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Written Submission from

Ontario Ministry of Natural Resources

In the Matter of

Ontario Power Generation Inc.

Proposed Environmental Impact Statement for OPG's Deep Geological Repository (DGR) Project for Low and Intermediate Level Waste

Joint Review Panel

September 16 to October 12, 2013

Mémoire du

Ministère des Richesses naturelles de l'Ontario

À l'égard de

Ontario Power Generation Inc.

Étude proposée pour l'énoncé des incidences environnementales pour l'Installation de stockage de déchets radioactifs à faible et moyenne activité dans des couches géologiques profondes

Commission d'examen conjoint

16 septembre au 12 octobre 2013

Canada

Ontario Ministry of Natural Resources' Submission to the Deep Geologic Repository (DGR) Public Hearing Process

In response to the Joint Review Panel's request of June 18, 2013, the Ministry of Natural Resources (MNR) is providing the following written submission.

1. Geology, Hydrogeology and Oil, Gas and Salt Resources

(Ministry employee to appear at the hearing: Terry Carter, Chief Geologist – Petroleum Operations Section)

Geology and Hydrogeology: the MNR is the lead provincial agency responsible for resource management and regulation of Ontario's oil and natural gas resources, storage of hydrocarbons in geological formations, mining of salt by the solution mining method, and disposition of the mineral rights for oil, gas and hydrocarbon storage on Crown lands in Ontario. To provide a factual and scientific support to these roles, the Ministry has geologists and engineers on staff at its Petroleum Operations office in London. It also collects and manages geological and engineering data from the drilling and operation of all wells used by industry and other clients, including test wells drilled to collect subsurface geological data. Public access to this data is at the Ontario Oil, Gas and Salt Resources Library at 659 Exeter Road in London, Ontario and through digital databases available online at www.ogsrlibrary.com.

The Oil, Gas and Salt Resources Library houses resources and data for public viewing including:

(i) drill cuttings samples from over 13,100 wells;
(ii) drill cores from over 1,027 wells;
(iii) file information on approximately 27,000 wells including geophysical logs, formations tops, well history and construction;
(iv) oil/gas/water zones, initial completion results;
(v) core analyses;
(vi) oil/gas/water analyses; and,
(vii) an extensive collection of reference books, periodicals and reprints on the subsurface geology of oil, gas, salt and subsurface storage resources of Ontario.

This data is the principal, and in most cases, only source of information on the subsurface bedrock geology and oil, gas, hydrocarbon storage and salt resources of southern Ontario. It is also an invaluable source of information on regional aquifers of fresh, saline and sulphurous water confined within the deep bedrock.

This data was used extensively by Ontario Power Generation (OPG)/Nuclear Waste Management Organization (NWMO) researchers to document and model

the regional subsurface stratigraphy and hydrogeology in the area surrounding the proposed Deep Geologic Repository and is a critical component in assessing the suitability of the site for long-term storage of nuclear wastes. The availability of this data has considerably enhanced the accuracy and validity of the models developed by the NWMO researchers.

This data has also been used by MNR geoscientists to document the regional occurrence of oil and gas and regional aquifers in the deep bedrock of southern Ontario. The observations and interpretations made by OPG and NWMO researchers for the proposed Deep Geological Repository (DGR) are consistent with the MNR studies. Preliminary results of the MNR studies were presented on September 20, 2012 at the annual conference of the International Association of Hydrogeologists in Niagara Falls, Ontario, and were presented to NWMO staff in their Toronto office on April 12, 2012.

In 2010, the Ontario Geological Survey published Special Volume 7 (SV7) - The Subsurface Paleozoic Stratigraphy of Southern Ontario. SV7 is a reference volume on the subsurface geology and stratigraphy of southern Ontario, and the water, oil, gas, hydrocarbon storage, salt and mineral resources contained in these rocks. It documents the accepted stratigraphic classification of these rocks and establishes and documents scientific standards for determination of formation contacts using geophysical logs and cuttings and cores from drilling operations. The NWMO researchers adopted the terminology and standards used in SV7 to guide their geological assessments. The Ministry's well data and database was the principal source of data for the book, together with field observations at outcrops, quarries and road-cuts. The book was a collaboration among the Ontario Geological Survey, the Ministry of Natural Resources, the Oil, Gas and Salt Resources Library and the Geological Survey of Canada.

Potential for Oil, Gas and Salt Resources: Some of the Paleozoic sedimentary formations which underlie the proposed site of the DGR do contain commercial accumulations of oil and natural gas further in south-western Ontario. There are 385 known oil and gas pools with recorded production in southern Ontario. The nearest two gas pools are the Hepworth and the Ashfield 5-IX WD. The Hepworth gas pool, located 48 km to the northeast, was discovered in 1900, and produced an undocumented amount of natural gas from the Trenton Group and Black River Group for local use before being abandoned. The Ashfield 5-IX WD gas pool is located 42 km to the south and was discovered in 1979 with first production of natural gas in 2000. This pool is still active. Gas is produced from a pinnacle reef in the Guelph Formation. A total of 64 wells have been drilled to explore for oil and natural gas in the land area within 50 km of the DGR, with only 2 wells drilled since 1991. No wells have been drilled in the waters offshore in Lake Huron. Drilling in the waters of Lake Huron is prohibited in accordance with a 1967 agreement between the province of Ontario and the state of Michigan.

Data collected from the drill holes and seismic data clearly establishes that there are no reservoirs of oil or natural gas within the proposed site of the DGR. The presence of minor "shows" of liquid crude oil in some drill core intervals in wells DGR-1 to DGR-8 does indicate that hydrocarbons were either generated in the rocks in this area or migrated into them. The small number of exploratory wells drilled into the Paleozoic rocks surrounding the DGR does not provide sufficient data to properly evaluate the oil and gas potential of these rocks. There may potentially be undiscovered resources of oil and natural gas in these rocks, but currently; industry interest is minimal.

Petroleum well drilling records and published geological maps indicate that there are no beds of salt (halite) underlying the proposed DGR. The northern limit of the salt strata in the Salina Group occurs approximately 13 km to the south.

MNR cannot comment on the surficial geology of the site as it is outside of our mandate and expertise. Relevant comments regarding the hydrogeology, surficial (Pleistocene) geology, and potential presence of other mineral resources at, or near, the DGR project site may be provided by Ontario's Ministry of Northern Development and Mines and the Ministry of Environment.

Approvals under Oil, Gas and Salt Resources Act: Ministry staff at Petroleum Operations Section in London were consulted by OPG early in the conceptual stages of the DGR project to ascertain regulatory requirements under the *Oil, Gas and Salt Resources Act*, as they were seeking information and advice on the subsurface bedrock geology of southern Ontario and its oil, gas and salt resources, and the data resources available at the Oil, Gas and Salt Resources Library. Petroleum Operations geologists also attended several scientific workshops at the temporary drill core storage facilities at Bruce Nuclear to examine the drill core acquired by the wells licensed under the *Oil, Gas and Salt Resources Act*.

Eight diamond drill holes drilled at the DGR site for geological evaluation and testing of the bedrock formations (DGR-1 to DGR-8) were licensed as wells under the *Oil, Gas and Salt Resources Act*. All aspects of drilling and subsequent operation of the wells were conducted under the regulatory requirements of the Act, Ontario Regulation 245/97 and the Provincial Standards. Drilling programs and geological prognoses were submitted with the applications to drill the wells and were reviewed by Ministry geologists and engineers. Wells were subject to inspection by petroleum inspectors of the Petroleum Operations Section based in London, Ontario. There were no issues or infractions. Drilling and completion records for the wells are filed at the Petroleum Operations office and are available for public viewing at the Oil, Gas and Salt Resources Library in London.

The drill cores acquired by these wells provided samples for study, testing and analysis by the research team at NWMO and their contractors and are presently stored temporarily at the Bruce Nuclear site near the proposed DGR. Provincial

Standards under the *Oil, Gas and Salt Resources Act* presently require that the core be delivered to the Oil, Gas and Salt Resources Library in London when the Deep Geological Repository commences operations (anticipated in 2019). The Library does not have sufficient capacity to house all the drill cores, as the volume of the cores is unprecedented in Ontario (there is approximately 5 km of cores).

It is MNR's opinion that it is in the public interest to preserve, for future use, the geologic data that the drill cores represent. Because the Library will not have sufficient capacity, we would like to request that OPG, the Canadian Nuclear Safety Commission, and the Joint Review Panel consider an alternative long-term storage option, possibly on the OPG site.

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2. Provincial Parks and Protected Areas

(Ministry employee to appear at the hearing: Tim Marchand – Park Management Planner, Ontario Parks)

In regard to the specific questions related to MNR's views on the effects of the Project on the use of provincial parks, specifically Inverhuron Provincial Park, the Ministry has the following comments.

Inverhuron Provincial Park is located immediately south of the Bruce Nuclear site with a portion being included in the DGR Site Study Area. Development of Inverhuron Provincial Park began in 1956 and the park was first opened in 1959. In 1967, the park was regulated under the then *Provincial Parks Act* (Ontario Regulation 245/67). With construction of the Bruce Nuclear facility, it was deemed necessary for the Hydro Electric Power Commission of Ontario to acquire the park in 1973 due to safety and security concerns. In that same year, a 999 year lease was signed granting MNR permission to continue operating the park as a day use area. The campground was phased out by 1976. With the shutdown of the last Bruce Nuclear heavy water plants, the lease between the MNR and Ontario Hydro (now Ontario Power Generation (OPG)) was amended in 1998, such that current conditions for the operation of the park may allow:

- expanded public access;
- extended hours of operation;
- extended operating season; and
- reintroduction of overnight camping.

As a condition of the operating licence for Bruce Nuclear, OPG has retained a 914-metre radius *exclusion zone* at the northwest corner of the park. The licence condition states that ownership and control of any land within the exclusion zone

shall be maintained by OPG and no use shall be made without prior written approval of the Atomic Energy Control Board. For the purpose of public safety, a fence and gates were erected in 1998 as a means of effectively preventing public access. Restricted access for Ontario Parks' staff will be allowed into this area for access control and other management purposes. It is this *exclusion zone* that falls within the limits of the DGR Site Study Area.

The *Inverhuron Provincial Park Management Plan* was approved in 2000 as the official policy for the long-term management and development of this park. The plan reflects the Ministry of Natural Resources' and Ontario Parks' intent to protect the natural and cultural features of Inverhuron Provincial Park and maintain and develop high quality opportunities for outdoor recreation and heritage appreciation for the residents of Ontario and visitors to the province.

Ontario Parks began redevelopment of the park and in July 2005 began accepting reservations for 162 campsites and is currently working towards adding an additional 80 sites and group camping areas to meet user demand. In addition to car camping, the park also provides day use recreation opportunities that include sunbathing, swimming, fishing, hiking, cycling, boating, canoeing, picnicking and wildlife viewing. In 2012, the park received 55,576 visitors and provided 49,839 camping opportunities.

In 2007, the *Provincial Parks Act* was replaced with the *Provincial Parks and Conservation Reserves Act* (PPCRA). The purpose of the new Act "is to permanently protect a system of provincial parks and conservation reserves that includes ecosystems that are representative of all of Ontario's natural regions, protects provincially significant elements of Ontario's natural and cultural heritage, maintains biodiversity and provides opportunities for compatible, ecologically sustainable recreation." 2006, c. 12, s. 1. The objectives in establishing and managing provincial parks include:

1. To permanently protect representative ecosystems, biodiversity and provincially significant elements of Ontario's natural and cultural heritage and to manage these areas to ensure that ecological integrity is maintained.
2. To provide opportunities for ecologically sustainable outdoor recreation opportunities and encourage associated economic benefits.
3. To provide opportunities for residents of Ontario and visitors to increase their knowledge and appreciation of Ontario's natural and cultural heritage.
4. To facilitate scientific research and to provide points of reference to support monitoring of ecological change on the broader landscape. 2006, c. 12, s. 2 (1).

Ecological integrity refers to a condition in which biotic and abiotic components of ecosystems and the composition and abundance of native species and biological

communities are characteristic of their natural regions and rates of change and ecosystem processes are unimpeded. 2006, c. 12, s. 5 (2). Ecological integrity includes, but is not limited to, a) healthy and viable populations of native species, including species at risk, and maintenance of the habitat on which the species depend; and b) levels of air and water quality consistent with protection of biodiversity and recreational enjoyment. 2006, c. 12, s. 5 (3).

In keeping with the purpose and objectives of the PPCRA, Inverhuron Provincial Park not only provides ecologically sustainable outdoor recreation opportunities, but also protects provincially significant special and representative prehistoric and historical resources, a variety of ecological communities including mixed forest, wetland, open field, and Lake Huron shoreline. The park's ecosystems support over 265 plant species, including species at risk, over 200 species of birds and a variety of mammals, amphibians and reptiles.

As indicated in the *Atmospheric Environment Technical Support Document*, residual adverse effects on air quality and noise level were identified for site preparation, construction and decommissioning phases. These effects may have the potential to negatively impact park user experience and/or individual species and/or habitats (e.g., breeding, nesting or staging (migration) birds, etc.). Therefore, Ontario Parks/MNR will engage OPG to discuss these potential effects and appropriate mitigation measures to minimize potential impacts to park users and the park environment during the above-mentioned phases. Ontario Parks supports the proposed recommended monitoring to determine the level of effects and effectiveness of the proposed mitigation.

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3. Other MNR approvals, interests

(Ministry employee to appear at the hearing: Mark Shoreman – District Manager, Midhurst District)

During the project's Environmental Assessment (EA) consultation period, MNR's local Midhurst District office provided technical advice to OPG. In particular, it provided advice regarding species at risk methodology and mitigation measures based on OPG's Environmental Impact Study. An *Endangered Species Act* authorization is not anticipated for this project.

The Environmental Impact Study (EIS) prepared by OPG (dated March 2011) was submitted to the District for review in May 2011. The EIS evaluated the potential effects of the DGR Project on the existing environment, including the terrestrial and aquatic environments of the project area and to a limited degree the local features in the broader site study area. The MNR does not have an

approval role for Federal Environmental Assessments. MNR generally provides technical comments, upon request, on key EAs.

The Midhurst District Office reviewed this application in relation to surficial key natural heritage matters as defined in legislative authority, including the *Aggregates Resources Act*, *Lakes and Rivers Improvement Act* and the *Endangered Species Act*. Based on our review, the District provided technical comments to OPG through the EA public consultation process regarding species at risk, specifically survey methodology for sensitive turtle species and mitigation measures.

In addition, the OPG and the Joint Review Panel sought expert assessment which confirmed earlier studies that sensitive turtle species were not found during any field surveys and that high quality habitat does not exist on the terrestrial lands being proposed for development. However, because surrounding lands may have high quality habitat, mitigation measures are being proposed to prevent incidental damage and or destruction during the construction process. The District does not anticipate that the proposal will alter, damage or destroy endangered species habitat.

Concluding Remarks

MNR is thankful for the opportunity to provide this written submission to the Deep Geologic Repository Joint Review Panel and to participate in the upcoming hearing.