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Written Submission from

Ontario Power Generation Inc.

In the Matter of

Ontario Power Generation Inc.

Application by Ontario Power Generation Inc. (OPG) for a new licence for the Site Preparation and Construction of the OPG's Deep Geologic Repository (DGR) Project for Low- and Intermediate-Level Waste (L&ILW)

Joint Review Panel

September 16 to October 12, 2013

Mémoire de

Ontario Power Generation Inc.

À l'égard de

Ontario Power Generation Inc.

Demande de Ontario Power Generation Inc. (OPG) visant un nouveau permis pour la préparation du site et construction du dépôt en formations géologiques profondes (DFGP) de déchets radioactifs de faible et de moyenne activité (DRFMA) proposé par OPG

Commission d'examen conjoint

16 septembre au 12 octobre 2013

Canada

ORIGINAL

PANEL MEMBER DOCUMENT (PMD)

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Reference: PMD 13-P1.1A

Ontario Power Generation

Public Hearing for Ontario Power Generation's Deep Geologic Repository for Low and Intermediate Level Waste

Scheduled for:
September 16, 2013

Request for a Licensing Decision:

Regarding:

Application for a Site Preparation and Construction Licence for a Deep Geologic Repository for Low and Intermediate Level Waste

Submitted by:
Ontario Power Generation

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EXECUTIVE SUMMARY

This written submission presents an overview of Ontario Power Generation's (OPG's) Application for a Licence to Prepare Site and Construct a Deep Geologic Repository (DGR) for long-term management of low and intermediate level waste at the Bruce nuclear site. Factors that determine the suitability of the DGR project site for locating the DGR facility, and contribute to a robust safety case, are described. To demonstrate that adequate measures are in place for each applicable Safety and Control Area (SCA) during the site preparation and construction phase, a brief overview of these measures is provided.

During the public comment period that ended on May 24, 2013, OPG provided extensive information in response to a large number of information requests from the Joint Review Panel (JRP), and during three Technical Information Sessions. This additional information is summarized, as appropriate, under the SCAs applicable to the site preparation and construction phase of the DGR project.

This document provides a brief overview of the large body of information submitted or presented to the JRP to date that supports the DGR project objective of protection of the environment and health and safety of the public and the workers through the DGR project's lifecycle, including the site preparation and construction phase, and concludes with a request for a site preparation and construction licence for a period of 10 years.

The document also states OPG's commitment to meet the conditions of the site preparation and construction licence and the accompanying licence conditions handbook for the DGR, after it is issued.

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1.0 INTRODUCTION

1.1 Background

On August 13, 2007, Ontario Power Generation (OPG) submitted to the Canadian Nuclear Safety Commission (CNSC) an application for a licence to prepare the site for and to construct a Deep Geologic Repository (DGR) for Low and Intermediate Level Waste (L&ILW) at the Bruce nuclear site (OPG 2007). Comprehensive documentation in support of this licence application, including a Preliminary Safety Report (PSR) with its supporting documents, an Environmental Impact Statement (EIS) and its Technical Support Documents (TSDs), and other miscellaneous information in support of the licence application were submitted in April 2011 to the Joint Review Panel (JRP) (OPG 2011a and OPG 2011b).

Through the site evaluation and characterization work documented in the April 2011 submission, OPG has demonstrated the DGR project site to be well-suited for locating, constructing and safely operating the DGR. OPG has also demonstrated that it is qualified to undertake the site preparation and construction activities, and will make provisions to protect the health and safety of persons, and the environment while conducting the activities for which it is requesting a licence. This current submission provides a summary of the information presented to the JRP in the April 2011 submission and a summary of the new information and clarifications provided during the public review process. The information is presented using the CNSC-defined Safety and Control Areas (SCAs), where applicable, pertinent to the site preparation and construction activities.

Once the DGR has been constructed, an operating licence will be necessary for operating the facility. At the end of the operational life of the facility, the facility will be decommissioned after obtaining a decommissioning licence, followed by an abandonment licence.

1.2 Summary of the Licence Application

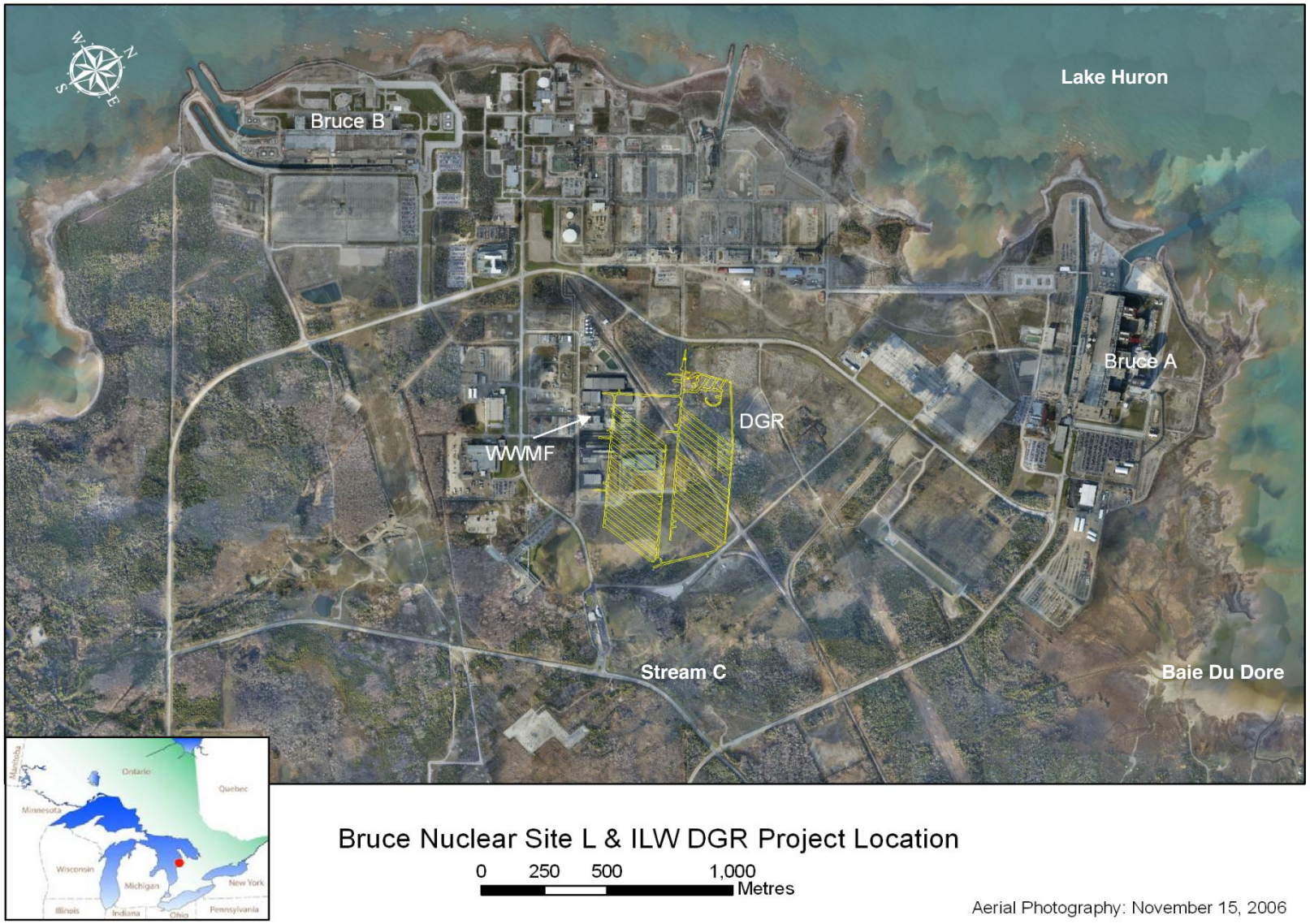
1.2.1 Purpose of the Project

The purpose of the proposed DGR is to provide safe long-term management of the L&ILW currently stored (91,000 m^3 at the end of 2012) at OPG's Western Waste Mangagement Facility (WWMF), situated on the Bruce nuclear site, and additional L&ILW produced by the continued operation and refurbishment of OPG-owned or operated nuclear generating stations.

1.2.2 The Project

The proposed DGR facility will be located on the Bruce nuclear site in the Municipality of Kincardine, in the Province of Ontario. The facility will be located entirely within the boundaries of the OPG-owned and retained lands (i.e., lands not leased to Bruce Power) at the Bruce nuclear site. The location of the DGR project on the Bruce site is shown in Figure 1. The DGR will consist of above- and below-ground facilities for the receipt of L&ILW, transfer of L&ILW underground, and emplacement of L&ILW in rooms excavated at a nominal depth of 680 m below surface in competent sedimentary rock. A schematic of the DGR is shown in Figure 2.

Figure 1



Bruce Nuclear Site L & ILW DGR Project Location

0 250 500 1,000 Metres

Aerial Photography: November 15, 2006

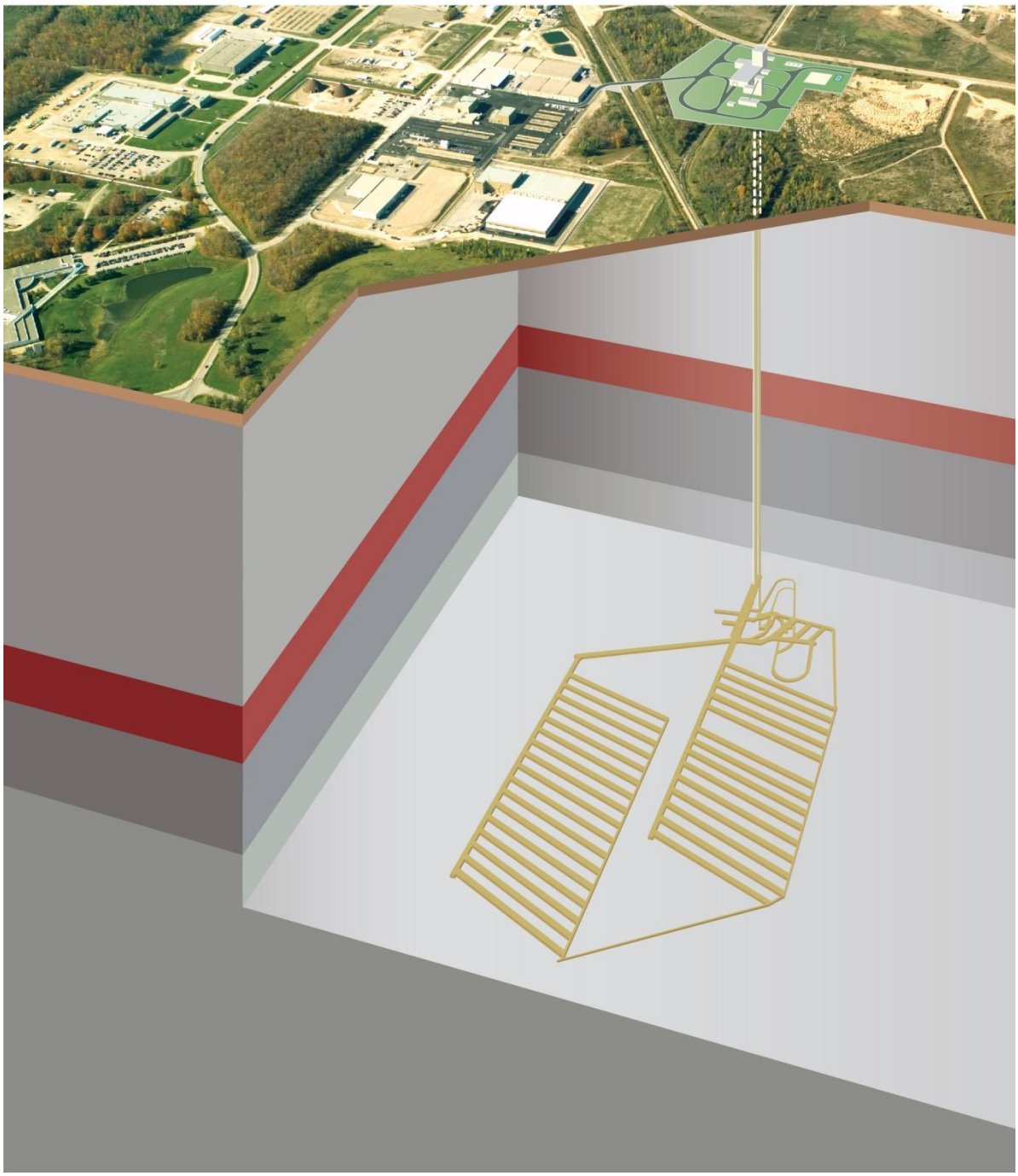


Figure 2: Schematic of the DGR

The DGR will accommodate approximately 200,000 m^3 of packaged L&ILW. Low-level waste typically consists of contaminated clothing, rags, plastic, mops, tools and paper. It contains primarily short-lived radionuclides. Intermediate-level waste typically consists of contaminated resins, spent filters and reactor core components, containing primarily long-lived radionuclides.

The DGR consists of surface facilities that include the waste package receiving building (to receive waste from the WWMF), amenities and other supporting buildings, headframes, and the waste rock and stormwater management areas. The underground facilities, located at a nominal depth of 680 metres, include access tunnels, emplacement rooms and a services area. Two shafts (main shaft and ventilation shaft) provide access to underground facilities. An illustration of the surface facilities is provided in Figure 3.

The DGR is currently assumed to operate for approximately 35-40 years, followed by decommissioning over a period of 5-6 years.

After receipt of a licence to prepare the site and to construct the DGR, a major portion of the DGR Project site will be prepared to establish construction facilities and services required for the construction of the DGR. Site preparation will include the following activities:

- Site fencing;
- Clearing and grubbing;
- Site grading;
- Preparing lay-down areas;
- Preparing waste rock management areas (temporary and permanent); and
- Installation of services and potential tie-ins.

Construction will subsequently begin with installation of construction services, followed by the following activities:

- Construction of stormwater management pond and drainage ditches;
- Ground improvement (e.g., grouting or freezing) around the two shafts;
- Preparation of the shaft collar areas (excavation to approximately 30 m depth) including installation of headframe foundations;
- Construction of main shaft and ventilation shaft headframes;
- Installation of shaft sinking and hoisting equipment;
- Sinking of the two shafts and construction of final concrete liners;
- Equipping each shaft (installation of shaft steel, permanent services, etc.) and installation of permanent hoisting equipment;
- Underground lateral development;
- Completion of surface facility construction; and
- Commissioning.

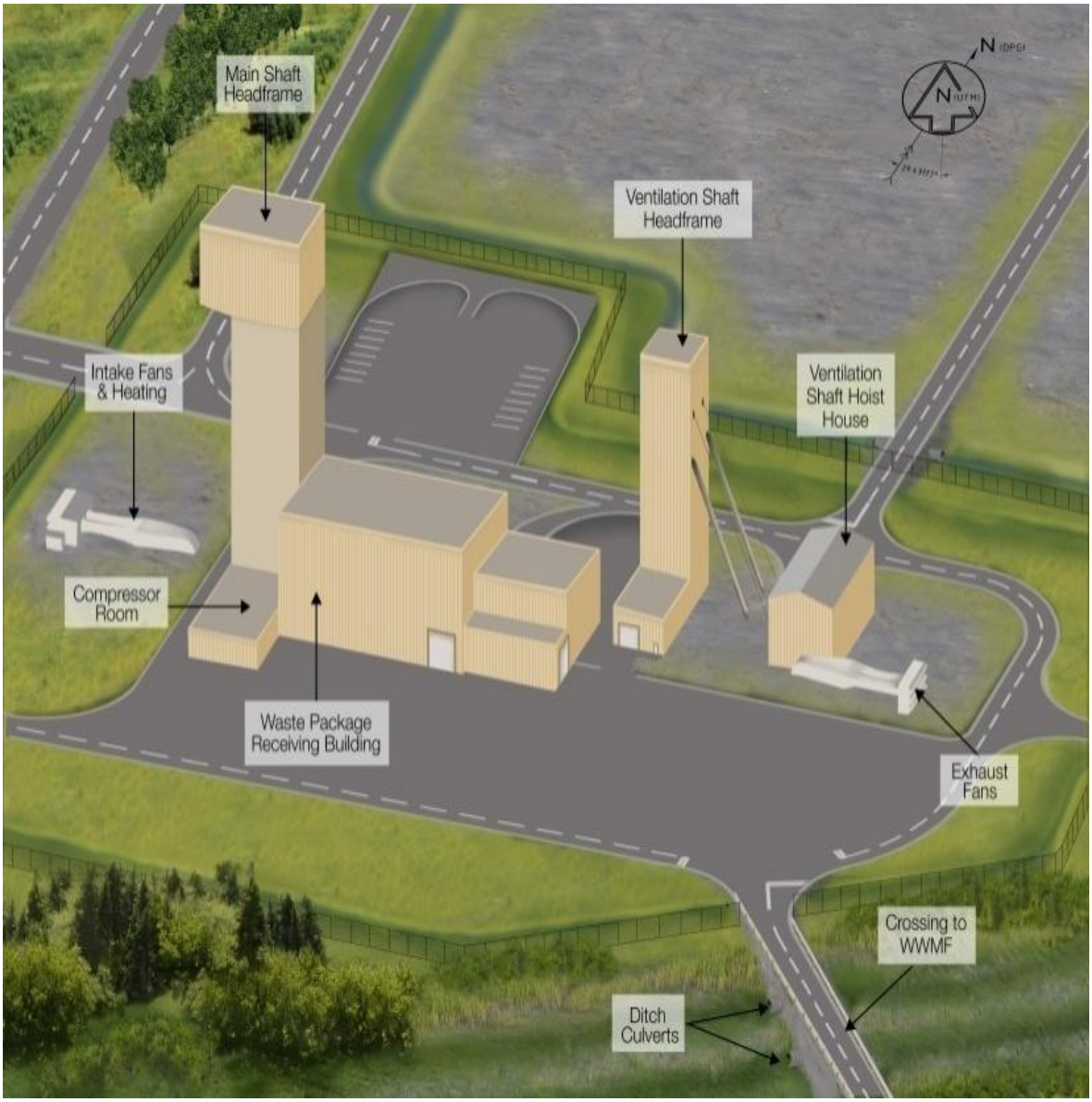


Figure 3: Illustration of the Surface Layout

1.2.3 Site Evaluation

The DGR site has been evaluated for its overall suitability for hosting the DGR by considering several factors. These factors are described below.

- Willing Host Municipality

  The DGR project has received formal endorsement from the Municipality of Kincardine through a hosting agreement between the Municipality and OPG, signed in 2004. The proposal for long-term management of L&ILW at the Bruce nuclear site was initiated by the

Municipality. Ongoing public involvement activities have confirmed that the level of community support for locating the DGR project at the Bruce nuclear site continues to be high. This is a significant favourable factor in siting the DGR at its proposed location.

- Favourable Geological Setting

  The DGR project site is located in a favourable geological setting, as demonstrated by the information summarized below.

  Based on the early geotechnical feasibility studies conducted in 2002-2003, seven hypotheses specifying favourable geoscientific attributes to site the L&ILW DGR at the Bruce nuclear site were formulated. The site-specific and regional geoscientific characterization plans were then developed and implemented to test these hypotheses listed below and obtain evidence to support the DGR safety case:

  - Predictable
  - Seismically Quiet
  - Multiple Natural Barriers
  - Shallow Groundwater Resources are Isolated
  - Geomechanically Stable
  - Contaminant Transport is Diffusion-Dominated
  - Natural Resource Potential is Low

  Under the geoscientific site characterization plan, six deep boreholes were drilled over the period 2006-2010 and the extracted cores and boreholes were subjected to thorough examinations that resulted in confirming the above hypotheses, providing positive conclusions about the suitability of the site to locate the DGR and contributing to a robust safety case. The conclusions drawn from the site characterization work support the key hypotheses and provide confidence that the geological setting at the Bruce nuclear site is suitable to support the development of a DGR for L&ILW in the Cobourg Formation. These conclusions can be summarized as follows:

  - The site geology is predictable. It has near-horizontally layered, undeformed sedimentary shale and limestone formations of large lateral extent.
  - The site is seismically quiet. The Bruce nuclear site is located within the tectonically stable interior of the North American continent, which is characterized by low rates of seismicity. No earthquake exceeding magnitude 5 has been observed in the regional monitoring area in 180 years of record.
  - Multiple low-permeability bedrock formations enclose and overlie the DGR.
  - Near surface groundwater aquifers are isolated from the deep saline groundwater system. Regionally, the hydrogeochemistry of the Michigan Basin defines two distinct groundwater regimes: i) a shallow bedrock system containing potable groundwater at depths above 200 m; and ii) an intermediate to deep saline system.
  - The DGR site is geomechanically stable. Precedent construction experience with the excavation of underground openings in the Ordovician sediments indicates that excavated openings in the DGR limestone formation are likely to be dry and stable.

  - Contaminant transport is diffusion dominated. Deep groundwater regime is ancient showing no evidence of glacial perturbation or cross-formational flow.
  - Natural resource potential is low: commercially viable oil and gas reserves are not present at the DGR site. Lateral traceability between the Bruce nuclear site boreholes and other proximal dry wells (e.g., Union Gas #1 and Texaco #6) demonstrates that locally around the Bruce nuclear site (~7 km radius), no pockets of oil or gas hydrocarbon are likely to exist.

- Secure Nuclear Site

  The DGR project site is located within an existing secure nuclear site. The Bruce nuclear site currently hosts three Class I nuclear facilities: two large nuclear power plants operated by Bruce Power and OPG's WWMF.

- Land Owned by OPG and Land Use Consistent with Existing Facilities

  The Bruce nuclear site comprises land that is leased to Bruce Power and land that has been retained by OPG. The land on which the DGR is to be constructed is part of the OPG-retained land.

  The DGR project site is located in the centre of a large nuclear site that is home to the WWMF, Bruce Power Nuclear Plants A and B, and its ancillary facilities. This makes the land use for the DGR project consistent with existing facilities.

- Adjacent to the WWMF

  The DGR project site is located adjacent to the WWMF, which is the facility where much of the low and intermediate level waste destined for the DGR is currently stored on an interim basis. This proximity to the WWMF will simplify transferring of the waste from the WWMF to the DGR when the DGR becomes operational.

- On-Site Services, Emergency Response Available For The DGR

  Due to the nature of the existing operations at the Bruce nuclear site, most of the on-site services required for the DGR project are readily available. Trained and well-qualified emergency response is available on site.

- Radiological Environmental Monitoring Program in Place for the Site

  Bruce Power has an existing Radiological Environmental Monitoring Program (REMP) that captures impacts on the surrounding environment from all radioactive releases from the Bruce nuclear site. An annual report is prepared and submitted to the CNSC by Bruce Power. The DGR will be covered under the program.

- Favourable Socio-Economic Environment

  The socio-economic environment in the vicinity of the Bruce nuclear site is favourable because of the following factors:

  - The Municipality of Kincardine is home to 40% of Bruce Power employees and the nuclear industry plays a large role in the economic base of the Municipality.

- The communities living in the area are familiar with the DGR project due to the ongoing OPG public communication programs and are largely supportive of it.
- Municipalities in the areas surrounding the Bruce nuclear site have sufficient existing capacity for growth in housing, population, and in their water, sewage and waste management systems.
- School boards in the area have available capacity to accommodate anticipated growth. Assessment of socio-economic impacts due to the DGR project has concluded that beneficial effects for the surrounding Municipalities are anticipated as a result of this project.

1.2.4 The Licence Application

The regulatory process for the DGR project started with the OPG submission of a letter of intent to construct a deep geologic repository, and a project description for the DGR project, to the CNSC in 2005 (OPG 2005). Subsequent to a public hearing on the Environmental Assessment (EA) scoping document by the Canadian Nuclear Safety Commission on October 23, 2006 (CEAA Registry Doc. #155), and CNSC recommendations to the Minister of Environment after the hearing (CEAA Registry Doc. #192), the Minister of Environment issued a notice to refer the project for environmental assessment to a review panel (CEAA Registry Doc. #153). This was followed by submission of a licence application by OPG to the CNSC on August 13, 2007 (OPG 2007), requesting licensing of the activities '*Preparation of the site for and construction of the DGR'.* Documentation to support the application, including a Preliminary Safety Report (PSR) and a compliance matrix was submitted to the JRP in April 2011 (OPG 2011a). The compliance matrix showed how the submission complies with the applicable Regulations. An Environmental Impact Statement (EIS) with its supporting Technical Supporting Documents and an environmental assessment follow-up monitoring program were also submitted in April 2011 (OPG 2011b).

1.2.5 OPG's Submission in Support of the Licence Application and Additional Information

Subsequent to the submission of a letter of intent and the project description (OPG 2005), extensive work was conducted by OPG in the areas of site characterization, facility design and safety assessment, during the period 2006-2010. Based on this work, OPG submitted in April 2011 a comprehensive documentation package in support of the DGR licence application. A roadmap for this submission is shown in Figure 4.

Updates to the DGR design, as described in Chapter 6 of the PSR, and corrections to some parts of the submitted information were submitted to the JRP in February 2012 in OPG (2012a) and OPG (2012b), respectively. Subsequently, OPG has responded to 575 Information Requests (IRs) received in 11 packages during the JRP's public review process.

Substantial additional information was also provided to the Joint Review Panel in the following three Technical Information Sessions:

- Technical Information Session #1 – held on July 18, 2012 – on construction methods and sequencing;
- Technical Information Session #2 – held on October 11, 2012 – on computer modelling; and

- Technical Information Session #3 – held on March 20, 2013 – on socio-economic aspects of the project.

Figure 4: Licensing Documents Roadmap

The safety objective set out for the DGR, as described in the PSR, was:

"To provide safe long-term management of low and intermediate level waste without posing unreasonable risk to the environment or health and safety of humans."

The submissions demonstrated that the overall safety objective was met because:

- The DGR provides long-term isolation and containment;
- Preclosure and Postclosure safety criteria are met;
- The DGR system is robust; and
- The DGR can be constructed, operated and decommissioned safely.

2.0 Safety and Control Areas

2.1 Management System

2.1.1 Relevance and Management

The SCA of Management System is relevant to the conduct of the DGR project as it encompasses the management structure and the tools in place to ensure that the project is conducted by qualified personnel in a well-managed and responsible manner. OPG will be the owner/licensee of the DGR. OPG has contracted the Nuclear Waste Management Organization (NWMO) to manage the regulatory approvals and the design and construction phases of the project. The NWMO is a non-profit organization established under the Nuclear Fuel Waste Act by OPG, Hydro Québec and New Brunswick Power.

OPG's DGR Project Charter, 00216-CHAR-0001, describes the management system applicable to the DGR Project for the regulatory approval, design, procurement, site preparation, construction of the project and turnover to OPG. It defines the management system roles of OPG and NWMO and provides assurance that the DGR will be designed, procured, constructed, commissioned and turned over in accordance with the requirements of Canadian Standards Association (CSA) Standard N286-05 "Management System Requirements for Nuclear Power Plants" as it applies to the L&ILW DGR Project.

As part of the management of project activities, positive safety culture is fostered among the project personnel by implementing practices that contribute to excellence in worker performance. A commitment to safety culture is demonstrated by all OPG and NWMO DGR Project personnel through adherence to the requirements of their respective management systems and by demonstrating the behaviours that contribute to excellence in human performance, including safe work performance.

During the public review period, OPG submitted to the JRP additional information on OPG and NWMO management systems in its responses to several Information Requests in this area. OPG clarified how it will ensure that NWMO's procedures and processes comply with the corresponding applicable OPG requirements, and elaborated upon OPG's oversight of NWMO and compliance with CSA N286-05 by OPG and its contractors and sub-contractors.

Specifically:

- OPG clarified in its response to IR LPSC-02-49 how it will ensure that the NWMO's procedures and processes comply with the corresponding applicable OPG requirements.
- IR LPSC-02-50 requested information on how OPG will verify the promotion, assessment and maintenance of the safety culture for DGR project activities. In response, OPG stated that consistent with its nuclear safety policy principles, OPG expects a culture where safety is the paramount consideration in all decisions and actions. OPG listed the elements that it will focus on, that demonstrate a strong safety culture at the NWMO in the conduct of its DGR-supporting activities.
- In response to IR LPSC-02-51, OPG described how the NWMO will determine that incident investigations completed by its contactors meet a standard acceptable to OPG and can meet CNSC requirements; and how OPG's oversight activities will ensure such investigations meet OPG requirements. Various OPG and NWMO documents were identified in the response that provide the tools to satisfy OPG requirements.
- OPG clarified in response to IR LPSC-02-52 which agreements are in place for maintaining records produced by the NWMO and its subcontractors during the Regulatory Approvals Phase, and for the Design and Construction Phase.
- IR LPSC-02-53 requested information on what clauses of the CSA N286-05 standard are met by a number of specified planned documents. OPG provided a Table listing each document, its purpose and scope, and which clause of CSA N286-05 it was intended to meet.
- IR LPSC-02-54 requested OPG to demonstrate that the requirements of CSA N286-05 clauses 5.12, 6.1, and 6.2 are incorporated in the management system documents of OPG, NWMO and sub-contractors. In response, OPG provided details with examples of how these requirements are met.
- In response to IR LPSC-04-66, where the JRP requested a straightforward, standalone safety case for the Licence to Prepare Site and Construct, OPG provided detailed information on NWMO's management system that govern the activities to prepare the site for and to construct the DGR and OPG's management system, used for oversight of these activities.

2.1.2 Future Plans

OPG will continue to conduct a number of audits and assessments of the DGR project per current practice, both for DGR project oversight activities within OPG and for the work contracted to NWMO. OPG will continue to request and receive NWMO's internal audit reports or assessments for review.

2.2 Human Performance Management

2.2.1 Relevance and Management

Human performance management is a relevant SCA for the DGR project as it is an important aspect of OPG's management system for the Project. OPG senior management is committed to ensure that all OPG L&ILW DGR Project workers demonstrate a commitment to safety culture

and to the management system through adherence to the requirements of the management system and by demonstrating the behaviours and values that contribute to excellence in human performance and the continual improvement of safety.

Adequate staff training will be provided in accordance with OPG and NWMO governance to equip DGR Project staff with necessary knowledge, skills, procedures and tools to safely carry out their duties related to the Project.

Additional information on how OPG will assess human performance program aspects of DGR project activities to ensure consistency with OPG's existing corporate program was provided in responses to IRs LPSC-02-48 and LPSC-02-50.

- In response to IR LPSC-02-48, OPG listed the human performance elements included in OPG's planned assessments, reviews and spot checks of all NWMO project activities and submittals to OPG. OPG described how NWMO manages human performance, what industry standards its management system is based upon, how OPG assesses NWMO's performance in this area and how NWMO manages human performance of its contractors.
- IR LPSC-02-50 requested information on OPG oversight of promotion, maintenance and assessment of safety culture for DGR project activities. As summarized above in Section 2.1.1, OPG listed the elements that it will focus on, to ensure that a strong safety culture is demonstrated by the NWMO. Behaviours developed through a strong safety culture directly contribute to excellence in human performance.

2.2.2 Future Plans

OPG will continue to monitor human performance and assess it through internal audits and self-assessments. OPG oversight of NWMO's human performance will be accomplished by periodically reviewing NWMO's assessments of its safety culture, periodic field inspections and by having independent assessments or audits of NWMO's human performance completed.

2.3 Operating Performance

2.3.1 Relevance and Management

Although this SCA is typically used to describe operating facilities' performance, for the purpose of this written submission, OPG is addressing the activities to be licensed under this subject, as these will be analogous to "operations" in the field when the site is prepared and construction work is carried out for the DGR project. OPG has programs and plans in place to ensure that site preparation and construction of the DGR project will be carried out in accordance with all applicable federal and provincial regulations, municipal by-laws, applicable standards and codes, using best industry practices, as previously committed in OPG's submissions. NWMO's Design and Construction Phase Management System (DGR-PD-EN-0001) describes the plans and procedures to manage the site preparation and construction activities in the field. OPG's Deep Geologic Repository Project Management System document describes how OPG will provide oversight for the conduct of licensed activities. A suite of documents consisting of policies, programs, procedures and plans identified in these documents provides an overall robust system to manage and control the conduct of licensed activities in accordance with the requirements of CSA Standard N286-05 "Management System Requirements for Nuclear Power Plants". Reporting to regulatory agencies and plans for addressing non-conformances and corrective actions are part of OPG's management system. The DGR project team regularly

reviews operating experience for international facilities similar to the DGR and incorporates lessons learned in its plans for site preparation and construction to continuously improve them.

Substantial information on how the activities of site preparation and construction will be carried out has been provided further to OPG's submissions in April 2011, in Technical Information Session #1 and in responses to Information Requests. Technical Information Session #1 was focused on addressing construction methods and sequencing. Information on the following subjects was presented to the JRP in this session:

- Construction Phases: these include site preparation, initial construction, shaft sinking, lateral underground development, and surface facilities. Also, key aspects/constraints and temporary facilities for construction were identified.
- Waste Rock Management.
- Water Management: included site and repository drainage, underground dewatering water sources, stormwater management pond, water quality and contingency treatment options.
- Ventilation, considering the following phases: shaft sinking, initial development of shafts, connection of the shafts, full development with large equipment, and operations ventilation.
- Mine Safety.
- Backfill, including use of backfill in the DGR, long-term safety, operational stability and safety, and long-term stability.

Additional information provided on conduct of activities to be licensed can be summarized as follows:

- In response to IR EIS-01-01, surface facility construction and excavation associated with shaft collar development was explained in relation to geotechnical and hydrogeological considerations. An impact assessment of DGR main and vent shaft construction on the groundwater system is provided in a report that was enclosed with the response.
- IR LPSC-01-25 and its follow-up IR requested project schedule and completion of engineering details and construction tasks, which was provided by OPG.
- In response to IR LPSC-01-27, OPG provided information on water treatment system and plant such as location, the basis for the design, description of the point of release to the stormwater management system, and the expected operation.
- In response to IR LPSC-01-28, construction of the waste rock management area was described.
- In IR LPSC-01-29 response, information was provided on the estimated range of annual output of grey water and clarification on the range of waste rock produced per year.
- Construction of the plenums as part of shaft pre-sinking activities was explained in the response to IR LPSC-01-30.
- Response to IR LPSC-01-38 provided information on commissioning of temporary installations during the site preparation and construction phase, and permanent installations, such as hoists, to be used in a construction configuration during this phase.
- In response to IR EIS-03-52, OPG discussed the two alternate excavation methods, i.e. drill and blast vs. roadheader, for lateral development.

- Response to IR EIS-04-101 discussed estimates of maximum excavation water discharge and sump water pumping.
- Design and operation of the stormwater management system was described in responses to various IRs (IR EIS-04-130; EIS-08-391; EIS-10-483).
- Estimation of mine water flows was provided in response to IR EIS-04-151.
- Choice of appropriate rock support and other repository features for safety of underground workers were described in response to IR EIS-05-187.
- OPG discussed storage of unsuitable soil materials within the planned construction layout in response to IR EIS-05-200.
- IR EIS-05-201 requested information on types of drilling equipment that may be required for surface site preparation scenarios (grouting, freezing or both) involving surface construction and early shaft sinking operations that may be needed to control potential groundwater inflows. OPG provided this information in its response and also described the potential effects to air quality from the use of such equipment.
- Geophysical testing in the vertical shaft was addressed by OPG in responses to IRs EIS-06-266 and EIS-06-267.

2.3.2 Future Plans

Site preparation and construction can only begin in the future, after the construction licence has been granted to OPG. OPG commits to complying with the licence and the licence conditions handbook when it is issued, so the activities to be licensed can be conducted in a manner that ensures protection of the environment and health and safety of the public and the workers.

2.4 Safety Analysis

2.4.1 Relevance and Management

The SCA of Safety Analysis is relevant to the activities to be licensed, as the design of the DGR is based on many analyses to confirm safety of the activities to be licensed. This SCA is also very relevant to assessing the overall safety of the DGR project, as extensive safety analyses were carried out to demonstrate the operational safety of the facility after it becomes in-service following completion of construction (preclosure safety), and also to assess the long-term safety of the DGR subsequent to its decommissioning and closure (postclosure safety). These analyses and their results are described in the PSR. Arguments are drawn from the results of these analyses and used in building the overall safety case for DGR construction, operation, decommissioning and long-term performance, presented in Chapter 14 of the PSR.

Consistent with G-320 "Assessing the Long Term Safety of Radioactive Waste Management" (CNSC 2006), the postclosure safety assessment has confirmed the DGR's ability to perform in a manner that will protect human health and the environment in the long term. The assessment considered potential impacts through consideration of a range of possible future scenarios. For the normal process of evolution of the repository over the long term, the detailed analyses concluded that the DGR system provides effective containment of the emplaced radionuclides. Most radionuclides decay within the repository or the deep geosphere. The amount of contaminants reaching the surface is very small, such that the maximum calculated effective doses for the Reference Case is orders of magnitude below the dose criteria for humans and biota, including people who may live on the site in the distant future. The maximum

concentrations of non-radioactive contaminants are also significantly below environmental protection criteria.

The analysis of the disruptive scenarios shows that the isolation afforded by the location and design of the DGR limits the likelihood of disruptive events potentially able to bypass the natural barriers to a small number of situations with very low probability. Even if these events were to occur, the vast majority of the contaminants in the waste would continue to be contained effectively by the DGR system. The risk criterion is met in all disruptive scenarios, even with conservative assessment modelling assumptions.

Long-term safety considerations constitute an essential input to the design and construction methods for the DGR. The integrity of the geosphere as a long-term barrier is ensured by minimizing the excavation damaged zone (EDZ) during construction, robustness of the shafts and their sealing systems and proper construction of the underground tunnels and emplacements rooms in a manner that takes geomechanical considerations and appropriate rock support design into account.

Substantial additional information was submitted in OPG's responses to JRP's Information Requests during the public review period, including the following:

- In response to IR EIS-01-03, additional information on initiating event frequencies was provided for accidents and malfunctions;
- In OPG's response to IR EIS-01-05, additional information on the measurement of radionuclides is provided. OPG's response to IR EIS-06-264 provides additional information on the scaling factor approach for waste stream radionuclide content. OPG's response to IR EIS-08-345 presents additional information on the principal waste categories for each radionuclide. OPG's response to IR EIS-08-384 indicates, for radionuclides that are directly measured, the number of times these nuclides were measured in each waste type, and provides upper confidence limits. OPG's response to IR EIS-01-06 and EIS-01-06a discusses the uncertainty associated with radionuclide inventory. The response to IR EIS-01-07 illustrates how to verify calculations of the quantity of radionuclides in the waste inventory;
- OPG's response to IR EIS-01-16 provided additional information on shoreline evolution processes (shoreline erosion, global warming, glacial rebound and glacial cycles) and their influence on DGR safety assessment;
- The impact of future glaciation cycles on the groundwater regime with the presence of the repository, shafts, seals and associated zones disturbed through excavation were discussed in response to IR EIS-01-17;
- In response to IRs EIS-01-19, EIS-01-21 and EIS-01-23, OPG answered many questions on gas generation and migration in the repository;
- Degree of conservatism in postclosure safety assessment was addressed in response to IR EIS-01-20;
- Information on degradation rate of ion-exchange resins was provided in response to IR EIS-01-22;
- Applicability of the Derived Release Limits (DRLs) for the WWMF to the DGR site on preliminary basis, and plans for the development of final DRLs for DGR operation were discussed in response to IR LPSC-01-40;
- OPG's responses to IR EIS-02-36 summarized the basis for confidence that there are no vertical faults close to the repository, and the basis for the modeled vertical fault

positions in the PSR. Further parametric analyses of other vertical fault scenarios, including different locations, are provided in OPG's response to IRs EIS-02-36a and EIS-08-385;

- In response to IR LPSC-02-55, OPG identified postclosure safety functions and geological barriers impacted by design changes and construction, and plans for communication with contractors;
- Durability of shaft seals was discussed in response to IRs EIS-03-64 and EIS-10-492;
- In response to IR LPSC-03-62, OPG provided an assessment of potential solute contaminant transport scenarios through the shaft EDZ and explained planned measures during the construction phase to reduce the extent and severity of the EDZ);
- Change in radiological hazard from the DGR over time was discussed in response to IR EIS-04-105;
- Model calibration, verification and validation, and confidence in postclosure safety assessment numeric models were discussed in response to IR EIS-04-109. Additional information on the robustness of and confidence in safety assessment modelling was provided in Technical Information Session #2;
- Amount of diffusion of radon from the L&ILW was discussed in response to IR EIS-04-111;
- In response to IR EIS-04-114, OPG provided evaluation of uncertainties in the sorption/desorption of contaminants on seal materials and host rocks, and in the precipitation/dissolution of contaminants, impact of these uncertainties on model predictions; and discussion of the interactions of contaminants with organic compounds in the rocks of the cap rock seal;
- Current and future chemical mobility of radionuclides was discussed in response to IR EIS-08-349;
- OPG explained in response to IR EIS-04-115 why carbon-14 was modelled differently than other radionuclides;
- Response to IR EIS-04-116 explained where and how natural analogues were used in the safety case;
- How OPG's management system will document iterative changes to the safety case was discussed in response to IR EIS-04-118;
- OPG's response to IR EIS-04-119 provided evidence and associated uncertainties that form the basis of predictions that the proposed DGR may take many hundreds of thousands, or even millions, of years to resaturate. Different saturation scenarios were evaluated with respect to the long-term performance of the proposed DGR;
- In response to IR EIS-04-123, OPG discussed shielding of waste and reiterated that in postclosure safety assessment, waste containers, including shields, are conservatively not credited for providing a barrier function;
- Various questions on faults and fractures were answered in response to IR EIS-05-164;
- The basis for a million year temporal boundary for postclosure safety assessment was explained by OPG in response to IR EIS-05-183;
- Doses to humans during normal operations were further discussed by OPG in responses to IRs EIS-06-242; EIS-06-243 and EIS-06-245; potential doses due to malfunctions and

accidents were further discussed in EIS-06-248; and potential doses due to very unlikely events during operations were discussed in IR EIS-06-270;

- The potential dose consequences and mitigating measures to minimize risk from human intrusion and shaft failure after closure were summarized in OPG's response to IR EIS-06-246 and EIS-06-247;
- OPG provided additional information on groundwater modelling in responses to the following IRs: EIS-08-397; EIS-09-446; EIS-09-447; and EIS-09-448. Groundwater modelling was also addressed in Technical Information Session #2;
- OPG provided further information on assessment of a human intrusion scenario at the time of decommissioning in response to IR EIS-09-461;
- OPG addressed long-term stability of geological formation and DGR robustness against earthquakes in response to IR EIS-08-398; and
- OPG discussed proton mass balance, limitation of methanogenesis and behaviour of supercritical fluids in response to IR EIS-09-404.

2.4.2 Future Plans

The safety analyses that support the overall safety case for the facility will be maintained during the site preparation and construction phase and over the operational life of the facility. Design change control requires an assessment of the change to confirm that the change does not have any impact on the safety case. The safety case will be updated in support of a future application for an operating licence, before any wastes are emplaced, and subsequently in support of future applications for licence renewals/amendments over many decades.

2.5 Physical Design

2.5.1 Relevance and Management

The SCA of Physical Design is relevant to the DGR Project as construction of the DGR will be based on detailed design. Chapters 6 and 17 of the PSR, the updated information provided to the JRP in OPG (2012a) and the responses to several Information Requests in the area of physical design, provide the design basis and the envisaged design of the DGR. Detailed design will be completed prior to start of construction and all changes to the approved final design will subsequently go through a rigorous change control process to ensure that all design changes remain within the licensing basis. Based on the definition of the licensing basis in CNSC Information Document INFO-0795,"Licensing Basis Objective and Definition" (CNSC INFO-0795), the licensing basis for the DGR is defined as the regulatory requirements in the applicable laws and regulations, the licence conditions and the safety and control measures described in the licence and the documents referenced in the licence, and the information submitted by OPG to the JRP in support of its licence application.

Considerable additional information was provided on many aspects of design in OPG's responses to Information Requests including the following:

- OPG provided information on applicable codes and standards in the areas of surface structures, fire protection, pressure-retaining systems and seismic design in IRs LPSC-01-01 to LPSC-01-05.

- Design of excavations in the till and overburden in relation to geotechnical and hydrogeological considerations was provided in response to IR EIS-01-01.
- A description of the foundations for the surface structures, including information addressing their suitability for the general ground conditions was provided in response to IR LPSC-01-06 and its follow-up IR LPSC-01-06a.
- Details about the electrical systems were provided in response to IR LPSC-01-10. Information was also provided, on the kinds of analyses used to assess voltage and current at bus bars and to avoid common mode power failure; the use of batteries in the emergency generator, and in emergency lighting and communication; and the hazards that will be considered for the locations of distribution and control panels.
- In OPG's response to IR LPSC-01-11, information was provided on the Human Factors design standard, criteria, and/or guidelines that have been and will be used in the detailed design and identified the areas, both above and below ground, where Human Factors are being applied to the design. Information was also provided on the activities in the main control room and design features in other safety-significant areas.
- OPG provided additional information in response to IR LPSC-01-14 on the ventilation system and its operation in the area of the underground facility. This information addressed things such as: size of ventilation tunnels, exhaust filtration requirements; plenum description; control of contaminated condensation from ventilation; ventilation logic for normal operation; and location of underground fans.
- In response to IR LPSC-01-17, OPG provided clarification on how the design of the shaft liners is expected to vary to address changeable rock conditions along the shaft length, and the method expected for the liner construction.
- The JRP requested additional information on the dimensions and configuration of the underground facilities in the service area, the ramp to shaft bottom, ventilation tunnel, and loading pocket, which was provided in response to the IR LPSC-01-18. Information on the expected ground support needs in these area was also provided. Information on rock support design was requested in IRs LPSC-01-34 and EIS-05-187. For underground development additional information was provided in the response on the excavation cycle, the use of partial-face excavation, and the ground support methods and their expected locations for installation in IR LPSC-01-34. In response to the second IR, further details concerning the choice of "appropriate rock support" and other repository features were provided, such as cross-sectional shape/geometry and room orientation within the geosphere, that will be used to ensure the safety of underground repository workers and/or provide structural reinforcement for facility elements.
- In response to IR LPSC-01-19 OPG provided clarification of the dewatering system, including sump/pump locations, pump sizes, and effluent release description and location, with a simplified flow diagram.
- OPG also provided information on other miscellaneous design-related subjects as follows: air quality monitoring system design (IR LPSC-01-24); completion of design details (IR LPSC-01-25); design of the stormwater management system (IR EIS-04-130); design of closure walls (IRs EIS-04-150; EIS-05-207); EDZ testing and measurement in the shafts (IR EIS-06-267); maximum expansion capacity of the DGR (IR EIS-08-341); redundancies in DGR design (IRs EIS-06-275; EIS-09-466); design and integrity of waste packages (IRs EIS-04-122; EIS-04-152 EIS-09-474); and management of design changes during construction (IR LPSC-04-65).

There are robust provisions in place through OPG and NWMO change control governance for design that will ensure that design basis for systems, components and structures is maintained as new information arises and design evolves, and that changes in the external environment are taken into account.

2.5.2 Future Plans

Detailed design for the DGR structures and components will be completed and submitted to the CNSC, as required by the licence and the licence conditions handbook, prior to start of construction.

2.6 Fitness for Service

2.6.1 Relevance and Management

This SCA is relevant to activities that ensure that the physical condition of systems, components and structures remains effective over time, and programs are in place to ensure that all equipment is available to perform its intended design function when called upon to do so during site preparation and construction.

Additional information was submitted in OPG's responses to JRP's Information Requests during the public review period, including the following:

- Commissioning of temporary equipment (IR LPSC-01-38); and
- Closed-circuit monitoring of instrumentation and control systems (IR EIS-05-217).

2.6.2 Future Plans

Over the construction period, OPG will achieve the objective for fitness for service through oversight of NWMO activities to ensure that the NWMO has the appropriate tools available to ascertain fitness for service of systems, components and structures during site preparation and construction.

2.7 Radiation Protection

2.7.1 Relevance and Management

This SCA covers the implementation of a radiation protection program in accordance with the Radiation Protection Regulations associated with the Nuclear Safety and Control Act. Since handling of radioactive waste or other radioactive substances will not occur under the site preparation and construction licence, this SCA is not relevant to the licence to prepare site and to construct.

Any gauges containing radioactive materials used by construction contractors, will have appropriate licences obtained by the contractor. Exposure to radon during construction is more an occupational health and safety issue than a radiation protection issue, so is covered under the SCA of conventional health and safety.

2.7.2 Future Plans

This SCA will be considered and appropriate information on radiation protection will be submitted in support of OPG's application to obtain a licence to operate the DGR.

2.8 Conventional Health and Safety

2.8.1 Relevance and Management

This SCA is relevant to the activities to be licensed, as there will be extensive physical work and a significant workforce involved in site preparation and construction of the DGR.

An assessment of conventional safety for the activities to be licensed was prepared and submitted to the JRP in OPG (2011a). OPG, in the capacity of the "Owner" as defined in the Ontario's Occupational Health and Safety Act (OHSA) and regulations made thereunder, will control and manage this SCA through the established programs and processes for oversight of NWMO, the "Constructor" for the DGR Project. The role of the "Constructor" is also defined in the OHSA. NWMO will control and manage this SCA through its processes for oversight of its contractors. OPG is accountable for safe conduct of the licensed activities and will ensure that these processes adequately cover all aspects of management of workplace safety hazards and protection of personnel and equipment, consistent with its obligations as "Owner" under OHSA and accountability required as the licensee under the Nuclear Safety and Control Act.

Although radon assessment for the rock environment in the DGR has concluded that radon hazard will be insignificant for worker health and safety, underground monitoring for radon during construction will be conducted to confirm that conclusion.

Additional to the conventional safety assessment report submitted in support of the licence application, information relevant to this SCA was submitted in OPG's responses to JRP's Information Requests during the public review period, including the following:

- OPG provided ventilation system details from conventional safety perspective in response to IR LPSC-01-14.
- In response to IR LPSC-01-37, OPG provided additional information clarifying the conventional safety requirements for the site preparation and construction phase. This included controls and measures for conventional safety required by the applicable regulations under Ontario's Occupational Health and Safety Act not identified in the Conventional Health Assessment, and how the controls and mitigations are to be provided.
- In EIS-05-217 the JRP asked OPG to indicate whether the use of closed-circuit television monitoring by DGR surface facility operators will be considered as a procedure for monitoring the safety of underground workers and operational conditions of the repository during all phases of underground operations. In its response OPG provided clarification that use of closed-circuit television monitoring is a common practice in mining and the DGR communications, and instrumentation and control systems, have accounted for this media.
- In response to IR LPSC-04-66, OPG provided a detailed standalone safety case for public and worker health and safety during the site preparation and construction phase. This response provided a comprehensive overview of how OPG and NWMO's

management systems will provide a robust system to manage safe conduct of activities to be licensed, ensuring that there is no unreasonable risk to the health and safety of the public and the workers at any time.

2.8.2 Future Plans

A Health and Safety Plan for the Project, reviewed by OPG, will be in place prior to starting work on site preparation for and construction of the DGR.

Similar to other SCAs, OPG will conduct periodic audits and assessments of NWMO to confirm that this SCA is being well-managed. NWMO governance includes tools such as self-assessment to self-identify opportunities for improvement and to foster a good safety culture.

2.9 Environmental Protection

2.9.1 Relevance and Management

The SCA of Environmental Protection is relevant to the DGR project as it is key to ensuring there that there is no unreasonable risk to the environment as a result of the Project. This SCA is addressed in a comprehensive manner through the EIS submission made to the JRP in OPG (2011b) and in many responses to Information Requests in this area provided during the public review process. Due to the significance of this SCA, it is addressed in detail in a separate submission to the JRP for the environmental assessment (OPG 2013).

Additional information submitted on environmental protection through responses to numerous Information Requests is identified in OPG (2013).

2.9.2 Future Plans

Future plans for EA follow-up monitoring and measures for environmental protection are addressed in OPG (2013). An Environmental Management Plan for the Project, reviewed by OPG, will be in place prior to starting work on site preparation for and construction of the DGR.

2.10 Emergency Management and Fire Protection

2.10.1 Relevance and Management

This SCA is relevant to the activities to be licensed, as there is a potential for fire and other accidents during construction of the DGR requiring an emergency response. The submissions in OPG (2011a and 2011b) have addressed these topics. OPG and NWMO have programs and processes in place to ensure that there will be adequate contingency plans for potential accidents, and emergency response ready and available in the event there is an accident or emergency situation, including a fire or an underground event, requiring mine rescue. A Bruce Power emergency response team is currently available to respond to emergencies within the Bruce nuclear site.

Additional information was submitted in OPG's responses to JRP's Information Requests during the public review period, including the following:

- In response to IR LPSC-01-02, OPG provided information on application of the National Fire Code of Canada (NFCC) to the fire protection systems of all surface facilities, including those described as mine specific; and the application of the current edition (2010) of the NFCC to below ground areas. OPG also confirmed that it is the 2010 edition of the code that applies to the DGR.
- In response to IR LPSC-01-15 OPG provided the ventilation logic for fire events and its relation to the egress strategy and the fire suppression strategy; the use of fire doors and temporary walls, their construction, and their function in the underground fire suppression scheme; and the ventilation logic in the event of an incident involving the release from a non-fire event of significant quantities of volatile radionuclides or volatile hazardous substances.
- In response to IRs LPSC-01-16 and LPSC-01-22, OPG provided clarification of the fire suppression methods that will be used (fixed and portable), along with requirements for the systems.
- OPG responded to many other questions related to fire protection in the IR response, e.g., on dry standpipe (IR LPSC-01-21); fire water supply to the DGR site (LPSC-01-20); fire protection program and fire hazard assessment (IRs LPSC-01-36; LPSC-01-43); emergency response and preparedness for the construction phase (IR LPSC-01-45); various details of emergency response measures for accidents and malfunctions (IR EIS-06-269); assessment of certain plume parameters associated with underground fire (EIS-07-281); various aspects of fire protection plan and emergency response plan (EIS-08-354); telephones in portable refuge stations (LPSC-03-59); and emergency egress through the ventilation shaft (IR LPSC-03-60).

2.10.2 Future Plans

Prior to start of the activities to be licensed for the DGR, an agreement with Bruce Power will be signed by OPG to confirm that response by trained and qualified personnel to potential emergencies will be available during DGR site preparation and construction. Supplementary arrangements will be made for areas of emergency response outside this team's areas of expertise, such as underground fire and events requiring mine rescue.

The state of preparedness for emergencies will be assessed periodically through emergency drills and self-assessments.

2.11 Waste Management

2.11.1 Relevance and Management

This SCA is relevant to the DGR project as there will be waste generated as a result of the activities to be licensed for the DGR Project. The PSR (OPG 2011a) and the EIS (OPG 2011b) provide estimates of waste generated due to site preparation and construction activities including the details for how waste rock to be excavated during construction of the DGR will be managed in the waste rock management area.

If the DGR is decommissioned at any stage during the construction, prior to becoming operational, it will be decommissioned in accordance with Appendix B of the Preliminary Decommissioning Plan (PDP) for the DGR. The PDP, submitted in support of OPG's licence application, addresses how waste generated from decommissioning will be handled. OPG has also addressed waste generated from decommissioning after construction in response to IR LPSC-01-46 and has provided estimates of the quantities of different types of waste generated in this scenario.

2.11.2 Future Plans

Existing plans to manage the excavated waste rock and other waste generated during site preparation and construction, as described in the PSR, will be implemented after these activities commence.

2.12 Security

2.12.1 Relevance and Management

Since no Category I, II or III nuclear materials (typically different forms of nuclear fuel) will be stored at the facility, the DGR is not classified as a "protected" facility and Nuclear Security Regulations do not apply.

Bruce Power controls access to the Bruce nuclear site and security clearance for on-site workers. A confidential submission on the security provisions for the DGR, in support of the licence application, was made to the JRP in OPG (2011c). Also, a response was provided to IR EIS-09-403 on specific questions about security during the site preparation and construction phase, with a confidential letter associated with the IR submitted to the JRP separately. Transportation, storage and use of explosives will be in accordance with applicable regulations and permits.

2.12.2 Future Plans

Access to the Bruce nuclear site will continue to be controlled by Bruce Power. Additional access control to the DGR project site will be provided similar to the arrangement in place for the L&ILW storage area of the Western Waste Management Facility.

2.13 Safeguards

2.13.1 Relevance and Management

This SCA is not relevant as there is no Category I, II or III nuclear material involved in the conduct of activities to be licensed for the DGR project.

2.13.2 Future Plans

Not applicable.

2.14 Packaging and Transport

2.14.1 Relevance and Management

This SCA is not relevant as packaging of nuclear substances for transportation on public roads or public transport of nuclear substances is not involved in the activities to be licensed.

2.14.2 Future Plans

Not applicable.

3.0 OTHER MATTERS OF REGULATORY INTEREST

3.1 Environmental Assessment

OPG (2013) provides details for the environmental assessment conducted under the requirements of the Canadian Environmental Assessment Act and is documented in the Environmental Impact Statement and the Technical Supporting Documents submitted to the JRP in OPG (2011b). OPG's submission for the environmental assessment (OPG 2013) summarizes the additional information provided to the JRP subsequent to these submissions.

3.2 Cost Recovery

OPG is compliant with the cost recovery regulations and has been paying all invoices in a timely manner. There are no outstanding amounts to be paid by OPG.

3.3 Financial Guarantees

The financial guarantee was addressed in OPG (2011a) in an attachment to the cover letter. It specified that a financial guarantee will be provided to the CNSC in the form of a letter of credit in the amount of the estimated cost for decommissioning in case of the project not proceeding beyond construction, on a sliding scale, consistent with the construction stage at which decommissioning is conducted.

3.4 Other Regulatory Approvals

OPG will be obtaining various provincial permits and approvals, as required, for the conduct of the activities to be licensed.

3.5 Licensee's Public Information Program

OPG's public information program for the DGR project is described in Chapter 12 of the PSR and records of past public involvement are provided in Appendix D of the EIS. The public information program for the DGR project is compliant with CNSC's Regulatory Document RD/GD-99.3 "Public Information and Disclosure". Further information on this program for the

site preparation and construction phase of the project was provided in response to the IR EIS-09-458.

OPG's Public Information Program is ongoing and will continue into the future, accommodating evolving issues and adjusting to the needs of the stakeholders in the future.

3.6 Additional/Other Matter

Based on the information submitted in OPG (2011a) and OPG (2011b) and the subsequent submissions to the JRP, OPG requests a licence to prepare the site for, and to construct the L&ILW DGR with a duration of 10 years.

4.0 CONCLUSIONS

Based on the large body of information submitted by OPG to the JRP on the DGR project that included the supporting documents for OPG's licence application and responses to a large number of IRs, and based on this written submission, OPG has fulfilled all regulatory requirements, expectations and needs for information for a site preparation and construction licence. A robust safety case exists for the DGR, as substantiated in the PSR and through the Information Request responses. All regulatory obligations, including the commitment to provide a financial guarantee for decommissioning, and providing evidence of ownership of land for DGR construction have been fulfilled.

OPG commits to complying with all regulatory requirements, and fulfill all requirements in the licence for site preparation and construction and the associated licence conditions handbook, after the licence is granted.

In conclusion, OPG submits that it is qualified to prepare the site for and to construct the DGR safely, with no unreasonable risks to the environment or to the health and safety of persons, and respectfully requests that a site preparation and construction licence be granted for a duration of 10 years.

REFERENCES

CNSC 2006 — CNSC Regulatory Guide G-320: Assessing the Long Term Safety of Radioactive Waste Management, December 2006.

OPG 2005 — OPG letter from K.E. Nash, to Barclay Howden, "Intent to Construct a Geologic Repository for Low and Intermediate Level Waste" with enclosure "Deep Geologic Repository for Low and Intermediate Level Radioactive Waste – Project Description" 00216-REP-07722.07-00001; dated December 2, 2005, CD# 00216-CORR-00531-00001. (CEAA Registry Doc. #191).

OPG 2007 — OPG letter from K.E. Nash to Barclay Howden, "Deep Geologic Repository for Low and Intermediate Level Waste (DGR) – Application for the Site Preparation and Construction Licence", August 13, 2007, CD# 00216-CORR-00531-00033. (CEAA Registry Doc. #283).

OPG 2011a — OPG letter from Albert Sweetnam to JRP Chair, "Submission of Information in Support of OPG's Licence Application for a Deep Geologic Repository for Low and Intermediate Level Waste", April 14, 2011, CD# 00216-CORR-00531-00090. (CEAA Registry Doc. #300).

OPG 2011b — OPG letter from Albert Sweetnam to JRP Chair, "Submission of an Environmental Impact Statement for a Deep Geologic Repository for Low and Intermediate Level Waste", April 14, 2011, CD# 00216-CORR-00531-00091. (CEAA Registry Doc. #298).pp

OPG 2011c — OPG letter from Albert Sweetnam to JRP Chair, "Submission of Information in Support of OPG's Licence Application for a Deep Geologic Repository for Low and Intermediate Level Waste – Security Provisions", April 14, 2011, CD# 00216-CORR-00531-00089. (Confidential)

OPG 2012a — OPG letter from Albert Sweetnam to Stella Swanson, "Updated Information in Support of OPG's Licence Application for a Deep Geologic Repository for Low and Intermediate Level Waste", February 10, 2012, CD# 00216-CORR-00531-00101. (CEAA Registry Doc. #336)

OPG 2012b — OPG letter from Albert Sweetnam to Stella Swanson, "Corrections to the Information Submitted in Support of OPG's Licence Application for a Deep Geologic Repository for Low and Intermediate Level Waste", February 10, 2012, CD# 00216-CORR-00531-00100. (CEAA Registry Doc. #335).

OPG 2013 — OPG letter from Laurie Swami to Stella Swanson, "Deep Geologic Repository Project for Low and Intermediate Level Waste – Written Submission (PMD) in Support of the Public Hearing for an Environmental Assessment", CD# 00216-CORR-00531-00199, July 23, 2013.

GLOSSARY

ALARA	As Low as Reasonably Achievable
CEAA	Canadian Environmental Assessment Agency
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DGR	Deep Geologic Repository
DRL	Derived Release Limit
EA	Environmental Assessment
EDZ	Excavation Damaged Zone
EIS	Environmental Impact Statement
IR	Information Request
JRP	Joint Review Panel
L&ILW	Low and Intermediate Level Waste
NFCC	National Fire Code of Canada
NWMO	Nuclear Waste Management Organization
OHSA	Occupational Health and Safety Act
OPG	Ontario Power Generation
PDP	Preliminary Decommissioning Plan
PSR	Preliminary Safety Report
SCA	Safety and Control Area
WWMF	Western Waste Management Facility