analyses). Provide an explanation for why there are no sampling locations for drinking water on Aboriginal lands. Note EIS 03-45 where a justification for Regional Study Area boundaries is required. Provide an explanation for why there does not appear to have been any measurement of radionuclides in water samples taken for the Hydrology and Surface Water Quality program in the Site Study Area. Provide a description of the level of confidence in the radionuclide baseline for surface waters in the Project, Site, Local and Regional Study Areas.	appropriateness of the baseline program. Since the VECs include "Members of the public including Aboriginals" (EIS Table 6.6.2-1, page 6-132), and since Aboriginal people may have specific exposure scenarios related to demographics, lifestyle and culture, data for their communities is required. Without these data, it is not possible to evaluate the appropriateness of the assessment for members of the general public in terms of whether that assessment encompasses the exposure scenarios specific to Aboriginal individuals. Sampling of surface water from North and South Railway Ditches, Stream C and MacPherson Bay took place in 2007 and 2009 (Appendix E, Hydrology and Surface Water Quality TSD). It No radionuclide analyses were provided from these samples. Section 6.6.6.2 of the EIS and Section 5.6.2 of the Radiation and Radioactivity TSD describe existing data for "other radionuclides" (i.e. radionuclides other than tritium and carbon-14 plus gross beta measurements). Sampling for "other radionuclides" appears to have ceased in 2000 due to cesium-137 and cesium-134 being consistently less than method detection limits (MDL) (EIS, page 6-147). There is no information provided regarding the total list of radionuclides analysed, nor is there any information on the location of water samples, the sampling method, and the precision and accuracy built into the sampling design. The only other sampling for "other radionuclides" appears to have been samples taken from the South Railway Ditch, North Railway Ditch and Little Sauble River (year is unknown). All results were less than MDL except for carbon-14 (EIS, page 6-147). Again, there are no details provided regarding the sampling design or data quality objectives. Provision of additional information on the past surface water sampling designs as well as an evaluation of the confidence in these data to suffice as a baseline is required to evaluate the completeness,

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
				reliability and defensibility of the assessment.
EIS 03-79	▪ Section 10.1.2, Surface Water	▪ *EIS:* Section 6.3.5.1, Lake Huron, page 6-77. ▪ Table 6.3.5-1, Summary of Lake Huron Water Quality Sampling Results, pages 6-78 and 6-79.	Provide additional surface water quality data for the Local Study Area, including MacPherson Bay, Baie du Doré, North and South Railway Ditches, the north project area wetland, the south project area swamp and Stream C. At a minimum, the data must include major ions, trace metals, nutrients and all major radionuclides identified in the waste inventory. Supporting data must include pH, conductivity, hardness and alkalinity. Samples taken from lake areas must be obtained from surface, middle and bottom of the water column. Data from all areas listed above should represent all four seasons. Provide the data quality objectives for the above sampling plan, including provision for an adequate representation of natural variability.	The data in Table 6.3.5-1 provide historic (1959/1960) to present-day (2007 and 2009) water quality data for Lake Huron. Interpretation of these data is limited by their relative scarcity. Some of the data points in the table are from one sample only. In other cases, the number of samples is unknown (footnotes d and e to Table 6.3.5-1). There is no information regarding the seasons of sampling in relation to important limnological parameters such as depth, currents and temperature stratification. There are no data on trace metal concentrations. The 2007 and 2009 data sets do not include analysis of nitrogen compounds, despite the fact that nitrogen compounds are one of the most common chemicals of concern associated with blasting. In light of the limited data set, any interpretation of the water quality of Lake Huron and water bodies in the Regional and Local Study Areas would appear to be tenuous and subject to significant uncertainty. Therefore, more data are required.
EIS 03-80	▪ Section 10.1.3, Groundwater	▪ *EIS:* Section 6.2.7.4 Environmental Heads and Hydraulic Conductivity	Provide a profile of the stratigraphic column showing the effective porosity of the stratigraphic horizons.	The discussion on porosity of rock samples recovered from the DGR boreholes reports total porosity, liquid, and water-loss porosity. In terms of solute transport, the effective porosity, the proportion of interconnected pore and fracture volume, is probably more significant.
EIS 03-81	▪ Section 10.1.3, Groundwater ▪ Section 10.1.6, Ambient Radioactivity	▪ *EIS:* Section 6.6.9, Radioactivity in Groundwater, pages 6-154 to	Provide information on the details of the groundwater sampling program conducted by Bruce Power, including location of all sample areas, the frequency of sampling, the number of samples taken per site, the radionuclides measured in each sample, and the supporting information collected for each sample (e.g. soil	The sampling program conducted by Bruce Power forms a major portion of the baseline for groundwater. Therefore, a greater understanding of the basis for the sampling design is required to evaluate the defensibility, completeness, reliability and appropriateness of the baseline program.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
		6-157 ▪ *Radiation and Radioactivity TSD:* Section 5.9, Radioacivitiy in Groundwater, pages 102-109	moisture, organic carbon content, particle size). Provide the data quality objectives for the sampling plan; i.e. the planned precision and accuracy and the tolerable decision error if statistical analyses are used on the data (e.g. trend analyses, comparisons between local and reference sample stations). Provide an explanation for why there are no sampling locations on Aboriginal lands. Note EIS 03-45 where a justification for Regional Study Area boundaries is required.	Since the VECs include "Members of the public including Aboriginals" (EIS Table 6.6.2-1, page 6-132), and since Aboriginal people may have specific exposure scenarios related to demographics, lifestyle and culture, data for their communities is required. Without these data, it is not possible to evaluate the appropriateness of the assessment for members of the general public in terms of whether that assessment encompasses the exposure scenarios specific to Aboriginal individuals.
EIS 03-82	▪ Section 10.1.4, Terrestrial Environment ▪ Section 10.1.6, Ambient Radioactivity	▪ *EIS:* Section 6.6.8.4, Radioactivity in Soil, page 6-153 ▪ *Radiation and Radioactivity TSD:* Section 5.8.4, page 101	Provide the details of the annual soil sampling program conducted by Bruce Power, including location of all sample areas, the number of samples taken per site (describe composite method if applicable), the season of sampling, the radionuclides measured in each sample, and the supporting information collected for each sample (e.g. soil moisture, organic carbon content, particle size). Provide the data quality objectives for the sampling plan; i.e. the planned precision and accuracy and the tolerable decision error if statistical analyses are used on the data (e.g. trend analyses, comparisons between local and reference sample stations). Provide an explanation for why there are no sampling locations on Aboriginal lands. Note EIS 03-45 where a justification for Regional Study Area boundaries is required.	The sampling program conducted by Bruce Power forms a major portion of the baseline for garden fruits and vegetables, agricultural plants and milk. Therefore, a greater understanding of the basis for the sampling design is required to evaluate the defensibility, completeness, reliability and appropriateness of the baseline program. Since the VECs include "Members of the public including Aboriginals" (EIS Table 6.6.2-1, page 6-132), and since aboriginal people may have specific exposure scenarios related to demographics, lifestyle and culture, data for their communities is required. Without these data, it is not possible to evaluate the appropriateness of the assessment for members of the general public in terms of whether that assessment encompasses the exposure scenarios specific to Aboriginal individuals.
EIS 03-83	▪ Section 10.1.5, Aquatic Environment	▪ *EIS:* Section 6.6.7.1. Radioactivity in Sediments, page 6-148 ▪ *Radiation and Radioactivity TSD:* Section	Provide information on the details of the annual sediment sampling program conducted by Bruce Power, including location of all sample sites, the number of samples taken per site, the season of sampling, the radionuclides measured in each sample, and the supporting information collected for each sample. Provide the data quality objectives for the sampling plan; i.e. the planned precision and accuracy and the tolerable decision error if statistical analyses are used on the data (e.g. trend analyses, comparisons between	The annual sediment sampling program conducted by Bruce Power forms a major portion of the baseline for sediments. Therefore, a greater understanding of the basis for the sampling design is required to evaluate the defensibility, completeness, reliability and appropriateness of the baseline program. There appears to have been an opportunity to combine analyses for trace metals and organics with analyses for radionuclides in the 2009 sediment sampling program conducted in the Site Study Area

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
		5.7.1, Radioactivity in Sediments, page 81 ▪ *Hydrology and Surface Water Quality TSD,* Appendix F 2009 Sediment Sampling Results	local and reference sample stations). Explain why the 2009 sediment sampling program conducted in the Site Study Area and reported in the Hydrology and Surface Water Quality TSD did not include radionuclide analyses, as these locations appear not to have been sampled for sediments according to information presented in the Radioactivity and Radiation TSD.	(in the Railroad Ditches, Stream C and MacPherson Bay) (Hydrology and Surface Water Quality TSD, Appendix F). The most recent sediment data for radioactivity in the Project Area appears to be from 2002, during a study conducted as part of an integrated EA follow-up monitoring program at the WWMF (Radiation and Radioactivity TSD, page 82). It is not clear that the 2002 program included samples from all of the locations sampled in 2009.
EIS 03-84	▪ Section 10.1.5, Aquatic Environment	▪ *EIS:* Section 6.6.7.3 Radioactivity in Fish, pages 6-149 and 6-150. ▪ *Radiation and Radioactivity TSD:* Section 5.7.3, Radioactivity in Fish, pages 82-83.	Provide information on the details of the annual fish sampling program conducted by Bruce Power, including location of all sample areas, the number of fish samples taken per site (describe composite method if applicable), the season of sampling, the radionuclides measured in each sample, and the supporting information collected for each sample, including any information on fish measurements (length, weight, age) and health (external and internal examination for pathology). Provide the data quality objectives for the sampling plan; i.e. the planned precision and accuracy and the tolerable decision error if statistical analyses are used on the data (e.g. trend analyses, comparisons between local and reference sample stations).	The annual fish sampling program conducted by Bruce Power forms a major portion of the baseline for radionuclides in fish. The commercial fish resource is a major concern to the SON. The recreational fishery is a significant activity in the area. Therefore, a greater understanding of the basis of the sampling design is required. In addition, the effort to obtain the fish samples for radionuclide analysis could be complemented by the collection of data relevant to the fishery (relative abundance, size, age, condition, etc). More information about the fish sampling program is required to evaluate the defensibility, completeness, reliability and appropriateness of the baseline program.
EIS 03-85	▪ Section 10.1.5, Aquatic Environment	▪ *EIS:* Section 6.4.3.1, Site Study Area and Project Area	Provide information on the condition and qualities of the wetlands within 500 m of the Project Area.	The EIS is limited to the examination of the condition and qualities of the wetlands on and within 100 m of the Project Area. The survey includes the creation of an inventory the vascular plants in these features, which is used to conclude that no plant community of special significance to Aboriginal peoples has been identified in the Project Area, and no vascular plant species with special significance have been identified.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
				Dust, run-off etc during exceptional climatic events may impact sensitive plant communities outside the surveyed range.
EIS 03-86	▪ Section 10.1.5, Aquatic Environment	▪ *EIS:* Section 6.3.5.3, Sediment Quality, page 6-84. ▪ Hydrology and Surface Water Quality TSD, Section 5.5.2.7 sediment Quality, page 62 and Appendix F, 2009 Sediment Sampling Results.	Provide additional sediment quality data for the Local Study Area, including MacPherson Bay, Baie Du Doré, North and South Railway Ditches, the north project area wetland, the south project area swamp and Stream C. At a minimum, the data must include trace metals and all major radionuclides identified in the waste inventory Supporting data must include sediment particle size distribution, percent moisture and total organic carbon. Provide the data quality objectives for the above sampling plan, including provision for an adequate representation of natural variability.	The Hydrology and Surface Water Quality TSD, states on page 62 that: “Unless major changes occur within a stream, changes in sediment quality (if any) are expected to occur slowly over time. It is therefore considered appropriate to use one sampling event to define the existing conditions.”This statement is not supported by adequate data. Provision of additional sediment data is required to establish a basis for evaluation of the defensibility and appropriateness of the assessment.
EIS 03-87	▪ Section 10.1.6, Ambient Radioactivity	▪ *EIS:* Section 6.6.7.2, Shoreline Gamma Survey, page 6-149 ▪ *Radiation and Radioactivity TSD:* Section 5.7.2, Shoreline Gamma Survey, page 82.	Describe the basis for the design of the ground gamma survey conducted in the fall of 2000 from Inverhuron Provincial Part to Scott Point (EIS, page 6-149). Present the objective of the survey. Include the rationale for the selection of this particular stretch of shoreline and explain the spatial extent (15 km). Explain the relevance of the observed results. Present the rationale for the follow-up survey conducted by Bruce Power in 2002. Explain whether the follow-up survey encompassed the same length of shoreline as the original survey and if not, why not. Explain the relevance of the observed results in more detail than	The brief section describing the shoreline gamma survey (EIS, page 6-149 and TSD page 82) lacks sufficient background information. Additional detail is required to evaluate the reliability and relevance of the results to the DGR project.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
			presented in the EIS or TSD such that there is a clear understanding of the source of the observed levels of cobalt-60.	
EIS 03-88	▪ Section 10.1.6, Ambient Radioactivity	▪ *EIS:* Section 6.6.8.1 Radioactivity in the Terrestrial Environment - Vegetation, pages 6-150 and 6-151; Section 6.6.8.2. Milk, pages 6-151 and 6-152 ▪ *Radiation and Radioactivity TSD:* Section 5.8., Vegetation, pages 84-85; ▪ Section 5.8.2, Milk, pages 86 and 95 ▪ Figures 5.8.1-1, 5.8.1-2, 5.8.2-1, 5.8.2-1 pages 87.89,91 and 93.	Provide the details of the annual garden fruit and vegetable and agricultural plant as well as the weekly milk sampling program conducted by Bruce Power, including location of all sample areas, the number of samples taken per site (describe composite method if applicable), the season of sampling (for vegetables, fruits and crops), the radionuclide measured in each sample, and the supporting information collected for each sample. Provide the data quality objectives for the sampling plan; i.e. the planned precision and accuracy and the tolerable decision error if statistical analyses are used on the data (e.g. trend analyses, comparisons between local and reference sample stations). Provide an explanation for why there are no sampling locations on Aboriginal lands. Note EIS 03-45 where a justification for Regional Study Area boundaries is required.	The sampling program conducted by Bruce Power forms a major portion of the baseline for garden fruits and vegetables, agricultural plants and milk. Therefore, a greater understanding of the basis for the sampling design is required to evaluate the defensibility, completeness, reliability and appropriateness of the baseline program. Since the VECs include “Members of the public including Aboriginals” (EIS Table 6.6.2-1, page 6-132), and since Aboriginal people may have specific exposure scenarios related to demographics, lifestyle and culture, data for their communities is required. Without these data, it is not possible to evaluate the appropriateness of the assessment for members of the general public in terms of whether that assessment encompasses the exposure scenarios specific to Aboriginal individuals.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-89	▪ Section 10.2.6, Human Health ▪ Section 11.5.6, Human Health	▪ *EIS:* Section 6.11.8.5 Cancer Incidence, pages 6-281 and 6-282.	Provide a thorough rationale for the interpretation of data on cancer incidence on page 6-282 of the EIS, including but not limited to, references to the peer-reviewed scientific literature.	From page 6-282 of the EIS: "The statistical significance of the differences between the South West LHIN and Ontario was not available. In general, cancer incidence rates are higher in the South West LHIN compared to the province as a whole. With the exception of prostate cancer, cancer incidence rates in the South West LHIN and Grey Bruce are within 10% of than (sic) Ontario incidence rates for the same type of cancer. As such, the South West LHIN and Grey Bruce PHU cancer incidence rates are considered to be comparable to Ontario rates due to many confounding factors that require consideration including lifestyle (smoking, alcohol consumption, obesity, etc.), genetic predisposition, access to medical care, and education. Also, while incidence rates appear to fluctuate, there are no apparent increasing trends for all types of cancers including prostate cancers." The above paragraph requires references to the literature to provide support for the opinions and interpretation expressed. Provision of a thorough rationale for the interpretation of data on cancer incidence, including but not limited to references to the peer-reviewed scientific literature, is required to evaluate the defensibility and scientific credibility of the assessment of the baseline cancer incidence data.
EIS 03-90	▪ Section 11; Effects Prediction	▪ *EIS:* Section 6.7.5.3, Existing Air Quality in the Local Study Area, Table 6.7.5-8).	Provide a quantitative analysis of the uncertainties associated with the dispersion model used to evaluate changes in air quality.	Existing air quality in the local study area was described using dispersion modelling results, rather than physical measurements (Table 6.7.5-8). The same model is also used to predict the impact of the DGR activities. To evaluate the difference between the two and isolate the contribution of the project, the Panel requires knowledge of the numerical uncertainties associated with the model values.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-91	▪ Section 11.1; Effects Prediction	▪ *EIS:* Section 6.7.5.3, Existing Air Quality in the Local Study Area, page 6-175	Explain the absence of any measurements of air quality in the Local Study Area; specifically, the absence of measurements of oxides of nitrogen, sulphur dioxide, carbon monoxide, ozone, suspended particulate matter, PM_{10} and $PM_{2.5}$.	Section 6.7.5.3 of the EIS states: "The existing air quality in the Local Study Area is described using a combination of background air quality and the modelled air quality resulting from the emissions from existing sources at the Bruce nuclear site." An explanation for why it was determined that field measurements of air quality in the Local Study Area were not necessary and a description of the level of confidence in the modelled air quality is required for the evaluation of the defensibility, reliability and appropriateness of the assessment
EIS 03-92	▪ Section 11.1 Effects Prediction. ▪ Section 11.3 Significance of Residual Effects	▪ *EIS:* Section 7.1, Assessment Methods, pages 7-1 to 7-3. ▪ Table 7.1-1 Effects Criteria and Levels for Determining Significance, page 7-3.	Explain how confidence in the prediction of effects, as well as the confidence in prediction of the significance of adverse effects, were estimated and justified.	EIS Guidelines Section 11 states, "The proponent must indicate the degree of uncertainty in predicting the environmental effects identified." Table 7.1-1 of the EIS (page 7-3) does not contain provision for expressions of confidence in the predictions produced by the evaluation methods represented by the table. Provision of information regarding prediction confidence is required to evaluate the defensibility, scientific credibility and completeness of the assessment. The assessment of prediction confidence requires input from uncertainty analysis conducted for modelled effects in each of the biophysical and socioeconomic components. The expression of prediction confidence must explain the balance achieved between the precautionary principle and the use of realistic assumptions in all predictions.
EIS 03-93	▪ Section 11.1, Effects Prediction. ▪ Section 11.3, Significance of	▪ *EIS:* Section 7.1 Assessment Methods, pages 7-1 to 7-3. ▪ Table 7.1-1	Explain in more detail why the assessment of residual adverse effects does not include probability of occurrence. • Provide more detail on the balance used between the precautionary approach and the use of more realistic assumptions;	The EIS states on page 7-3 that "Probability of occurrence was not explicitly included as a criterion for the assessment of significance of residual adverse effects. The assessment recognizes the widest, reasonable range of likely environmental effects without specific regard for their respective probability of occurrence. The focus is on evaluating the possible impact of such effects on the

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
	Residual Effects.	Effects Criteria and Levels for Determining Significance, page 7-3.	• Explain whether standard approaches were employed in the preparation of the EIS when there were sufficient data to derive a distribution of effects based upon a distribution of exposures (i.e. a standard percentile or other statistic such as median or average); and • Assemble a set of definitions of "widest, reasonable range of likely environmental effects" for each discipline and relate each definition to the determination of boundaries between "Low", "Medium" and "High" effects level definitions	environment and VECs and the consideration of feasible mitigation measures that can be incorporate to control, reduce or eliminate the effect." The above statement requires much more thorough explanation in order that an evaluation of the defensibility, reliability and appropriateness of all of the effects assessments/discipline can be conducted. The framework outlined in The Canadian Environmental Assessment Agency Reference Guide: *Determining Whether A Project is Likely to Cause Significant Adverse Environmental Effects* (November 1994), consists of three general steps: • Step 1: Deciding Whether the Environmental Effects are Adverse • Step 2: Deciding Whether the Adverse Environmental Effects are Significant • Step 3: Deciding Whether the Significant Adverse Environmental Effects are Likely The EIS Guidelines, Section 11.3 Significance of Residual Effects, requires that: "The proponent must assess the significance of predicted effects according to the following categories: • Magnitude of the effect; • Geographic extent of the effect; • Timing, duration and frequency of the effect; • Degree to which effects are reversible or mitigable; • Ecological and social/cultural context; and • Probability of occurrence."

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-94	▪ Section 11.3, Significance of Adverse Effects	▪ *EIS:* Figure 7.3.3-1 Determination of Significance of Residual Adverse Effects for Hydrology and Surface Water Quality VECs, page 7-41. ▪ Section 7.3.3, Significance of Residual Adverse Effects, pages 7-39-7-40.	Provide a detailed explanation of the hierarchy of criteria used in the decision tree presented in Figure 7.3.3-1. • Clarify how the decision tree is used for each EIS component (geology, air quality, etc.); • Explain the absence of the irreversibility criterion from the decision tree; • Discuss instances where a different hierarchy would be appropriate, depending upon the VEC being considered; and • Explain how uncertainty is recognized, estimated and addressed.	Page 7-39 of the EIS states: "The level of significance is assigned by using a decision tree model illustrated in Figure 7.3.3-1. Firstly, magnitude, geographic extent, timing and duration, frequency, and degree of irreversibility are combined to identify an environmental consequence. Then the social and/or ecological importance of the VEC being affected is considered to determine significance". The above description does not appear to correspond with the way the decision tree is depicted and used in Figure 7.3.3-1. The Figure implies that there is a hierarchy of criteria, beginning with magnitude, then spatial extent, then timing and duration, then frequency and then social/ecological importance (not all criteria are used depending upon the initial magnitude and extent results). Irreversibility does not appear in the decision tree. An explanation of the hierarchy of criteria is required to provide clarity with respect to the logic used in definition of "significant adverse effect". There may be instances where a different hierarchy would be appropriate, depending upon the VEC. This issue requires exploration and discussion. There is obviously a substantial reliance on professional judgment when using the decision tree. This increases the onus on the proponent to provide clarity with respect to the use of the decision tree, including demarcations between the "low", "medium" and "high" categories, the consideration of uncertainty, confidence in the predictions, and the rationale behind the particular hierarchy used for each discipline. Section 11.3 of the EIS Guidelines requires that: "The EIS must contain a detailed analysis of the significance of the potential residual adverse environmental effects it predicts. It must contain clear and sufficient information to enable the joint review panel and the public to understand and review the proponent's judgment of the significance of effects. The proponent must define the terms used to describe the level of significance."

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-95	▪ Section 11.4.3, Groundwater	▪ *EIS:* Section 7.2.1.1, Soil Quality	In view of the lack of direct observations on the nature of the surficial deposits under the proposed Waste Rock Management Area, provide the rationale for the following conclusions: a) "Dilution by horizontally migrating groundwater will be on the order of 10 times the volume of vertically infiltrating groundwater." (EIS page7-6) b) "... the native till soil also has a very low potential for infiltration (conservatively estimated at 5 to 10 cm/a); therefore, precipitation that percolates through the rock pile is more likely to flow from the base of the rock pile to the stormwater management system than it is to infiltrate to the subsurface." (EIS page 7-6)	Context provided in IR.
EIS 03-96	▪ Section 11.4.3, Groundwater	▪ EIS: Section 7.2.1.1, Soil Quality	Provide data on leachate metal concentrations and pH that may be expected to reach the groundwater table for the different waste rock piles. This evaluation must also consider evolution of leachate compositions over time, both during and after the construction phase. Measurements of nitrates and relevant organic compound concentrations in the leachate must be included. Reconcile the differences in explosive weights used to predict the blasting effects during shaft sinking and underground operations. Provide estimates of the type and annual amount of explosives used as well as estimates of the amounts of residues produced during the construction phase.	During the construction phase, the waste rock piles of the WRMA will be exposed to infiltration. No constructed barrier is proposed to isolate the leachate of the waste rock from the shallow groundwater. The composition of the underlying surficial deposits is inferred but not known. Groundwater flow directions are uncertain and may be modified by the presence of the 15 m high waste rock pile. The wetlands to the north east of the WRMA may therefore be impacted by contaminated groundwater. Blasting effects are evaluated on the basis of an explosive charge of 20kg (page 7-73) and maximum explosive weight of 112 and 150 kg per delay period (page 7-122). Estimates of the type and annual amount of explosives used during the construction period are required to evaluate the transfer of explosives residues to the WRMA. The anticipated residue concentrations in waste rock materials produced during blasting must be provided to estimate potential releases to water.

IR #	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
EIS 03-97	▪ Section 11.4.8, Noise and Vibration	▪ *EIS:* Section *7.4, Terrestrial Environment* ▪ *Atmospheric Environment TSD:* Section 8.3, Noise Levels	Provide an analysis of the quantitative uncertainties associated with the CadnaA Noise Model used to evaluate changes in noise levels. Demonstrate how parametric changes (conservative assumptions) adequately address uncertainties.	In Table 7.4.1-5, the anticipated changes in the noise levels at ecological receptor sites are evaluated using the CadnaA Noise Model. Uncertainties are addressed in Table 8.1.1-2 (Atmospheric Environment TSD) by stating, "Uncertainty associated with emissions is managed by making conservative assumptions".
EIS 03-98	▪ Section 1.3, Preparation and Review of the EIS	▪ *EIS* ▪ *Preliminary Safety Report*	For both the EIS and the Preliminary Safety Report, provide a table that directs the reader to the relevant section or sub-section (i.e. 1.1.1) of the referenced volume whenever only the volume is referenced (except when reference to the whole volume is appropriate). Ensure that cross-references to subsections are also provided for all responses to information requests.	Throughout the EIS and the Preliminary Safety Report, references to the TSDs and other supporting documents are frequently made by volume only when they should be referring to the relevant sections or pages in these volumes.

Attachment 2
Deep Geological Repository Project
Joint Review Panel LPSC Information Requests
Package 3 – May 24, 2012

IR #	Section #, NSCA Regulations	Section # in OPG's LPSC Application	Information Request	Context
LPSC 03-56	Class 1 Nuclear Facility Regulations (C1NFR), Section 5(d),	▪ *Preliminary Safety Report:* 4.5.4.3 Long Term Cavern Stability, page 240-243 ▪ *EIS:* Table 3.4.10-1, page 3-57	Provide justification as to why (beyond cost) an engineered backfill material has not been considered for use during the operational and/or closure stages of the repository as a means of reducing eventual overbreak within and/or damage to repository rooms and pillars, as has been predicted to occur. Provide justification for the statement in Table 3.4.10-1 of the EIS (page 3-57), Technical heading column, Backfill Repository alternative that: "backfill leads to higher repository gas pressures in the long-term".	Backfill will be used in the shafts to restrict both upward contaminant flow and to mitigate shaft wall damage and enlargement of the excavation damage zone. No similar use of backfill is contemplated within the emplacement rooms where failure of the roof, walls and pillars is anticipated in the very long term. The failed excavation rock is eventually anticipated to fill void spaces within these rooms with bulked rock that will thereafter restrict further wall damage and extension of the damage zone once all voids are occupied. No consideration has been given to use of backfill during the operational and closure phases of the DGR within emplacement rooms. Reduction of voids will reduce potential wall closure and thus extension of the excavation damaged zone that would serve as a primary route for contaminant outflow.
LPSC 03-57	C1NFR, Section 5(a)	▪ *Preliminary Safety Report:* 9.4.5, Shaft Sinking	Provide detailed information regarding specialized boundary blasting techniques that will be applied to all stages of shaft sinking in order to minimize overbreak or excessive excavation damage zone (EDZ) generation.	On page 612, the *Preliminary Safety Report* states that, for shaft sinking operations: "Drill and blast patterns will be designed to minimize the damage, or overbreak, of the shaft walls … (and will) optimize drill patterns, explosive types and powder factors to achieve this requirement." The use of proper delay sequencing and low energy shearing holes to minimize boundary fracturing is mentioned in the description of underground opening development on page 614. However, this has not been explicitly stated for the shaft sinking

IR #	Section #, NSCA Regulations	Section # in OPG's LPSC Application	Information Request	Context
				procedures where it is very important to minimize overbreak and extension of the EDZ.
LPSC 03-58	C1NFR, Section 5(a)	▪ *Preliminary Safety Report:* 13.6.3.1, Design and Construction of Shaft Seal	Indicate how a 500 mm thick annulus of rock immediately at the shaft surface will be excavated to remove any damaged rock during shaft decommissioning procedures and prior to shaft seal placement without creating new or additional damage to the newly-exposed surface rock. Provide explanation as to why new rock bolts and concrete liners must be emplaced following removal of the 500 mm thick annulus of rock existing about the shafts to support a concrete liner.	During shaft decommissioning, shaft support structures will be progressively removed and "an additional 500 mm of host rock will be excavated beyond the initial shaft diameter to remove any damaged rock that may have formed during shaft sinking and the operational period of the DGR." (*Preliminary Safety Report*, page 657). No information is provided as to how the 500 mm (0.5 m) annulus of damaged host rock will be removed prior to shaft seal installation without creating additional damage to the rock surface by the process of removal. No procedure for its removal has been proposed. Should standard blasting be required, this will additionally damage the rock surface and seal condition. Also on page 657, it is stated that "… shaft support structures and concrete liners will be removed … (and) Rock bolts will be installed, as required, to support concrete liner and any newly exposed rock where the liner has been removed …" Consideration is being given to rock bolt and concrete liner installation in order to support newly exposed rock. This requires explanation and justification.
LPSC 03-59	C1NFR, Section 5(e)	▪ *Preliminary Safety Report:* Section 6.2.4.2, Communications Systems	Indicate whether hard-wired emergency telephone systems will be installed in any portable refuge station sites underground.	In Section 6.2.4.2 of the *Preliminary Safety Report*, it is stated that hard-wired emergency phones will be installed at the main surface control room, main and ventilation shaft stations and at each refuge station (presumably adjacent to each shaft station).

IR #	Section #, NSCA Regulations	Section # in OPG's LPSC Application	Information Request	Context
LPSC 03-60	C1NFR, Section 5(d)	▪ *Preliminary Safety Report:* Figure 6-14, page 323. ▪ *Preliminary Safety Report:* Figure 6-21, page 334.	Describe how emergency egress by personnel working underground can be made via the ventilation shaft, should main shaft access be denied. Specifically, what egress is available to personnel who may be working within the emplacement room panels should main tunnel access back to the main shaft become blocked? Provide descriptions of access and egress routes that will be developed for the diesel fuel bay, maintenance shop and storage facility in the services area (Figure 6-14, page 323) to permit two-way directional movement towards refuge stations in case of route blockage during occupancy of these work sites	During operations, emplacement rooms will be empty, active or filled. While these rooms are empty, it is stated that "the flow-through ventilation system provides egress from both sides of the emplacement rooms" (page 365). However, during placement and after, at the downstream end of each room (closest to the ventilation return air drift/tunnel), as shown in Figure 6-21 (page 334), the only opening into the ventilation tunnel will be by an airflow regulator. It appears that there is no possible escape route for personnel to travel directly to the ventilation shaft other than by travelling back to the services area. That is, there is only one escape route.
LPSC 03-61	C1NFR, Section 5(i)	▪ *Preliminary Safety Report:* Section 6.9, Emergency Response, page 367	Provide confirmation that the DGR will have access to or provision for staffing of two Mine Rescue Teams (MRT) at all times to respond to fire and rock fall events underground. Indicate whether the DGR will have two MRT units on site/on call, or whether the two-team requirement will consist of only one DGR team and one off-site team from a neighboring mine. Indicate whether provisions have been or will be made by contractual written agreement between the DGR and an identified local or neighbouring mine to provide MRT assistance in the event of emergency response, and that such agreements will be viable for the full term of underground operations at the DGR.	Section 6.9 of the Preliminary Safety Report states: "Although the DGR will provide two teams, reliance on the neighboring mines in the region will be necessary." It also states that, "The DGR requires an emergency response mine rescue team (MRT) to respond to fire and rock fall events … provided with special training from the Ontario Mine Rescue Division of MASHA …MASHA requires a back-up team to be on-site … and a third team must be on site before the second (DGR) team can go underground.", and "Although the DGR will provide two teams, reliance on the neighboring mines in the region will be necessary."

IR #	Section #, NSCA Regulations	Section # in OPG's LPSC Application	Information Request	Context
LPSC 03-62	▪ C1NFR, Section 5(a)	▪ *Preliminary Safety Report:* Section 4.5.4.2, Shaft Seal Analysis, page 235 ▪ Section 13.6.3.1, Design and Construction of Shaft Seal, page 657 ▪ *EIS:* Section 4.11.4, Decommissioning of the Shafts ▪ Section 7.2.1.4, Abandonment and Long-term Performance Phase	Provide an assessment of potential solute contaminant transport scenarios through the shaft EDZ. Explain any measures that are planned or that could be taken during the construction phase to reduce the extent and severity of the EDZ.	In the evaluation of potential transport pathways for the Normal Evolution Scenario, consideration is given to the possibility of solute transport through the shaft seal. A greater concern is transport via the annular EDZ associated with each shaft. A clearer explanation is required as to how fracture induced diffusion and advective flow in this zone can be inhibited on a long-term basis.