

1.0 INTRODUCTION

Pickering A and Pickering B Nuclear Generating Stations (PNGS A and PNGS B) are located on the Pickering Nuclear (PN) site in the City of Pickering, Ontario. They are owned and operated by Ontario Power Generation (OPG).

The PNGS B is a CANDU pressurized heavy water nuclear generating station, constructed adjacent to the PNGS A and making use of design and construction experience obtained on PNGS A. The four units that make up PNGS B are numbered 5 through 8, from west to east. Similar to PNGS A, the four reactors have a combined power output of 2064 MW(e). Construction of PNGS B commenced in 1974. The first unit (Unit 5) came into service in 1983 and the last unit (Unit 8) in 1986. PNGS B has operated continuously since 1983.

Pressure tube refurbishment of CANDU nuclear generating stations is an element of the plant design assumed to be required at some point in the life of the plant, generally after 25 to 30 years of operation. Refurbishment would allow PNGS B to continue to operate for another 25 to 30 years (to approximately 2060 for the last of the four units).

1.1 PROPOSED PROJECT AND PROPONENT

1.1.1 Introduction and Background

The proposed project is titled the “Refurbishment and Continued Operation of Pickering B Nuclear Generating Station” hereafter called the “PNGS B Project” or “Project”.

Should OPG decide to extend the life of PNGS B, a number of major components in each of the PNGS B units may need to be refurbished or replaced during planned outages in order to extend the life of the units. During these outages, after the reactors have been defuelled and dewatered, the fuel channel assemblies, calandria tubes, feeder pipes, and steam generators would be removed and replaced in each unit.

Used nuclear fuel will continue to be stored in the station’s Irradiated Fuel Bay (IFB) for a minimum of ten years before being transferred to dry storage at the Pickering Waste Management Facility (PWMF) located on the PN site. Refurbishment waste, including the large steam generators, may be stored at expanded facilities at the PWMF or it may be transported by road to the Western Waste Management Facility (WWMF) on the Bruce site near Kincardine, Ontario.

For Environmental Assessment (EA) purposes, refurbishment activities are assumed to begin as early as 2010, and refurbishment of the units would likely be completed between 2024 and 2026. Scheduling assumptions are provided in Section 2.6. Refurbishment and replacement of the life-limiting components of the PNGS B units will extend the expected service life of the units.

Following each planned outage, the refurbished unit will be refuelled and returned to full power operation. Ongoing operation after refurbishment will include routine scheduled maintenance activities and inspections as defined by the life cycle management plans and Integrated Safety Review. For EA purposes, operation of all four refurbished reactors is anticipated to continue to the new end of life which has been conservatively estimated to be 2055 for the last of the four units, but for bounding purposes is stated in this EA Study Report to be 2060.

In summary, the EA study for the Project includes the following activities:

- Site preparation in support of refurbishment;
- Refurbishment of all four reactors;
- Continued operation of all four reactors for an additional 30 years;
- Construction of structures for the interim storage of refurbishment waste at the PN site;
- Processing and interim storage of refurbishment waste at the PN site or transport off-site to the WWMF for centralized storage;
- Construction of additional storage capacity for the used nuclear fuel produced from the continued operation of PNGS B; and
- Interim storage of additional used nuclear fuel at the PN site.

As the owner and operator of both PNGS B and PWWF, OPG is the proponent for the Project.

1.1.2 Need for and Purpose of the Proposed Project

PNGS B has produced base-load electrical power for distribution through the provincial grid since 1983. The continued operation of PNGS B will be an important contribution to stable electricity supply for industrial, commercial and residential consumers in Ontario. The continued operation of PNGS B requires that the reactors be refurbished so that they may continue to operate safely and efficiently.

1.1.3 Location of the Project

PNGS B is located on the PN site in the City of Pickering, within the Regional Municipality of Durham, Ontario, on the north shore of Lake Ontario at Moore Point. The site is about 32 km (19 miles) east-northeast of the City of Toronto (downtown) and 21 km (12.5 miles) southwest of the City of Oshawa. The PN site has three separately licensed facilities: the PNGS A, PNGS B and the PWMF which provides interim storage for used nuclear fuel from both PNGS A and PNGS B.

The site location and vicinity are shown in Figure 1.1-1. The location of PNGS B within the PN site is provided in Figure 1.1-2

1.2 REGULATORY REQUIREMENTS

1.2.1 Canadian Environmental Assessment Act

The Canadian Nuclear Safety Commission (CNSC) is the federal authority responsible for the regulation of nuclear facilities in Canada. Regulatory control of the PNGS B Project is exercised by the CNSC by means of both the PNGS B and the PWMF operating licences (PROL 08.11/2008 and WFOL-W4-350.02/2008, respectively). Activities associated with the PNGS B Project constitute some changes in these existing licences at the PN site for which the CNSC may require amendments of the licences. Therefore, approval by the CNSC, under the *Nuclear Safety and Control Act (NSCA)*, is necessary before OPG may proceed with the Project. Such approvals are covered under S. 5(1) of the *Canadian Environmental Assessment Act (CEAA)* and constitute one of the two requisite triggers for an EA. Further, the Project will involve several activities, including refuelling from the defuelled state and returning the units to full power following a major refurbishment outage, that relate to a physical work. As such, they would be considered a project under *CEAA*, the second requisite trigger for an EA. According to *CEAA* (s. 11), as early as practicable in the planning stages of the Project and before irrevocable decisions are made, the necessary EA must be completed satisfactorily before the CNSC can make any decision with respect to a licence amendment. The CNSC cannot grant requisite licence amendments until it is satisfied that the Project will not likely cause significant adverse environmental effects taking into account the implementation of mitigation measures.

More substantially, the project activities triggering an amendment to the PWMF licence include storage of additional waste at the PWMF. Refurbishment wastes (steam generators and waste related to feeders, fuel channel assemblies, and calandria tubes) may be reduced in volume and stored at the PWMF. Construction of additional storage structures for the interim storage of refurbishment wastes at the PWMF would require an amendment to that facility's operating licence.

Continued operation of PNGS B will result in additional used nuclear fuel that would be stored in the PWWMF, similar to current practice. However, additional storage capacity at the PWWMF to accommodate the additional used nuclear fuel would also require an amendment to that facility's operating licence.

The management of low and intermediate level waste (LLW&ILW) arising from all activities associated with the continued operation of PNGS B after refurbishment, including wastes from routine operation and maintenance, consistent with current practice, will continue to be transported to OPG's WWMF on the Bruce site. No change to the WWMF licence (WFOL-W4-314.00/2017) will be required for the storage of reactor operational LLW&ILW, and as a result there is no trigger for an EA for this component of the Project. Transport of the waste to the WWMF is currently regulated under the CNSC's *Packaging and Transport of Nuclear Substances Regulations* (CNSC 2000).

The EAs triggered from amendments to both the PNGS B operating licence and the PWWMF operating licence will be combined into a single EA Study which is the subject of this report.

1.2.1.1 Screening Level Assessment

The proposed project is not described in the Comprehensive Study List or the Exclusion List Regulations under *CEAA*; therefore, a screening level EA is to be conducted. Pursuant to Subsection 18(1) of *CEAA*, the CNSC is required to ensure the conduct of the screening EA and the preparation of a Screening Report before the proposed licensing decision can be made pursuant to the *NSCA*. This EA Study Report will provide the basis for the Screening Report.

Before issuing any licence amendments under the *NSCA*, the CNSC must be satisfied that, based on the screening EA and taking into account mitigation measures, there will be no "significant adverse environmental effects" (*CEAA*, Section 5, Subsection 20(1)). In accordance with this requirement, the EA Study has been undertaken to identify and evaluate likely environmental effects of the proposed project, determine appropriate mitigation and monitoring measures, assess the significance of any residual adverse effects, and assess cumulative environmental effects.

1.2.1.2 Federal Roles and Responsibilities

The CNSC is the only Responsible Authority (RA) under the *CEAA* identified for this EA. As RA, the CNSC provides guidance on the EA and determines the scope of the assessment and the scope of the factors to be considered in it, as detailed in the EA Guidelines titled "*Environmental Assessment for the Refurbishment and Continued Operations of Pickering B Reactors at the*

Pickering B Nuclear Generating Station” issued by the CNSC in April 2007 (CNSC 2007). A copy of the EA Guidelines is included in Appendix A.

Pursuant to the *Federal Co-ordination Regulations* under the *CEAA*, Health Canada (HC), Environment Canada (EC), Natural Resources Canada (NRCan), the Department of Fisheries and Oceans (DFO), the Department of Indian and Northern Affairs Canada (INAC) and Transport Canada (TC) have been notified of the PNGS B Project and have been requested to make a determination of their role, either as an RA or an expert Federal Authority (FA). HC, EC, NRCan, DFO, and TC have indicated that they are not RAs pursuant to *CEAA*, but that they wish to participate in the EA process as FAs. INAC also indicated it was not an RA and recommends that the proponent keep the First Nations, and other mentioned organizations, informed of the progress of the Project.

1.2.1.3 Delegation of EA Report Preparation Responsibilities

As the RA under the *CEAA* (subsection 17(1)), the CNSC has delegated to OPG the conduct of technical support studies for the EA, part of the public consultation to be carried out for this Project, and the preparation of the EA Study Report (CNSC 2007). The EA Study Report will be reviewed by the CNSC and the identified FAs. Once accepted, the EA Study Report will be used by the CNSC as the basis for the preparation of the Screening Report for this project.

OPG’s Planning Process

As part of its planning process, OPG is proceeding with the EA study for PNGS B as early as practicable. As the decision to refurbish one or more of the PNGS B reactors has not been made, the EA studies will make an important contribution to OPG’s business decision on whether or not to refurbish the PNGS B reactors. The “Plant Life Extension Project – Pickering B” has several phases as follows:

- Phase 1: (to 2008): obtain necessary corporate, government and regulatory approvals (e.g. EA and Integrated Safety Review) such that PNGS B reactors can be refurbished in a timely and cost-effective manner;
- Phase 2: assuming a positive business decision regarding refurbishment, undertake detailed engineering studies;
- Phase 3: implement refurbishment plans and execute outages;
- Phase 4: begin operation of refurbished units.

Previous Environmental Assessments

As noted previously, PNGS B is an existing nuclear generating station located on the existing PN site. As such, there is an extensive amount of information available on PNGS B operation and the PN site. Recent EAs undertaken and approved by the RA on the facilities within the PN site include the *Pickering A Return to Service Environmental Assessment (PARTS-EA) (OPG 2000a)*, the *Pickering Waste Management Facility Phase I Environmental Assessment (OPG 2000b)*, and the *Pickering Waste Management Facility Phase II Environmental Assessment (OPG 2003a)*. These approved assessments provide an extensive information base that will be used in carrying out the necessary EA studies for the project. Also, the *Tier 3 Ecological Risk Assessment of Pickering Nuclear Phase IV (SENES 2002)* and the ongoing follow-up and monitoring program from the PARTS-EA add to the extensive environmental database that exists for the PN site.

1.2.1.4 Public Registry

The CNSC has established a public registry for the EA, as required by section 55 of the *CEAA*. This includes identification of the EA in the Canadian Environmental Assessment Registry (CEAR), which can be accessed on the website of the Canadian Environmental Assessment Agency (www.ceaa.gc.ca). The CEAR reference number for this project is 06-01-21226.

As part of the registry, the CNSC must also maintain a list of documents pertaining to the EA. Interested parties may obtain copies of specific documents on the list by contacting the CNSC's EA Contacts for this Project:

John Clarke Environmental Assessment Specialist Environmental Assessment Division Canadian Nuclear Safety Commission 280 Slater Street, P.O. Box 1046 Ottawa, Ontario K1P 5S9 Phone: 1-800-668-5284 Fax: 613-995-5086 E-mail: ceaainfo@cnsccsn.gc.ca	T.E. Schaubel Director Pickering Regulatory Program Division Canadian Nuclear Safety Commission 280 Slater Street, P.O. Box 1046 Ottawa, Ontario K1P 5S9 Phone: 1-800-668-5284 Fax: 613-995-5086 E-mail: ceaainfo@cnsccsn.gc.ca
--	---

1.2.2 Canadian Nuclear Safety Commission Licences

PNGS B is currently licensed by the CNSC as a Class I Nuclear Facility under the *NCSA*. Operation of PNGS B is governed by the Nuclear Power Reactor Operating Licence (PROL 08.11/2008) granted by the CNSC to OPG. The licence is valid from July 1, 2003 to June 30,

2008, unless suspended, amended, revoked or replaced. At that time, an application for licence renewal will proceed for consideration.

The PWMF is currently licensed by the CNSC as a Class I Nuclear Facility under the NSCA. Operation of the PWMF is governed by the Waste Facility Operating Licence (WFOL-W4-350.02/2008) granted by the CNSC to OPG. The licence is valid from April 1, 2003 through March 31, 2008 unless suspended, amended, revoked or replaced. At that time, an application for licence renewal will be prepared by OPG.

1.2.3 Provincial Approvals

The CNSC has consulted the Ontario Ministry of Environment (MOE) with a view to determining whether there are provincial EA requirements under the Ontario *Environmental Assessment Act* that are applicable to the proposed Project. CNSC staff has received confirmation from the MOE (Environmental Assessment and Approvals Branch) that there are no provincial EA requirements under the Ontario *Environmental Assessment Act* that are applicable to the PNGS B Project.

Compliance with provincial requirements regarding air and water discharges is regulated through Ontario's *Environmental Protection Act* and the *Ontario Water Resources Act*. The MOE regulates the discharge of non-radioactive substances through Certificates of Approval under these Acts and, in the case of liquid effluent releases, through regulations promulgated under the *Environmental Protection Act* in relation to the Municipal Industrial Strategy for Abatement (MISA). Use of Lake Ontario water is governed through a Permit to Take Water under the *Ontario Water Resources Act*.

OPG is registered with the MOE as a generator of hazardous wastes under Waste Generator Registration Number ON0018401. OPG prepares and files an Annual Generator Registration Report with the MOE as required by O.Reg. 347, *General Waste Management Regulation*. Any hazardous wastes generated by the PNGS B Project will be included in this annual report.

1.2.4 Municipal Approvals

OPG holds municipal approvals (e.g. sewage) with respect to operation of PNGS B. Municipal codes and standards are observed as they are applicable. The municipality levies taxes related to the operation of PNGS B.

The City of Pickering has a role as reviewer of the EA Study Report, and provides input to the assessment with respect to issues such as transportation, traffic and socio-economic conditions. Other local municipal organizations may also have roles in the EA study.

1.3 PROJECT SCHEDULE

Table 1.3-1 provides a proposed timeline for the EA study of the Project. OPG recognizes that the CNSC is responsible for determining the type, scope and schedule of the EA process for this Project.

**TABLE 1.3-1
PRELIMINARY SCHEDULE FOR REFURBISHMENT AND CONTINUED
OPERATION OF PICKERING B NUCLEAR GENERATING STATION PROJECT**

Milestones	Date
Letter of Intent and Project Description Submitted	June 2006
Draft EA Guidelines Issued by CNSC for Public Review	September 2006
CNSC Commission Hearing on EA Guidelines for CNSC	January 2007
Final EA Guidelines Issued by CNSC	April 2007
Draft EA Study Report Submitted by OPG to CNSC	June 2007
Final EA Study Report Submitted by OPG to CNSC	Fall 2007
Draft Screening Report Issued by CNSC for Public Review	Winter 2007
CNSC Commission Hearing on Screening Report	Spring 2008
CNSC Commission Decision on EA	Late Spring 2008

1.4 SCOPE OF THE PROJECT AND SCOPE OF THE ASSESSMENT

1.4.1 Environmental Assessment Guidelines

Under the *CEAA*, the scope of the project and the scope of the factors included in an assessment are to be determined by the RA that, in this case, is the CNSC. Therefore, this EA report has been prepared in accordance with the Scope of the Project and Scope of the Assessment provided in the EA Guidelines developed by the CNSC for this Project (Appendix A).

1.4.2 Scope of the Project

As outlined in the EA Guidelines, the CNSC has determined the scope of the PNGS B Project for EA purposes.

As described in the EA Guidelines (Section 7.0, p.4), the physical works for the Project are the PNGS B Units 5, 6, 7 and 8 and ancillary systems necessary for their operation through to about

2060. The proposed undertakings in relation to the physical works are the refurbishment and continued operation of these units until about 2060.

Decommissioning is not part of the scope of project; however, as requested by the CNSC, a description of the preliminary decommissioning plan is provided in this EA Study Report. When appropriate, decommissioning will be subject to the requirements under the *NSCA* (or equivalent legislation in force at that time), and a determination regarding the application of the *CEAA* (or equivalent legislation in force at that time) will be made at that time.

For EA purposes, the scope of project, as defined by the CNSC (Section 7.0, p.4 of the EA Guidelines), will consider refurbishment activities, including:

- *“site and facility preparation in support of refurbishment, including site preparation, temporary facilities and staging areas;*
- *refurbishment activities at each of the four Pickering B units comprising of the following activities:*
 - *defuelling and dewatering of the reactor;*
 - *management of heavy water during refurbishment;*
 - *replacement of reactor components (fuel channel assemblies and feeder pipes);*
 - *replacement of steam generators;*
 - *replacement or upgrade of systems and components for balance of plant;*
 - *preparation of low and intermediate-level refurbishment waste for storage;*
 - *transportation of low and intermediate-level refurbishment waste on the Pickering site; and*
 - *management of non-nuclear waste;*
- *construction of structures for the interim storage of low and intermediate-level steam generator and fuel assembly refurbishment waste at the Pickering site;*
- *interim storage of low and intermediate-level steam generator and fuel assembly refurbishment waste at the PWMF or transport off-site to the Western Waste Management Facility (WWMF) for centralized storage;*
- *transport off-site to the WWMF for centralized storage of low and intermediate-level miscellaneous refurbishment waste;*
- *refuelling and restarting the reactors;*
- *normal repair and maintenance of components while each reactor undergoes a major refurbishment outage; and*
- *transport of materials, labour force and replacement components to the site.”*

As outlined in the EA Guidelines (Section 7.0, p.5), the scope of project will consider the following activities related to the continued operation of the refurbished reactors until about 2060, including:

- *“continued operation, maintenance and generation of power by refurbished reactor units;*
- *continued management of operating low and intermediate-level radioactive waste;*
- *continued interim storage of used fuel at the Pickering Used Fuel Dry Storage Facility (PUFDSF) within the PWMF;*
- *conduct of ongoing maintenance and repair;*
- *construction of additional storage capacity at the PWMF PUFDSF for the used nuclear fuel to be produced from the proposed continued operation of the Pickering B units;*
- *interim storage for the additional used nuclear fuel and the refurbishment waste at the PWMF; and*
- *transport of routine operational low and intermediate-level waste to the WWMF.”*

The PWMF PUFDSF is now referred to by OPG as the PWMF.

In addition, the scope of project for this EA also includes the assessment of all waste management-related activities including waste reduction activities and decontamination.

1.4.3 Scope of the Assessment

This section describes the scope of the EA Study for the PNGS B Project. It summarizes the requirements stipulated in the EA Guidelines (Section 8.0, p.5) prepared by the CNSC. Specifically, the EA Guidelines require that all factors identified in paragraphs 16(1)(a) to (d) of the *CEAA* and any other matter that the CNSC requires to be considered be included in the screening assessment:

- *“the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;*
- *the significance of the effects identified above;*
- *comments from the public that are received in accordance with the *CEAA* and its regulations; and*
- *measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project.*

In accordance with subsection 16(1)(e) of the *CEAA*, the CNSC will also consider:

- *the purpose of the project;*
- *consideration of traditional and local knowledge, where relevant;*
- *the need for, and requirements of, a follow-up program in respect of the project; and,*
- *the capacity of renewable and non-renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.”*

1.4.4 Compliance with Requirements of the Environmental Assessment Guidelines

This EA Study Report has been prepared in accordance with the requirements of the *CEAA* and the CNSC EA Guidelines for this project, as shown in Table 1.4-1. The organization of the table corresponds directly to the various sections of the EA Guidelines.

**TABLE 1.4-1
EA STUDY REPORT COMPLIANCE WITH EA GUIDELINES**

EA Guideline Requirements		EA Study Report Section
1.0	Purpose (of EA Guidelines)	1.2.1.2, 1.4.1
2.0	Background	1.1.1
3.0	Application of the <i>Canadian Environmental Assessment Act</i>	1.2.1
4.0	Identification of Other Federal and Provincial Expert Departments	1.2.1.2
5.0	Delegation of Assessment Studies to OPG	1.2.1.3
6.0	Canadian Environmental Assessment Registry	1.2.1.4
7.0	Scope of the Project	1.4.2
8.0	Factors to be Considered in the Screening	
	<p>Paragraphs 16(1) (a) to (d) of the <i>CEAA</i> require that the following factors be included:</p> <ul style="list-style-type: none"> • the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out; • the significance of the effects identified above; • comments from the public that are received in accordance with the <i>CEAA</i> and its regulations; and • measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project. <p>With the discretion allowed for in paragraph 16(1)(e) of the <i>CEAA</i>, the CNSC will also require consideration of:</p> <ul style="list-style-type: none"> • the purpose of the project; • consideration of traditional and local knowledge, where relevant; • the need for, and requirements of, a follow-up program in respect of the project; and • the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future. 	<p>5.0; 6.0; 7.0; 8.0</p> <p>9.0</p> <p>10.0</p> <p>5.0</p> <p>1.1.2</p> <p>10.2.1</p> <p>11.0</p> <p>6.1</p>

TABLE 1.4-1 (Cont'd)
EA STUDY REPORT COMPLIANCE WITH EA GUIDELINES

EA Guideline Requirements		EA Study Report Section
9.0	Assessment Methodology	3.0
9.1	Structure of the Screening Report	1.5
9.2	Specific Information Requirements	
9.2.1	Purpose of the Project	1.1.1, 1.1.2; 1.2.1.3
9.2.2	Project Description	2.0
	General Information, Design Characteristics and Normal Operations:	
	<ul style="list-style-type: none"> • the location of the project; • the planned operational life (justified on a unit-by-unit basis where applicable); • the basic configuration, layout, shape, size, design and operation of the facility; • the key operational components of the plant (following completion of refurbishment work), including a discussion of component age and wear issues where relevant to future environmental performance and reliability; • the key components of the plant and its physical security systems (excluding prescribed information), designed specifically to isolate the project from the surrounding environment, or to prevent, halt or mitigate the progress or results of malfunctions and accidents; • identify and describe engineered and administrative controls, including use of an approved margin of subcriticality for safety, which would assure that the entire process will be subcritical under normal and credible abnormal conditions – accidents or accident sequences – that have frequency of occurrence equal to or greater than one in a million years; • a discussion of other past events that are relevant to the assessment of future environmental performance and reliability; • the stored inventories of radioactive and other hazardous materials used as part of the project, including locations and storage methods, and criticality control plans; • the estimated activity in Bq of the waste that will be generated and stored at each of the waste management areas as a result of refurbishment; • the sources, types and quantities of radiological and non-radiological waste, including hazardous waste, predicted to be generated by the project; 	 1.1.3 2.6.3 2.2 2.3.1 – 2.3.10 2.11 2.3.3; 7.3 7.2.2 2.3.6.2; 2.4 2.7.4 2.5, 2.7.4

TABLE 1.4-1 (Cont'd)
EA STUDY REPORT COMPLIANCE WITH EA GUIDELINES

EA Guideline Requirements	EA Study Report Section
<ul style="list-style-type: none"> the on-site processes for the management of radioactive and non-radioactive waste, including hazardous waste, such as collection, handling and transportation, to be generated by the project; 	2.5; 2.7.4
<ul style="list-style-type: none"> the sources, quantities and points of release from the project of routine radiological and non-radiological emissions and effluents, including thermal (heat) releases; 	5.4.1; 5.4.2; 5.5.3; 5.8.1; 5.8.2; 5.9.2; 5.9.3; 5.9.4
<ul style="list-style-type: none"> the predicted doses to workers, including dose to contract workers, involved with the operations and activities that are within the scope of this project; 	5.9.5
<ul style="list-style-type: none"> the sources and characteristics of any fire hazards; 	7.2.3
<ul style="list-style-type: none"> the sources and characteristics of any noise, odour, dust and other likely nuisance effects from the project; 	5.4.1; 5.4.2
<ul style="list-style-type: none"> results of past emission and effluent monitoring at the Pickering B NGS site as relevant to establishing a pre-project environmental baseline and making future predictions of environmental performance. Limitations in the coverage and/or accuracy of past monitoring information should be discussed; 	4.0
<ul style="list-style-type: none"> the predictions of future emissions and effluents from the project under normal operating conditions; 	5.4.1; 5.4.2; 5.5.3; 5.8.1; 5.8.2; 5.9.2; 5.9.3; 5.9.4
<ul style="list-style-type: none"> the sources and characteristics of any potential risks (including radiological risks) to workers, the public or the environment from the project; 	5.9; 5.14; 7.2; 7.3
<ul style="list-style-type: none"> key operational procedures relevant to protection of workers, the public and the environment relating to the project, including the criticality control program; and 	2.11.3 - 2.11.6
<ul style="list-style-type: none"> a description of the relevant organizational and management structure, and staff qualification requirements with emphasis on safety and environmental management programs. 	2.10; Figure 2.10-1
<p>Malfunctions and Accidents</p> <p>The information on malfunctions and accidents may be included in the general project description or presented in a separate section of the report:</p>	
<ul style="list-style-type: none"> an identification and discussion of any past abnormal plant operations, accidents and spills to the extent that they are relevant to the current assessment; 	7.2.2; 7.2.3

TABLE 1.4-1 (Cont'd)
EA STUDY REPORT COMPLIANCE WITH EA GUIDELINES

EA Guideline Requirements	EA Study Report Section
<ul style="list-style-type: none"> a description of specific criticality events and a demonstration that consequences of the events do not violate criteria established by international standards and national guidance as a trigger for a temporary public evacuation; a description of any contingency, clean-up or restoration work in the surrounding environment that would be required during, or immediately following, the postulated malfunction, accident and criticality events. 	7.3 7.2, 7.3
<p>Preliminary Decommissioning Plan</p> <p>The preliminary plan will document the preferred decommissioning strategy, including a justification of why this is the preferred strategy. It will also include end-state objectives, the major decontamination, disassembly and remediation steps; the approximate quantities and types of waste generated; and an overview of the principal hazards and protection strategies envisioned for decommissioning.</p>	2.9
<p>9.2.3 Spatial and Temporal Boundaries of the Assessment</p> <p>Both the study areas and time frames will remain flexible during the assessment to allow the full extent of likely environmental effects to be considered in the screening.</p> <p>Study Areas (Spatial Boundaries)</p> <p>Time Frames (Temporal Boundaries)</p>	3.2.3 3.2.2
<p>9.2.4 Description of the Existing Environment</p> <p>The environmental components that should be described in the various study areas include:</p> <ul style="list-style-type: none"> human health; surface water; atmosphere; aquatic environment; geology and hydrogeology; terrestrial environment; land resources; cultural heritage current use of lands and resources for traditional purposes by aboriginal persons; and socio-economic conditions. 	4.12, 5.14, 7.2.5, 7.3.3, 7.3.4 8.4, 8.5, 8.6 4.2 4.1 4.3 4.5 4.4 4.9.3 4.8 4.10 4.9 4.1.4; 4.2.6; 4.3.4; 4.4.9;

TABLE 1.4-1 (Cont'd)
EA STUDY REPORT COMPLIANCE WITH EA GUIDELINES

EA Guideline Requirements	EA Study Report Section
<p>Valued Ecosystem Components (VECs)</p> <p>VECs in the existing environment will be identified and used as specific assessment end-points.</p>	4.5.6; 4.6.5; 4.7.3; 4.8.7; 4.9.8; 4.10.4; 4.11; 4.12
<p>9.2.5 Assessment and Mitigation of Environmental Effects</p> <p>Assessment of Effects Caused by the Project</p> <p>1) Identify the potential interactions between the project activities and the existing environment during construction and normal operations, and during identified relevant malfunctions and accidents.</p> <p>2) Describe the resulting changes that likely would occur to the components of the environment and VECs as a result of the identified interactions with the project.</p> <p>3) Identify and describe mitigation measures that may be applied to each likely adverse effect (or sequence of effects), and that are technically and economically feasible.</p> <p>4) Describe the significance of the residual environmental effects that likely will occur as a result of the project, having taken into account the implementation of the proposed mitigation measures.</p> <p>Assessment of Effects of the Environment on the Project</p> <ul style="list-style-type: none"> • The assessment must also take into account how the environment could adversely affect the project (for example, from severe weather or seismic events). • The assessment must also take into account any potential effects of climate change on the project, including an assessment of whether the project might be sensitive to changes in climate conditions during its life span. 	<p>5.3; throughout Chapter 5.0 for each of Sections 5.4 to 5.13; Table 5.3-1; Chapter 7.0</p> <p>throughout Chapter 5.0 for each of Sections 5.4 to 5.13 throughout Chapter 5.0 for each of Sections 5.4 to 5.13</p> <p>9.3; Tables 9.3-1-9.3-3</p> <p>6.2</p> <p>6.3</p>
<p>9.2.6 Assessment of Cumulative Effects</p> <ul style="list-style-type: none"> • The effects of the project must be considered together with those of other projects and activities that have been, or will be carried out, and for which the effects are expected to overlap with those of the project (i.e., overlap in same geographic area and time). 	8.0

TABLE 1.4-1 (Cont'd)
EA STUDY REPORT COMPLIANCE WITH EA GUIDELINES

EA Guideline Requirements		EA Study Report Section
9.2.7	<p>Assessment of the Effects on the Capacity of Renewable and Non-renewable Resources</p> <ul style="list-style-type: none"> Take into account whether the likely project-related environmental effects will have an impact on the capacity of natural and non-renewable resources to meet the needs of the present and those of the future. 	6.1
9.2.8	<p>Significance of the Residual Effects</p> <ul style="list-style-type: none"> Consider the significance of the environmental effects of: the project on the environment; the natural hazards on the project; project malfunctions and accidents; and other projects and activities that could cause cumulative effects. 	9.3; Tables 9.3-1-9.3-5
9.2.9	<p>Stakeholder Consultation</p> <ul style="list-style-type: none"> Notification of, and consultation with, the potentially affected stakeholders, including the local public. Use of various media to inform and engage individuals, communities, interest groups, local governments and other stakeholders as well as the holding of appropriate public consultation meetings, and A summary review of the comments received during this EA process and an indication of how issues identified have been considered in the completion of the assessment, or where relevant, how they may be addressed in any subsequent licensing and compliance process. 	10.1; 10.2 10.1.3 10.3
9.2.10	Follow-up Program	11.0
10.0	Conclusions And Recommendations For Decision	12.0
11.0	Contacts For The Assessment	1.2.1.4
12.0	References	13.0
13.0	Glossary of Terms	14.0

1.5 THE EA STUDY REPORT

1.5.1 Purpose and Organization of Report

This EA Study Report responds to the needs for a Screening Report as outlined in Section 1.2. The report is organized into 14 chapters as follows:

- 1. Introduction:** describes the purpose and location of the project, project schedule, the regulatory environment, the scope of the project and the scope of the assessment.
- 2. Description of the Proposed Project:** describes the existing PNGS B, how the project will be carried out, the key works and activities that are involved, project target dates, OPG's management structure, and applicable environmental, safety, monitoring and security programs. It also provides a preliminary decommissioning plan.
- 3. Environmental Assessment Methodology:** describes temporal and spatial boundaries of the project, how environmental effects will be determined and measured, how a follow-up and monitoring program will be developed, and how community and stakeholder involvement will be conducted.
- 4. Description of the Existing Environment:** describes the existing environment (i.e. baseline conditions) in the regional, local and site study areas of the project and its most important features, including a description of Valued Ecosystem Components (VECs).
- 5. Assessment of Likely Environmental Effects and Mitigation:** focuses on the potential interactions between the project and the environment, including human health, determines any adverse effects, indicates ways by which such effects would be mitigated, determines any residual effects, and summarizes human health considerations.
- 6. Assessment of Other Likely Effects:** describes the likely effects of the project on the sustainable use of resources, the likely effects of the environment on the project, and the potential long-term effects of climate change on the project.
- 7. Assessment of Credible Malfunction and Accident Scenarios:** identifies and assesses credible malfunctions and accidents (non-radiological, radiological, and nuclear) related to all phases of the project, and to human health.

- 8. Assessment of Likely Cumulative Environmental Effects:** addresses the possibility of residual effects from the project interacting with effects from other existing and future projects, and assesses likely cumulative effects with respect to human health.
- 9. Significance of Residual Adverse Effects:** assesses the significance or importance of any adverse residual effects on the environment.
- 10. Community and Stakeholder Consultation:** outlines the consultation program undertaken, notes the comments and issues raised by the public and other stakeholders, and OPG responses to key issues.
- 11. Monitoring and Follow-up Program:** describes the plan for and preliminary scope of the monitoring and follow-up program, including locations for monitoring and the duration and/or frequency of monitoring activities.
- 12. Conclusions of the Assessment:** indicates whether there are any likely adverse environmental effects which cannot be mitigated and whether there are any outstanding public concerns.

13. References

14. Abbreviations and Acronyms

1.5.2 Technical Support Documents and Appendices

1.5.2.1 Technical Support Documents

Technical Support Documents (TSDs) have also been prepared for 13 technical areas that are relevant to the proposed PNGS B Project. These areas relate to the following environmental components:

- Atmospheric Environment;
- Surface Water Resources;
- Aquatic Environment;
- Terrestrial Environment;
- Geology, Hydrogeology and Seismicity;

- Radiation and Radioactivity;
- Ecological Risk Assessment (ERA);
- Transportation;
- Physical and Cultural Heritage Resources;
- Socio-Economic Environment Conditions;
- Community and Stakeholder Consultation and Communication Program (CSCCP);
- Credible Malfunction and Accident Scenarios; and
- Human Health.

Where there are differences between the TSDs and the EA Study Report, the latter should be regarded as definitive.

1.5.2.2 Appendices

The EA Guidelines prepared by the CNSC for the PNGS B Project are included as Appendix A to the EA Study Report. Supplements to several Technical Support Documents are provided in Appendix B of the EA Study Report. Information in these supplements reflect responses to comments from regulatory agencies and peer reviewers. Comments by review agencies on the Draft EA Study Report and TSDs, and OPG's responses to them are provided in Appendix C.