

OPG Proprietary

December 18, 2024

CD# NK38-CORR-00531-25844 P

Ms. Candace Salmon
Commission Registrar
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
OTTAWA, Ontario, K1P 5S9

Dear Ms. Salmon:

**Darlington NGS – Supplemental Update in Support of the Power Reactor
Operating Licence Renewal Application**

The purpose of this letter is to submit supplemental information to the Application for Renewal of the Darlington Nuclear Generating Station (NGS) Power Reactor Operating Licence that was submitted in Reference 1.

Attachment 1 provides updates on metrics and information that were pending at the time of the Darlington NGS application for renewal, submitted on May 30, 2024 (Reference 1). The supplemental application also includes information related to CNSC staff's technical sufficiency review (Reference 2) and OPG's response to CNSC staff's review (Reference 3). This supplemental document is meant to be read in conjunction with the application (Reference 1) and does not negate any information that was already provided.

Please note that since the submission of the Darlington NGS licence renewal application (Reference 1), Power Reactor Operating Licence PROL 13.03/2025 has been amended to revision PROL 13.04/2025 through CNSC Commission Record of Decision – DEC 24-H101 (Reference 4).

Should you have any questions please contact Ms. Aditi Bhardwaj, Senior Manager, Regulatory Affairs at 289-387-2110 or at aditi.bhardwaj@opg.com.

Sincerely,



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Attach.

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- References:
1. OPG letter, A. Grace to C. Salmon, "Darlington NGS – Application for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence 13.03/2025", May 30, 2024, CD# NK38-CORR-00531-25450.
 2. CNSC letter, A. Baig to A. Grace, "Darlington Nuclear Generating Station: CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence", August 1, 2024, e-Doc# 7334720, CD# NK38-CORR-00531-25589.
 3. OPG letter, A. Grace to A. Baig, "Darlington NGS – OPG Response to CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence: Action Item OPG-2024-33652", August 16, 2024, CD# NK38-CORR-00531-25595.
 4. CNSC Record of Decision DEC 24-H101, "Application to Amend Power Reactor Operating Licence PROL-13.03/2025 to Authorize the Production of Cobalt-60 at the Darlington Nuclear Generating Station", June 5, 2024, e-Doc# 7295750 (PDF), CD# NK38-CORR-00531-25501.

ATTACHMENT 1

OPG letter, A. Grace to C. Salmon, "Darlington NGS – Supplemental Update in Support of the Power Reactor Operating Licence Renewal Application"

CD# NK38-CORR-00531-25844 P

Supplemental Update in Support of the Power Reactor Operating Licence Renewal Application

(91 pages)



Darlington

Nuclear Generating Station



***Supplemental Update in Support of
the Power Reactor Operating Licence
Renewal Application***

December 2024

**ONTARIO
POWER
GENERATION**

Land Acknowledgement

The lands and waters on which the Darlington Nuclear Generating Station (NGS) is situated are the treaty and traditional territory of the Michi Saagiig and Chippewa Nations, collectively known as the Williams Treaties First Nations.

Darlington NGS is within the territory of the Gunshot Treaty and the Williams Treaties of 1923. These Treaty Rights were reaffirmed in 2018 in a settlement with Canada and the Province of Ontario.

Ontario Power Generation Inc. (OPG) respectfully acknowledges that the Williams Treaties First Nations are the Rights holders, stewards, and caretakers of these lands and the waters that touch them, and that they continue to ensure their health and integrity for generations to come.

As a company, OPG remains committed to developing positive and mutually beneficial relationships with the Williams Treaties First Nations.





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1.0 Overview

1.1 Introduction – Supplemental Information

In May 2024, Ontario Power Generation Inc. (OPG) requested authorization from the Canadian Nuclear Safety Commission (CNSC) for renewal of the Darlington Nuclear Generating Station (NGS) Power Reactor Operating Licence (PROL) 13.03/2025 for a 30-year licence term from December 1, 2025 to November 30, 2055 (Reference 1).

This application demonstrated that OPG will continue to safely operate the Darlington NGS while meeting the requirements of the *Nuclear Safety and Control Act* (NSCA) and associated Regulations. OPG will continue its licensed activities and make adequate provisions to protect the health, safety and security of persons and the environment, and maintain national security and measures required to implement international obligations.

This supplemental submission provides updated information on metrics and information that was pending at the time of the requested authorization, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3. This supplemental document is meant to be read in conjunction with the application and does not negate any information that was already provided.

Additionally, OPG acknowledges that following the submission of the Darlington NGS PROL renewal application (Reference 1), PROL 13.03/2025 was amended to PROL 13.04/2025 through CNSC Commission Record of Decision – DEC 24-H101 (Reference 4) to authorize the production of Cobalt-60 at Darlington NGS. Updates associated with this amendment are included in this supplemental document.

In support of the Darlington NGS PROL renewal application (Reference 1), OPG also provided information regarding implementation timelines of CNSC Regulatory Documents and Canadian Standards Association (CSA) standards in References 5 and 6.

In summary, the original licence renewal application provided in May 2024, together with this supplemental document, contains the information to demonstrate that OPG meets all the regulatory requirements and is qualified to carry on the licensed activities and continues to make adequate provisions to protect the health, safety and security of persons and the environment, and maintain national security and measures required to implement international obligations.



2.0 Safety and Control Areas

The following information is provided as updates to specific Safety and Control Areas (SCAs), supplementary to the information provided in Darlington NGS's May 2024, Power Reactor Operating Licence Renewal Application (Reference 1). The relevant section which is being updated is referenced to this document, referred to as the *"2025 Licence Renewal Application"*.

2.1 Management System

The fundamental objective of OPG's nuclear management system is to ensure OPG nuclear facilities are operated and maintained using sound nuclear safety and defence-in-depth practices to ensure radiological risks to workers, the public, and the environment are As Low As Reasonably Achievable (ALARA), and in keeping with the OPG *Nuclear Safety and Security Policy* and the best practices of the international nuclear community.

OPG's nuclear management system sets out the principles, required supporting actions and documentation to support safe and reliable nuclear facilities, and brings together in a planned and integrated manner, the processes necessary to satisfy requirements and to carry out licenced activities safely.

Management system requirements provide direction to develop and implement management practices and controls. Programs and processes are created such that all applicable regulatory requirements and codes and standards are embedded and integrated within the nuclear management system, including aspects of health, safety, environment, security, economics and quality.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Management Systems SCA is available in Section 2.1 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Sections 2.1.1 (Management System), 2.1.2 (Organization) and 2.1.3 (Performance Assessment, Improvement and Management Review)

The following provides additional information regarding OPG's organizational structure:

An organization chart has been provided in Appendix D that identifies OPG Nuclear and Nuclear Interfacing organizations. It also identifies positions with responsibilities for the management and control of licensed activities.

The following provides clarification regarding OPG governing document framework:

N-CHAR-AS-0002, *Nuclear Management System* gives authority to N-PROG-AS-0001, *Nuclear Management System Administration*, which defines the generic programs within the nuclear management system. N-CHAR-AS-0002, Appendix A also provides the governing framework that documents the programs. The figure below provides a copy of N-CHAR-AS-0002, Appendix A.

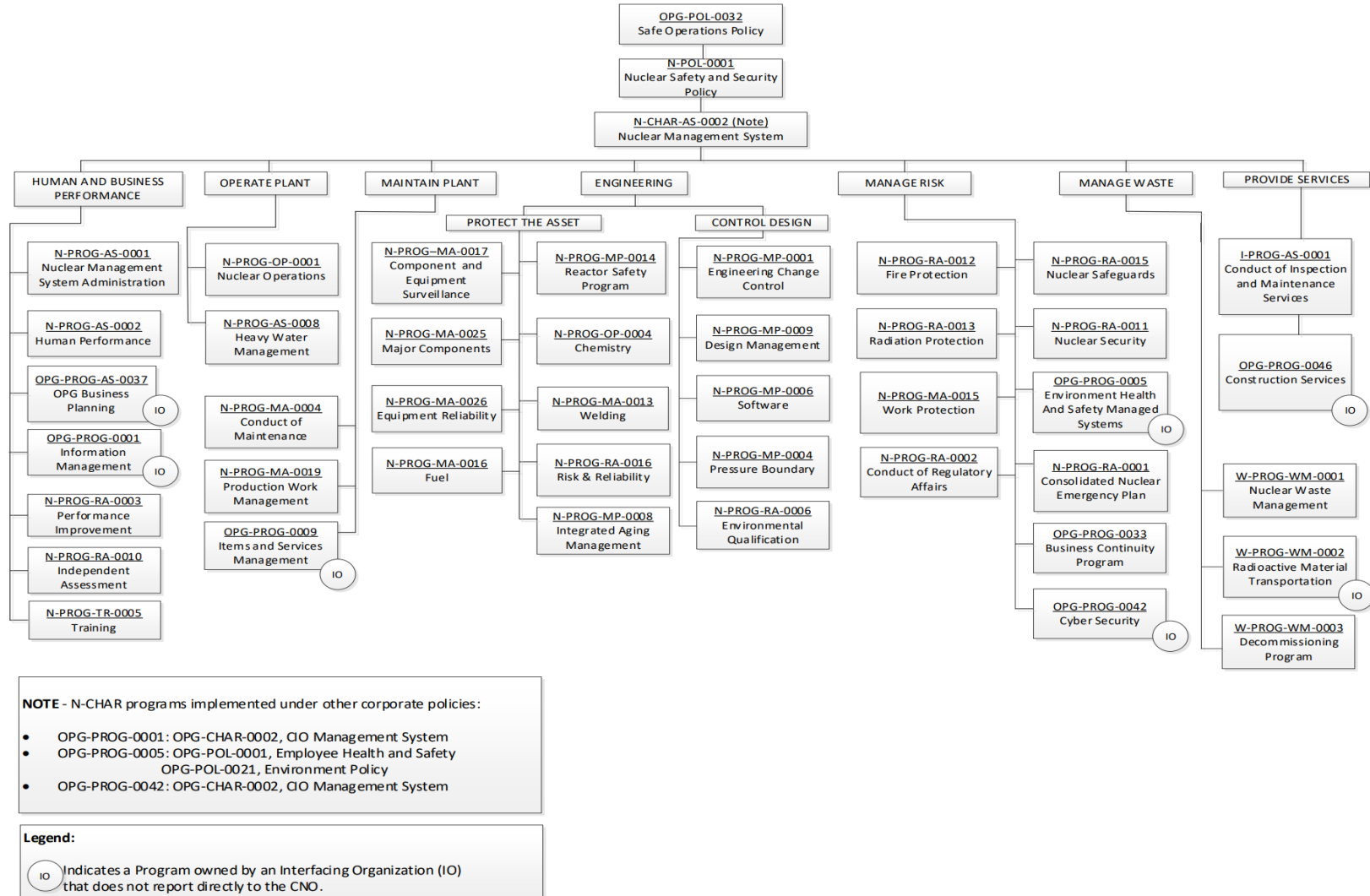


Figure 1: OPG Governing Document Framework (N-CHAR-AS-0002, Appendix A)




Figure 3 in the 2025 Licence Renewal Application (Reference 1) also provides activities, programs and configuration information (similar to N-CHAR-AS-0002, Appendix A of the governing framework). Figure 3 in the 2025 Licence Renewal Application (“Configuration Management Relationship”) is taken from N-STD-MP-0027, *Configuration Management* which takes authority from N-PROG-AS-0001.

2025 Licence Renewal Application, Section 2.1.4 – Operating Experience (OPEX), Problem Identification and Resolution

The following provides an update on the improvement initiatives related to the OPEX process and use of OPEX at Darlington NGS:


As detailed in the Darlington NGS PROL renewal application (Reference 1), OPG has initiated a number of improvements to the OPEX process and use of OPEX at Darlington NGS. The following improvements have been completed since the application was submitted:

- The OPEX Health Metrics indicators have been revised to challenge status quo for indicators with consistent green scores over a long period. Target score for green, white, yellow and red ranges have also been revised to further improve performance and challenge the fleet for maintaining excellence. Part of the OPEX Health Metrics revision included automation of some Key Performance Indicators related to OPEX resulting in a change for external and internal OPEX reviews. This provides efficiency in completing monthly metrics and visibility to line organizations of where the data is coming from by listing the OPEX station condition records and actions taken. This metric also allows visibility into which departments are taking the actions to help identify trends (declines or improvements). The benefit will provide line organizations the opportunity to check and adjust their behaviours towards implementing OPEX internally and from external sources.
- In addition to adding OPEX items from the weekly CANDU Owners Group (COG) screening package into the Integrated Station Brief meeting package for discussion and understanding of lessons learned, Darlington has also begun adding broader industry Institute of Nuclear Power Operations (INPO) Industry Reporting and Information System (IRIS) reports for key consequential events to the Integrated Station Brief meeting package for discussion. These key consequential events are also communicated to COG to ensure they also get included in the external OPEX screening packages (produced by COG).

2.2 Human Performance Management

Darlington NGS has an effective Human Performance Management Program that meets or exceeds all applicable regulatory requirements and related objectives to enable effective Human Performance through implementation of processes that ensure a sufficient number of licensee personnel are in relevant job areas, have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

The following sections provide a description of updates, including information related to CNSC staff’s review of OPG’s application in Reference 2 and OPG’s response to CNSC staff’s review in Reference 3, since the application submission in this area. More information on the Human



Performance Management SCA is available in Section 2.2 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.2.1 – Human Performance Program

The following is an update to the Human Performance Program related to Site Event Free Day Resets (SEFDRs):

The effectiveness of the Human Performance Program has resulted in Darlington NGS achieving top industry performance in SEFDRs. Since the submission of the 2025 Licence Renewal Application in Reference 1, there has been one SEFDR that occurred on November 29, 2024.

2025 Licence Renewal Application, Section 2.2.2 – Personnel Training

The following is an overview of refurbishment training in relation to the Systematic Approach to Training:

The impact of engineering changes such as Darlington Refurbishment is systematically analysed, designed, developed, implemented, and evaluated to support job performance. The Training and Qualification processes are based on the N-PROC-TR-0008, *Systematic Approach to Training* process, which are highlighted within procedure N-PROC-MP-0090, *Engineering Change Control Process*.

As part of the Return-to-Service (RTS) protocol, OPG must declare available for service using the Systems Available for Service (SAFS) process to release a Regulatory Hold Point (RHP). In the SAFS reports, as per N-GUID-09701-10017, *Nuclear Refurbishment System Available for Service Package Preparation Guideline* the Nuclear Refurbishment Training department must declare that modifications on the system have been assessed, and where the assessment identified the need for specified training, it has been developed and delivered.

Furthermore, a RTS Training Report is another protocol deliverable for release of a RHP which documents the training required and the progress of training. These reports are provided to CNSC staff and document requirements for staff training. The reports describe the training needs, compliant with the Systematic Approach to Training, which ensures Darlington employees are properly trained and qualified to support surveillance and operation during a Refurbishment outage, the RTS period of the outage, and when the unit resumes commercial operation.

CNSC staff rigorously complete compliance inspections of Refurbishment activities and have confirmed that OPG's RTS training strategy (Type II Inspection Report DPRD-2018-00863), satisfies all OPG Systematic Approach to Training requirements and thus provides a fully auditable and encompassing process.



2025 Licence Renewal Application, Sections 2.2.2 (Personnel Training) and 2.2.3 (Personnel Certification)

Section 2.2.2 – Personnel Training

The following is an overview of the certification training full scale simulators in relation to refurbishment training:

OPG's Simulator Training program maintains two referenced Unit 2 Darlington NGS Full Scope Training Simulators at the Darlington Learning Centre (DLC) and the Pickering Learning Centre (PLC). The DLC Simulator maintains a hybrid configuration, with a Unit 1 configuration for secondary side updated Turbine Generator Controls and Turbine Trip Parameters and the primary side remaining as modelled after Unit 2 (consistent across all Units). The PLC Simulator currently maintains the original referenced Unit 2 and is targeted to be modified to align with the hybrid configuration of the DLC Simulator in 2025. The Darlington NGS Unit 2 upgrade for the Turbine Generator Controls is currently targeted for 2027. Once the modification is complete on Unit 2, the DLC and PLC simulators will reflect the Unit 2 reference configuration.

Any simulator changes required as part of the Darlington Refurbishment Project have been installed with relevant sustainment details being captured in revision control and work management repositories as per N-PROC-TR-0023, *Simulator Quality Assurance*. There are no deficiencies nor system-health issues that could negatively impact certification training on either the DLC or PLC simulator.

The PLC simulator is used for initial certification training and examination. The DLC simulator is used for certified operator training and requalification testing.

Section 2.2.3 – Personnel Certification

The following provides additional information regarding Trainers and Examiners qualification requirements as per the personnel certification program:

Training Qualification Document, N-TQD-602-00001, *Nuclear Trainer Training and Qualification Description*, and Qualification Guide N-QG-602-00001, *Operator Training Instructor Qualification Guide*, serve to identify the training and qualification requirements for OPG staff who conduct Initial Certification Training, Initial Certification Examinations and Requalification Tests at Darlington NGS.

Such persons are normally previously or currently certified at Darlington NGS. OPG training governance also includes a provision for qualifying persons as Authorization Training Instructors and Examiners in cases where the person was not previously certified at Darlington NGS.

N-QG-602-00001 provides the detailed qualification requirements for Authorization Training Instructors, Initial Certification Examiner and Requalification Testing Examiners.

Persons who were previously or currently certified at Darlington NGS are granted a hard credit as applicable, by virtue of their having completed the initial certification training program as outlined in either:

- N-TQD-101-00001, *Authorized Nuclear Operator Initial Training and Qualification Description*,

- N-TQD-102-00002, *Nuclear Shift Manager/Control Room Shift Supervisor Initial Training and Qualification Description*, or
- N-TQD-105-00005, *Darlington Unit 0 Control Room Operator (CRO) Initial Training and Qualification Description*.

During their period of certification, these persons must also satisfy the continuing certification training requirements per N-TQD-103-00001, *Nuclear Certified Personnel Continuing Training and Qualification Description*.

For persons who were not certified at Darlington NGS, knowledge may be gained through completion of a Mentored Training Program. The training requirements of the Mentored Training Program will be dependent on the entry-level qualifications of each candidate. The program can take up to 40 weeks and allows the person to develop technical competence for plant operation. The program will be complemented by regular written evaluations and on-shift experience.

The Mentored Training Program serves to provide assurance that those examiners who were not previously certified at Darlington NGS are fully familiar with the knowledge and skill requirements of the persons being examined.

Persons seeking qualification as Initial Certification Examiners or Requalification Testing Examiners must also hold qualification as a Full-Scope Simulator Instructor.

Before becoming qualified as examiners, the individual must also satisfy the other requirements specified in CNSC-EG1, Rev.0: *Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants*, CNSC-EG2, Rev.0: *Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants*, and CNSC document: *Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants*, Revision 2. These include:

- Familiarity with the assessment techniques used during testing on a full scope simulator;
- Familiarity with the criteria and guidelines for simulator-based certification examinations;
- For Lead Examiners, On-the Job training as an examiner.

Each of the regulatory requirements is addressed by the detailed qualification requirements specified in N-QG-602-00001 and reflected in the structure of the Training Information Management System.

The Table below is an update to Table 3 of the 2025 Licence Renewal Application in Reference 1 for Certified Staff at Darlington NGS:

Table 1: Certified Staff at Darlington Nuclear (December 5, 2024)

Certified Position	Number of Certified Staff	Number of Trainees
Shift Manager and Control Room Shift Supervisor	26	27
Authorized Nuclear Operator	64	6
Unit 0 Control Room Operator	19	0
Responsible Health Physicist	5	0



Section 2.2.5 – Fitness for Duty

The following provides an update to fitness for duty regarding the implementation of REGDOC-2.2.4, Fitness for Duty, Vol. II: Managing Alcohol and Drug Use, Version 3:

As documented in the 2025 Licence Renewal Application in Reference 1, OPG has implemented programmatic elements to comply with certain aspects of REGDOC-2.2.4. On June 6, 2023, the Federal Court of Canada endorsed the CNSC's move to require pre-placement and random alcohol and drug testing for worker's holding Safety-Critical Positions at high-security nuclear facilities. This decision was appealed by the Unions', and while awaiting the outcome of the appeal which was heard in January 2024, all licensees, including OPG, were restricted from implementing the pre-placement and random testing requirements. On November 6, 2024, the Federal Court of Appeal issued their decision to uphold the Federal Court ruling on the validity of the pre-placement and random alcohol and drug testing requirements mandated by REGDOC-2.2.4.

Further communication to OPG on implementation timelines is pending from the CNSC (Reference 7).

2.3 Operating Performance

Darlington NGS has an effective Operations Program which meets or exceeds all applicable regulatory requirements and related objectives. The program ensures that plant operation is safe and secure, with adequate regard for health, safety, security, radiation and environmental protection, and international obligations.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Operating Performance SCA is available in Section 2.3 of the 2025 Licence Renewal Application (Reference 1).


Section 2.3.2 – Procedures

The following is additional information regarding Electronic Based Procedures:

The Electronic Based Procedures (Computer Based Procedures) project is an Information Technology initiative.

Human Factors Engineering (HFE) Specialists provided some HFE support for this initiative whereby HFE Specialists were involved in providing input to the Request for Proposal, provided Ease-of-Use evaluation criteria for the evaluation of potential proponents, participated in the evaluation / ranking of the proponents, attended project meetings, and identified HFE issues/concerns throughout the project. In addition, the HFE Specialists researched best practices for Computer Based Procedures and participated in the analysis of results from the Computer Based Procedures pilot that collected data from both procedure performers and authors.

Development of the Electronic Based Procedures follows existing governance and processes as per procedure N-PROC-AS-0028, *Development, Review and Approval of Technical Procedures*.



Technical reviews of the draft procedures include a review automated functionality. Once issued, a PDF of the Electronic Based Procedure would be stored in the Approved Information Management System and would be available in the same formats as the current procedures.

The implementation of the project is still ongoing. A limited subset of procedures is being developed as a trial currently limited to Main Control Room panel checks and Operator Test Procedures. To date, no Electronic Based Procedures have been issued at Darlington NGS.

Section 2.3.5 – Safe Operating Envelope

The following is additional information regarding OPG's Safe Operating Envelope (SOE) Improvement Project:

The SOE program at Darlington NGS has undergone continuous improvements driven by internal and external inspections and audits. As a continuous improvement opportunity, the Darlington NGS SOE Improvement Project was initiated to iteratively improve the SOE over time. As part of this initiative, OPG self-identified an opportunity to provide further clarity to the technical basis of some existing Operational Safety Requirements (OSRs) safety limits and availability requirements. The review is now complete of the SOE documents (e.g. OSRs) and operational documents (e.g. Abnormal Incident Manuals). Any enhancements noted in the review of the SOE documentation are being processed through OPG's document change management process and notifications will be made to the CNSC, where applicable, as per Regulatory requirements. The review supported the recent closure of a CNSC staff inspection item.

2.4 Safety Analysis


Darlington NGS has an effective Safety Analysis program which meets or exceeds all applicable regulatory requirements and related objectives. The program ensures the maintenance of the safety analysis that supports the overall safety case for the facility. It also ensures there is demonstrated acceptability of the frequency and consequences of design-basis and beyond design basis events, with the ability of protective systems and emergency mitigating equipment to adequately control power, cool the fuel and contain or limit any radioactivity that could be released from the plant.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Safety Analysis SCA is available in Section 2.4 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.4.1 – Deterministic Safety Analysis

The following provides additional information regarding OPG software governance and requirements for deterministic safety analysis:

The primary objectives of performing Deterministic Safety Analysis are to confirm that the design of the Nuclear Power Plant meets design and safety requirements, and to derive or confirm operational limits and conditions that are consistent with the design and safety requirements. Furthermore, Deterministic Safety Analysis must confirm that the structures,



systems, and components, in combination with plant procedures and operator actions, are effective in fulfilling their safety functions and keeping the releases of radioactive material from the plant below acceptable limits.

The governing document for nuclear safety analysis is N-PROG-MP-0014, *Reactor Safety Program*, which defines the organizational responsibilities and key program elements for management of issues related to Deterministic Safety Analysis.

Software used for Deterministic Safety Analysis falls under the scope of Scientific, Engineering and Safety Analysis software classification which is governed by N-PROG-MP-0006, *Software*. The software program complies with CSA N286-12, *Management System Requirements for Nuclear Facilities* and CSA N286.7-16, *Quality Assurance of Analytical, Scientific, and Design Computer Programs for Nuclear Power Plants*.

N-STD-MP-0008, *Development, Qualification and Use of Scientific, Engineering, and Safety Analysis Software*, provides requirements for development, qualification and use of Scientific, Engineering and Safety Analysis software in design, analysis or support of the continued operation of OPG Nuclear stations. Special emphasis is placed on software that falls within the scope defined by CSA N286.7-16.

2025 Licence Renewal Application, Section 2.4.2 – Hazard Analysis

The following provides additional information regarding OPG's plans to address the construction and future operation of Darlington New Nuclear Project (DNNP) BWRX-300 in the hazard analysis for Darlington NGS:

Hazard Analysis for Darlington NGS is performed in compliance with REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*. NK38-REP-03611-10043, *Hazards Screening Analysis – Darlington*, was last updated in 2019 as part of the 5-year update cycle for the Darlington NGS PSAs.

OPG is currently updating the Darlington NGS Hazard Screening Analysis (HSA) for the 2025 Darlington NGS PSA updates. The scope of work for this HSA update includes the potential hazards that will arise from the construction activities taking place on the DNNP site. This updated HSA will be provided to CNSC staff as part of the 2025 Darlington NGS PSA submissions in compliance with the REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.

The potential operational hazards from the DNNP BWRX-300 operation have not been considered for this round of the 2025 Darlington NGS update. OPG will perform a HSA to assess the impact of operational hazards from BWRX-300 operation on the Darlington NGS site when the BWRX-300 operational details and detailed design are available. The impact of DNNP operational hazards on Darlington NGS will be included in the scope of the next Darlington NGS PSA, provided the required inputs are available.

Climate Change

Based on CNSC staff's request in Reference 2 and OPG's subsequent response in Reference 3, the following is an update of the process of conducting a climate change assessment of Darlington NGS:

Since the submission of the 2025 Licence Renewal Application (Reference 1), OPG Nuclear is adapting their methodology to align with the Electric Power Research Institute (EPRI) *Climate Vulnerability Assessment Guidance for Nuclear Power Plants*. As a result, Darlington NGS will also follow this guidance recommendation and has provided an update to CNSC staff via Reference 8.

To summarize, Darlington NGS intends to perform a forward-looking climate risk assessment using the EPRI guidance and has acquired site-specific climatic indicators to identify possible vulnerabilities and develop strategies, if required, to ensure the nuclear assets are resilient to potential future changes in climate. The plan is to identify climate-related hazards followed by an assessment that evaluates the exposure of different components of the plant to these hazards which will lead to a vulnerability assessment where the interactions of the exposed assets and the climate-related hazards are considered to understand the potential impact on nuclear safety. Finally, a risk analysis is to be used to prioritize adaptation strategies considering the available adaptive capacity.

2025 Licence Renewal Application, Section 2.4.3 – Probabilistic Safety Analysis

The following provides additional information regarding the Darlington NGS Probabilistic Safety Assessment:

As per the requirements of REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants* and REGDOC 3.1.1, *Reporting Requirements for Nuclear Power Plants*, OPG performs updates of the Darlington NGS PSA every 5-years. As part of these updates, OPG also prepares a PSA summary report which is released to both the CNSC and the general public. The PSA summary report contains a summary of the methods used to prepare the different PSAs, identifies the changes made with respect to the previous update, and provides the results of the PSAs.

The results of the latest PSA for Darlington NGS from the 2020, *Darlington NGS Probabilistic Safety Assessment Summary Report*, NK38-REP-03611-10072-R002, are provided in the Table below:

Table 2: Results of 2020 Darlington NGS PSAs from NK38-REP-03611-10072-R002

Model	Severe Core Damage Frequency (occurrences per reactor year)	Large Release Frequency (occurrences per reactor year)
Internal Events At-Power	1.7E-06	7.9E-07
Internal Events Outage	4.7E-07	4.6E-07
Internal Fire At-Power	2.8E-05	9.1E-06
Seismic At-Power	7.4E-06	7.4E-06
Internal Flooding At-Power	4.9E-08	1.3E-08
High Wind At-Power	1.9E-06	1.7E-06
Non-Reactor Sources	N/A	7.1E-08
OPG Safety Goal	1E-04	1E-05
OPG Administrative Safety Goal	1E-05	1E-06

Appendix B of OPG's 2025 Licence Renewal Application (Reference 1), provides additional details on specific systems such as the functional and performance requirements, nuclear safety requirements, and projects and modifications on each system or various components within the

system. For each 5-year update cycle, a project freeze date is identified, and all design changes and operational changes which have been made to the plant as of the freeze date are modelled in the PSA. The 2020 Darlington NGS PSA had a project freeze date of December 31, 2018. Any changes to the plant, which have been implemented since then and until the 2025 Darlington NGS PSA freeze date of December 31, 2023, will be captured in the 2025 Darlington NGS PSA, and the impact on the Severe Core Damage Frequency and Large Release Frequency will be quantified.

The following provides additional information regarding the Darlington NGS PSA and the Darlington Refurbishment Project:

The Darlington Refurbishment Project incorporated several Safety Improvement Opportunities (SIOs) to improve plant safety. The following SIOs were credited in the 2020 Darlington NGS PSA:

- Shield Tank Overpressure Protection;
- Powerhouse Steam Venting System;
- Third Emergency Power Generator;
- Installation of Emergency Mitigation Equipment;
- Emergency Service Water make-up to the Heat Transport System.

Following the implementation of these SIOs, there was a significant decrease in the Severe Core Damage Frequency and Large Release Frequency. The results of the 2020 Internal Events At-Power PSAs, which incorporated the SIOs, can be seen in the table below, along with the results from the 2015 PSA, which did not contain credit for the SIOs.

Table 3: Results of the 2015 and 2020 Darlington NGS Internal Events At-Power PSAs

Model	Severe Core Damage Frequency (occurrences per reactor year)	Large Release Frequency (occurrences per reactor year)
2015 Internal Events At-Power PSA	2.3E-06	1.0E-06
2020 Internal Events At-Power PSA	1.7E-06	7.9E-07
Percent Risk Reduction Between 2015 and 2020	26%	21%

To confirm the assignment of probabilities in the PSA appropriately represents SIO changes for each unit, sensitivity cases are run. The 2020 Darlington NGS PSAs ran sensitivity cases to assess the Severe Core Damage Frequency and Large Release Frequency for the station in various refurbishment configurations. In these sensitivity cases, the SIOs were credited for units in post-refurbishment states and were not credited for units in pre-refurbishment states. The 2025 Darlington NGS PSAs will model all four units in post refurbishment state as the baseline and will run sensitivity cases for any units in refurbishment outage during the 5-year cycle.



2.5 Physical Design

Darlington NGS has an effective program to maintain its design basis which meets or exceeds all applicable regulatory requirements and related objectives. The program ensures that Structures, Systems and Components meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Physical Design SCA is available in Section 2.5 and Appendix B of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.5.2 – Site Characterization

The following provides additional information regarding the Darlington NGS Flood Hazard Assessment:

OPG plans to evaluate the potential cumulative impact of the Darlington New Nuclear Project (DNNP) on Darlington NGS flood hazard assessment once the detailed design of DNNP is available. In 2014, OPG performed and documented a detailed hydrological assessment for Darlington NGS and issued NK38-REP-03610-0566868, *External and Construction Hazard Screening and Assessment for Darlington Campus Plan Aggregate Modifications: External Flooding Addendum* in 2015 to document the potential cumulative impact of the Campus Plan modifications (from the Darlington NGS Refurbishment project) on nuclear safety with respect to external hazards. The addendum was revised in 2017 to reflect the latest campus plan.

In 2022, a flood hazard assessment for the DNNP site was prepared (NK054-REP-02730-00001, *BWRX-300 DNNP Development Flood Hazard Assessment*). This assessment identified flood hazards at the DNNP site due to natural and human-induced hydrological and meteorological events internal and external to the site, including simultaneous combinations of these events.

2025 Licence Renewal Application, Section 2.5.5.2 – Environmental Qualification of Equipment)

The following provides additional information regarding Environmental Qualification requirements:

Darlington Environmental Qualification (EQ) assessments and Preventive Maintenance program addresses the station life for all environmentally qualified equipment and inherently includes extended commercial operation. N-PROG-RA-0006, *Environmental Qualification* addresses operation for the entire life of the plant, which is as per REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear Power Plants* and CSA N290.13, *Environmental qualification of equipment for nuclear power plants* and is captured under Section 1.1, *Program Requirements*. Section 1.1 also ensures that documentation and demonstration of qualification is maintained current with the plant licensing basis.



2025 Licence Renewal Application, Section 2.5.5.3 – Electromagnetic Interference

The following provides an update on the status of the revision of the OPG guidelines for Electromagnetic Compatibility:

OPG has guidelines in place for Electromagnetic Compatibility testing in conjunction with the Engineering Change Control process. The guidelines provide design engineering teams with International Electrotechnical Commission standards and test levels to consider in their design and testing requirements for instrumentation and electrical equipment. This allows for the mitigation of potential Electromagnetic Interference issues, and appropriately considers the criticality and safety classification of the System Structures and Components.

Since submission of the 2025 Licence Renewal Application (Reference 1), the OPG guidelines for Electromagnetic Compatibility have been revised to take into account:

- Guidance from Electric Power Research Institute TR-102323, *Guidelines for Electromagnetic Interference Testing in Power Plants*; and,
- Updates to the International Electrotechnical Commission 61000 series, *Electromagnetic Compatibility*, of standards.

2025 Licence Renewal Application, Section 2.5.5.6 – Reactor and Reactor Coolant Systems Nuclear Design and Core Nuclear Performance

Update on Nuclear Design and Core Nuclear Performance

The following provides an update regarding the Cobalt-60 modification:

There is a permanent core design change to replace existing adjuster rods with cobalt adjusters of similar reactivity worth in all units. A recent amendment to the PROL allows Darlington NGS to operate with cobalt adjuster rods to generate the Cobalt-60 radioisotope (Reference 4). This modification will be first commissioned in Unit 1 return to service.

2025 Licence Renewal Application, Appendix B – B.17, Plant Auxiliary Systems – Water Treatment Plant


The following provides an update regarding the available for service date of the new Demineralized Water Plant:

The new Demineralized Water Plant currently has a target available for service date of the end of Q4-2024.

2.6 Fitness for Service

The Darlington NGS fitness for service program ensures all equipment is available to perform its intended design function when called upon to do so. The physical condition of structures, systems and components at Darlington NGS remain available, reliable, effective and consistent with design, analysis and quality control measures.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Fitness



for Service SCA is available in Section 2.6 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.6 – Fitness for Service

The following provides additional information regarding Darlington NGS Compliance Verification Criteria documents:

The following non-OPG COG documents are Compliance Verification Criteria documents listed in the current Darlington Licence Conditions Handbook, LCH-PR-13.03/2025-R005, Licence Condition 6.1:

- COG-JP-4107-V06-R03, *Fitness-for-Service Guidelines (FFSG) for Feeders in CANDU Reactors*; and,
- COG-07-4089-R02, *Fitness-for-Service Guidelines for Steam Generator and Preheater Tubes*.

The following provides additional information regarding documents supporting the major components Periodic Inspection Program:

The following documents support the major components Periodic Inspection Program:

- I-STD-AS-0003, *Non-Destructive Examination*: this standard ensures that Advanced Inspection and Maintenance conducts Non-Destructive Examination in a planned and controlled manner using approved procedures and qualified personnel, including inspections to support the Periodic Inspection Program and the Sites' PROL in accordance with the applicable CSA Standards.
- N-PROC-MA-0052, *Flaw Dispositioning*: this procedure is to establish generic process and accountabilities for evaluation of CSA N285.4, *Periodic inspection of CANDU nuclear power plant components*, and N285.5, *Periodic inspection of CANDU nuclear power plant containment components*, periodic inspection results and preparation and submission of a disposition to the CNSC, and ensure disposition conditions are not exceeded. This procedure applies to components subject to periodic inspection under CSA N285.4 or N285.5.
- N-REP-31100-10041, *Acceptance Criteria and Evaluation Procedures for Material Surveillance Pressure Tube*: this report provides an outline of measurement and evaluation procedures, references to detailed testing procedures and acceptance criteria for the test results. Clause 12.4 of CSA N285.4 identifies mandatory material surveillance requirements for pressure tubes removed for material property testing.
- N-PROC-MA-0044, *Fuel Channel Life Cycle Management*: this procedure establishes the process to produce the fuel channels life cycle management plan to ensure each nuclear generating Unit maintains a current fuel channel periodic inspection program in accordance with requirements of CSA N285.4, Clause 12, *Fuel Channel Pressure Tubes - Supplementary Inspection*.
- N-PLAN-01060-10007, *Feeders Technical Basis Document*: this document is intended as a companion to N-PLAN-01060-10001, *Feeders Life Cycle Management Plan*. The background information, supporting documentation referenced, underlying rationales supporting the life cycle management plan strategies and fitness for service assessments are included in this technical basis document.



2025 Licence Renewal Application, Section 2.6.3.1 – Systems, Structures or Components-Specific Aging Management Plans

Fuel Channel Aging Management

The following provides additional information regarding fuel channel aging management and CSA N285.8:

The fuel channel life cycle management plan is updated annually to capture new information from outage inspections, research, and operating experience, in addition to activities planned in compliance with CSA N285.4, *Periodic inspection of CANDU nuclear power plant components* and CSA N285.8, *Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors*. With the implementation of the fuel channel life cycle management plan, OPG will continue to demonstrate that aging mechanisms are understood and confirm that component condition remains acceptable via monitoring and inspection for post-refurbishment operation. OPG has committed to the long-term use of CSA N285.8 requirements for pressure tube fitness-for-service evaluations through compliance plan, N-REP-31100-10061, *Compliance Plan for Long-Term Use of CSA N285.8 for In-Service Evaluation of Zirconium Alloy Pressure Tubes*.

2025 Licence Renewal Application, Section 2.6.5 – Periodic Inspection and Testing and Structural Integrity

Darlington NGS CSA N285.7 Periodic Inspection Program

The following provides additional information regarding CSA N285.7:

CSA Standard N285.7, *Periodic inspection of CANDU nuclear power plant balance of plant systems and components* defines the requirements for the periodic inspection of balance of plant pressure-retaining systems, components, and supports that form part of a CANDU nuclear power plant. OPG submitted the Darlington NGS Transition Plan to CNSC staff for the 2021 edition of CSA Standard N285.7 in September 2024; per the timelines in Reference 5, and report NK38-REP-03680-11940, *Darlington NGS Periodic Safety Review (D-PSR): Integrated Implementation Plan*. The Transition Plan provides the plan and schedule for completing the work required for Darlington NGS's compliance with the Standard.

2.7 Radiation Protection

Darlington NGS has an effective Radiation Protection (RP) program that meets or exceeds all applicable regulatory requirements and related objectives. The health and safety of persons is protected through the implementation of the RP program, which ensures that radiation doses are kept below regulatory dose limits and are optimized and maintained As Low As Reasonably Achievable (ALARA). Radiological impacts of plant operation to workers and the public will continue to be of an acceptable level.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Radiation Protection SCA is available in Section 2.7 of the 2025 Licence Renewal Application (Reference 1).



2025 Licence Renewal Application, Section 2.7.2 – Worker Dose Control

The following provides additional information regarding the use of radiation detection instrumentation at Darlington NGS. This includes a description of how these instruments are selected, calibrated, maintained, and monitored for end-of-life, as well as an assessment of any shortcomings associated with the current suite of instruments:

Radiation Protection Equipment and Instrumentation

The process for ensuring approved RP instruments are used, calibrated, maintained and monitored for end of life is documented in N-PROC-RA-0066, *Lifecycle Management of Radiation Protection Instruments* as follows:

Selection of RP instrumentation:


- Only approved RP instruments shall be purchased as listed in N-EL-03425.42-10000, *List of Radiation Protection Instrumentation Approved for Purchase in Ontario Power Generation, Nuclear*. Approved RP instruments for specialized use are listed in N-EL-03425.42-10001, *List of RP Instrumentation for Specialized Use in OPG Nuclear*.
- Requests for the introduction of a new make, model or type of RP instrument requires a completed OPG-FORM-0260, *Change Management Plan*, in accordance with standard OPG-STD-0140, *Managing Change*, that is submitted to the Manager, Health Physics Department for approval. This standard outlines the Change Management approach to ensure changes achieve their intended results, maximize outcomes, and minimize risk. The Health Physics Department-Radiation Protection Programs and Field Support Section (HPD-RPP&FS) prepares an implementation plan that includes development of technical specifications if required, and an evaluation and performance testing against both site-specific conditions and specifications. The plan will ensure that instruments to be used at site have been acceptance tested.

Calibration of RP instrumentation:

- As per instruction N-INS-09071-10009, *Requirements for the Calibration and Maintenance of Radiation Protection Instruments*, all RP instruments, fixed or portable, shall be calibrated at least once a year. Calibrations shall be performed in accordance with procedures approved by the Health Physicist Instrumentation at HPD-RP Programs & Field Support (HPI-FS). Calibration of Fixed Area Alarming Gamma Monitors (FAAGM) and Fixed Area Alarming Tritium Monitors (FAATM) are performed using approved Control Maintenance procedures. An instrument record shall be generated each time an instrument is calibrated and a label indicating the calibration date shall be applied to the instrument. Darlington NGS uses a software solution for tracking of maintenance and calibration of RP instruments through procedures N-PROC-MA-0070, *Calibration of Field Equipment* and N-PROC-MA-0015, *Tool Control*.

Maintenance of RP Instrumentation:

- For each type of RP instrument, the manufacturer's service manual shall be registered as a controlled document in accordance with OPG-PROC-0178, *Controlled Document Management*. All maintenance work shall be performed in accordance with the



registered service manual. A maintenance record or Work Report shall be generated each time an instrument is reported defective. RP instruments that have deficiencies noted during pre-operational checks will be identified with a defective instrument tag and removed from service pending repairs. Instruments reported defective shall be calibrated before they are returned to service.

Monitoring RP Instrumentation for End-of-Life:

- Manager Health Physics Department approves the maintenance-related Performance Indicators developed by HPI-FS to monitor the performance of portable RP instrumentation while in service. Performance Indicators are metrics used to track the health of the inventory of RP Instruments in use at OPG for availability and monitoring for end of service life. The indicators are divided into two distinct groups, Health Physics and Maintenance:
 1. Health Physics Indicators deal with the instrument's ability to accurately measure the radiation hazard it is designed to measure.
 2. Maintenance Indicators deal with the instrument's availability for use which is influenced by factors such as mean time between failures and includes managing the instrument inventory at sites. Factors such as cost (time and materials) to keep an instrument in service can also be used to determine service life. A description of performance indicators is referenced in N-INS-03425.41-10002, *Performance Indicators for Radiation Instruments*. HPI-FS collects data on performance and availability of portable RP instruments and prepares monthly Performance Indicator Report on Portable Radiation Instruments. Site HPIs prepare quarterly Fixed Instrument reports that capture the results of instrument sensitivity checks, availability, and detector lifetime. For monitors located at Zone 1 or public domain exit boundaries, challenge testing is performed annually. Deliberate failure tests are performed every 5-years or whenever modifications to the monitor due to hardware, firmware or software changes. Site HPI review Station Condition Records and Work Reports and utilize performance monitoring and self-assessments to identify industry best practices. Copies of Performance Indicator reports are provided to the site Section Manager, ALARA for local trending and to the Manager, RPP&FS, HPD for fleet trending and review to determine if changes to instrument calibration or maintenance are required. Annual reviews are also conducted to identify new instrument purchase requirements and replenishment of spare parts inventory necessary to ensure availability of instruments.
- System Engineers associated with Radiation Protection are assigned to monitor the performance of fixed RP monitoring systems, such as FAAGMs and FAATMs. As documented in procedure N-PROC-MA-0024, *System Performance Monitoring*, System Engineers conduct system monitoring activities in accordance with System Performance Monitoring Plans and initiate remedial actions in accordance with the Performance Monitoring Equipment List. FAAGMs and FAATMs are considered a "Tier 3" system (not production critical) and do not require monitoring in accordance with N-PROC-MA-0024, however they are still subject to all other applicable OPG nuclear programs and processes whereby some monitoring elements may use this procedure as a guide. With respect to FAAGMs, they are monitored on a "level of effort" basis as this Tier 3 system may consider system significance and impact of system failure in combination with:

1. System health history.
2. Chronic or repeat performance issues.
3. Degree of reliability assured by implemented activities in combination of:
 - Preventive, or Predictive Maintenance or Condition Based Monitoring

Therefore, a system performance monitoring plan and system walkdown performance element has been put in place for the FAAGMs.

Shortcomings Associated with Current Suite of Instruments:

- The neutron meters currently in use at Darlington are challenging to use (heavy and bulky) and are limited in quantity and availability. As part of life cycle management, HPD-RPP&FS are currently reviewing and assessing new neutron meters that have improved ergonomics and availability.
- RP identified a need for a portable tritium monitor that could measure airborne tritium concentrations at 5 MPCa or less that was intrinsically safe for use in the Tritium Removal Facility (TRF). HPD-RPP&FS were able to assess, approve and supply intrinsically safe tritium meters capable of measuring low concentrations (1 MPCa) for use in the TRF.
- A project is currently ongoing to replace the FAAGMs and FAATMs that have been in service since the station was built. Replacement is conducted due to the aging of equipment and obsolescence of spare parts.
- HPD-RPP&FS are assessing models of Electronic Personal Dosimeters that can measure neutron dose.

2025 Licence Renewal Application, Section 2.7.3 – Radiation Protection Program Performance


The following provides additional information regarding the outage work program series at Darlington NGS. Included are tables summarizing the major work series that contributed to Collective Radiation Exposure (CRE) values, along with lessons learned and results of self assessments over the current licensing period:

Outage Work Series

The following Table are the outage work program series summary of the ALARA plans contributing to collective dose:

Table 4: Outage – Major Work Series Contributing to Yearly CRE

Year	Outage – Major Work Series
2015	<ul style="list-style-type: none"> • Feeder Inspections. • Shield Tank Overpressure Protection (STOP) Modifications. • Fuel Channel Inspections.
2016	<ul style="list-style-type: none"> • STOP Modifications. • Feeder Inspections. • Fuel Channel Inspections.




Year	Outage – Major Work Series
2017	<ul style="list-style-type: none"> • Single Fuel Channel Replacement. • STOP Modifications. • Feeder Inspections. • Feeder Scanner Replacement. • Fuel Channel Inspections.
2018	<ul style="list-style-type: none"> • Fuel Channel Inspections. • Reactor Maintenance Support. • Feeder Inspections.
2019	<ul style="list-style-type: none"> • Feeder Inspections. • Fuel Channel Inspections. • Feeder Channel Replacement.
2020	<ul style="list-style-type: none"> • Single Fuel Channel Replacement.
2021	<ul style="list-style-type: none"> • Fuel Channel Inspections (new tooling). • Feeder Inspections. <p>Note: there were two planned outages in 2021 with the major work series above.</p>
2022	<ul style="list-style-type: none"> • Target Delivery Installation.
2023	<ul style="list-style-type: none"> • Not applicable – no planned outages.

Lessons Learned from Major Work Series

The following Table provides a summary of the outage work program series lessons learned.

Table 5: Summary of Major Work Series Lessons Learned

Major Work Series	Lessons Learned and Operating Experience	Dose Reduction Trend (adjusted for source term and scope)
Feeder Inspections	<p>Development of remote tooling used for inspection of graylocs and instrument lines to maximize distance from source.</p> <p>Work control enhanced sequencing and logic of inspection locations to minimize platform movements, scaffold modifications, and feeder panel removals.</p> <p>Use of teledosimetry and rovers to minimize number of personnel on the reactor maintenance platform.</p>	Decrease.
Fuel Channels Inspections (Damp Scrape)	<p>In 2018, dose rates and contamination levels on used cutters increased due to deeper axial oxide cuts. Additional Silflex shielding installed on flasks containing cutters to minimize dose to personnel during shipping and transport.</p> <p>Contamination control on the maintenance platform: Installation of additional layers of Dandex to ease decontamination. Ensuring equipment</p>	<p>Measures put in place in 2018 contributed to a decrease trend in dose.</p> <p>In 2021, to accommodate a new sampling strategy, new tooling was used to conduct fuel channel sampling. The dose associated with the initial deployment of the new tooling was higher than expected.</p>



Major Work Series	Lessons Learned and Operating Experience	Dose Reduction Trend (adjusted for source term and scope)
	<p>is wrapped on the maintenance platform prior to craning down to vault floor.</p> <p>Embedding RP staff into inspection crews on the same shifts to improve effectiveness of mock-up training.</p>	<p>Through mock-up and proficiency improvement, the dose associated with the inspection remained consistent campaign over campaign.</p> <p>The method of manual fuel channel inspections are being replaced by automated machine delivery scrape in future post-refurbishment outages. Therefore, exposure to staff is expected to be significantly reduced.</p>
STOP Modifications	<p>Scaffold and platform installation and removal assessments improved (more detailed pictures and floor plans) to minimize rework and adjustment during execution.</p> <p>Temporary shielding improvements: Installation of scaffold shield wall to facilitate hanging of temporary shielding to reduce work area dose rates on the STOP platform. Heavy duty carabiners used for quicker installation and easier manipulation.</p> <p>Pre-fabrication of piping outside containment to minimize exposure time.</p>	<p>The STOP modification incorporated lessons learned from previous campaigns, and area dose rates were optimized using shielding strategy based on lessons learned from initial execution. The dose trends are comparable to each campaign after considering source term performance of each unit.</p>
Single Fuel Channel Replacement	<p>Specific and detailed access restrictions were established, based on extensive beam surveys to prevent unplanned exposures during open beam conditions.</p> <p>Procedural updates to ensure garter springs locations are monitored and controlled during removal to prevent exposure to personnel.</p>	Decrease.
Feeder Scanner Replacements	<p>Additional temporary shielding on Emergency Coolant Injection lines directly above feeder scanner pit to minimize work area dose rates.</p> <p>Pre-fabrication and connection of cables outside containment to minimize exposure time.</p>	Decrease.

ALARA Self-Assessments

The following Table provides the ALARA self-assessments, documenting a summary of recommendations, actions and benefits.

Table 6: ALARA Self-Assessments

Self-Assessment	Recommendations & Actions	Details/Benefits (Actions are complete)
1	Revise damp scrape RP Coordinator assist plan. Addition to daily dose report: D2O trench level and status.	To improve contamination control practices during execution and demobilization. To bring awareness to outage organization on contributors to containment tritium levels and request assistance from Operations to drain.
2	Horizontal Flux Detectors and Liquid Injection Shutdown System shielding improvements. Emergency Coolant Injection shielding installation.	To improve Horizontal Flux Detectors and Liquid Injection Shutdown System shielding strategy to maximize shielding coverage. Continue to track progress on project to install magnetic steel bands permanently on all units to facilitate magnetic shielding installation and removal.
3	Implement the Rapid Access Program. Personal Contamination Events trending above year-to-date recovery plan.	Improved software for access control, streamlines process and qualification checks. Workgroup oversight during outages for tasks involving heavily contaminated equipment.
4	Electronic Personal Dosimeter dose alarm event mitigation. Contamination control.	Teledosimetry communication improvements and protocols. Dose alarm operating experience in continuing training. Mentoring of maintenance supervision to assess and recognize work with elevated contamination risk and utilize independent oversight as applicable to maintain ALARA.

2025 Licence Renewal Application, Section 2.7.4 – Radiological Hazards Control


Planning for Unusual Situations:

The following provides additional information regarding the RP provisions during unusual situations at Darlington NGS:

The category areas in the Table below document RP provisions for planning for unusual situations.

Table 7: RP Provisions for Planning for Unusual Situations

Category Area	Radiation Protection Provisions
Access Controls	<ul style="list-style-type: none"> Assembly Areas for personnel accounting to help ensure personnel exposures are minimized from radiological hazards associated with incident area(s).



Category Area	Radiation Protection Provisions
	<ul style="list-style-type: none"> Number of site support personnel strategically managed through Resource Deployment Manager in Site Management Centre to ensure number of potential personnel exposures are minimized. Site ingress and egress considerations based on weather conditions, radiological conditions, and timing to any planned radiological release.
Habitability Controls	<ul style="list-style-type: none"> Routine (hourly) radiation surveys conducted to establish habitability. Eating and drinking provisions under the direction of Health Physics Manager. Alarming gamma monitors alert personnel of changing radiological conditions.
Communication Systems	<ul style="list-style-type: none"> Updates between Health Physics Manager in the Site Management Centre and Health Physics Director in the Corporate Emergency Operations Facility. Communication available through direct landline, cell phone, third party web platform, fax, or dedicated beyond design basis accident telecommunication system and radio equipment.
Radiation Monitoring Capabilities	<ul style="list-style-type: none"> Redundancy in exit radiation monitors for personnel. Live-time transmitting gamma and tritium monitoring; hourly surveys obtained, reviewed, and transmitted. Routine in-plant surveys for gamma dose rate, airborne tritium, and airborne particulate conducted by in-plant survey team at strategic locations, including corridors, airlocks, heat transport pump rooms, and other areas as directed by the Shift Manager. Chemistry lab includes capabilities for analyzing airborne samples for radioiodine. Gaseous Fission Product system includes sensitivity and alarms to key radionuclides associated with fuel defects.
Portable Emergency Response RP Equipment and Instrumentation	<ul style="list-style-type: none"> Multiple D2O spill cabinets available throughout the plant for optimized spill response. Dedicated portable gamma instruments poised for use (includes capabilities for high range detection and extension probe for increased distance). Standalone dosimetry devices available for use when the standard services are unavailable or when directed by Shift Manager or Health Physics Manager. N-PROC-RA-0040, <i>Maintenance and Testing of OPG Nuclear Emergency Response Organization Facilities and Equipment</i> includes addition site instructions to manage RP equipment checks supporting assembly area cabinets, in-plant survey team cabinets, off-site survey team, and Transportation Emergency Response Plan.
Radiation Personal Protection Equipment	<ul style="list-style-type: none"> N-PROC-RA-0025, <i>Selection of Radiation Personal Protection Equipment</i> is followed to the extent practical.

Category Area	Radiation Protection Provisions
	<ul style="list-style-type: none"> Provisions for radiation personal protective equipment under emergent work documented with use approvals required by Responsible Health Physicist.

Retube Waste Processing Building

The following provides additional information regarding the scope of decommissioning and demobilization of the Retube Waste Processing Building and its contents.

OPG Refurbishment RP decommissioning project groups have initiated preliminary discussions regarding the scope of decommissioning and demobilization of the Retube Waste Processing Building and its contents. As part of the ALARA process under program N-PROG-RA-0013, *Radiation Protection* and procedure N-PROC-RA-0027, *Radioactive Work Planning, Execution and Close Out*, an assessment of the impact on the health and safety of persons will be performed as part of N-PROC-RA-0027, Section 1.9.3, “ALARA Plans”. Dose estimation is part of the planning process as well as identifying opportunities to reduce dose in specific tasks.

Darlington Worker Dose

The following Table provides additional information regarding worker dose data requested by CNSC Staff in Reference 9. This data has not historically been collected through the Nuclear Power Plant Personnel report.

Table 8: Worker Dose Data for a Nuclear Energy Worker

Regulatory Limit for a NEW	Dose Statistic for a NEW	2015	2016	2017	2018	2019	2020	2021	2022	2023
500 mSv/year	Average ² skin dose (mSv)	1.24	1.47	3.31	2.75	1.97	1.28	3.76	3.04	2.84
	Maximum skin dose (mSv)	18.59	9.27	19.45	19.25	12.49	9.89	20.18	20.43	20.92
500 mSv/y	Average ² extremity dose (mSv)	2.15	2.01	4.38	3.56	2.44	1.53	4.33	3.19	3.05
	Maximum extremity dose (mSv)	29.23	17.57	40.49	183.24	69.97	19.31	31.53	20.43	26.05
150 mSv/y (prior to Nov 2020) ¹	Average ² Lens-of-Eye dose (mSv)	N/A	N/A	N/A	N/A	N/A	N/A	3.75	3.0	2.8
50 mSv/y (after Nov 2020)	Maximum Lens-of-Eye dose (mSv)	N/A	N/A	N/A	N/A	N/A	N/A	19.95	19.4	20.2
Regulatory Limit for a NEW	Dose Statistic for a NEW	Previous Regulatory Dose Period*: 01 January 2016 – 31 December 2020 (mSv)				Current Regulatory Dose Period*: 01 January 2021 – 31 December 2025 (mSv) (provide dose to date) ⁴				
100 mSv effective dose over a 5-year regulatory dose period	Maximum individual effective dose for a NEW at the DNGS	52.19				67.4				
	Average ² individual effective dose for a NEW at the DNGS	5.11				6.82				

¹ Prior to 2020 for a Nuclear Energy Worker (NEW) the regulatory eye dose limit was 150 mSv per annum. OPG did not record eye dose prior to 2020 as annual total effective dose was used as a limiting factor.

² Average value is calculated based on non-zero doses.

³ Dose reported above is based on OPG's dosimetry year, not calendar year.

⁴ Calculated based on doses from 2021 - Q2 2024.



2025 Licence Renewal Application, Section 2.7.4.1 – Enhancements and Methods for Improved Radiological Hazards Control

The following provides additional information regarding the initiatives and changes to enhance RP/ALARA performance at the Darlington NGS for the proposed licensing period:

OPG is undertaking various opportunities in an effort to reduce worker exposures and keeping collective doses ALARA. This includes, but is not limited to, the following initiatives and programs:

New Type of Channel Closure Plugs

OPG is utilizing a new type of channel closure plugs, effectively managing channel leakage during various Primary Heat Transport operating states during unit outages, effectively containing tritiated water within the Primary Heat Transport system and lowering vault tritium.

Enhanced Fuel Channel Inspection Techniques

Enhancing fuel channel inspection techniques by utilizing a Rapid Deployment System including Advanced Non-Destructive Examination (ANDE) inspections, ANDE replication (contingency) and Machine Delivered Scrape. The ANDE system is used to perform volumetric and dimensional inspection and replication of selected fuel channel flaws, while the Machine Delivered Scrape system is to take pressure tube samples using the Circumferential Wet Scrape Tool. Utilizing these systems will greatly reduce worker exposure by eliminating ice plug work inside feeder cabinets and eliminate workers performing channel inspection in front of the reactor face. The added benefit of eliminating formation of channel ice plugs will also aid tritium recovery within containment by maximizing performance on the Vault Vapour Recovery System.

Radionuclide Characterization


The objective of a radionuclide characterization program is to determine the radionuclide distribution of contamination at Darlington NGS by nuclide speciation. This process is useful to confirm that the assumptions made in the dosimetry program and contamination control and monitoring program are justified. Darlington NGS is required to undertake a routine radionuclide characterization program at a minimum every 5-years. This includes new buildings, sites, plant modifications (such as isotope production) or reactors where radionuclide materials are anticipated and may result in airborne radiological hazards during work activities. This is to manage any new radiological source term and the associated radiological hazard/risks. The associated instruction is N-INS-09071-10019, *Radionuclide Characterization at OPG Nuclear Facilities*.

Emergency Coolant Injection Steel Band Modifications

The last set of Emergency Coolant Injection bands, to facilitate shielding, will be installed in Unit 3 by 2026 during the planned maintenance outage. Expected dose savings from this initiative will continue to benefit staff accessing the 111m elevation and working/traversing near the Emergency Coolant Injection lines.

Moderator D2O Supply Line Cut and Cap Modification

This modification is expected to terminate accumulation of radionuclides within the Horizontal Flux Detectors and Liquid Injection Shutdown System heavy water bellows, in the Shutdown System 2 bunker. Project preparation is currently underway. When instituted, expected dose



savings from the initiative will benefit all personnel performing maintenance on Shutdown System 2 components inside containment during outages.

Additional Initiatives:

- As part of the ALARA program, outage activity transport monitoring surveys will continue on planned outages. Source term characterization surveys are completed as part of the ALARA program requirement to trend potential changes in radionuclide composition. The Site ALARA Committee acts as an oversight entity on site CRE performance and ensuring actions are in place for continued dose reduction efforts and meeting industry CRE goals.
- The tritium oversight committee provides weekly updates on site tritium performance. Its mandate is to place priority and focus on maintaining station's tritium recovery systems, as well as keeping station and public dose ALARA. The committee is currently tracking tritium initiatives such as key component replacement to restore fueling facilities auxiliary areas Vault Vapour Recovery System and TRF availability. The team also assesses the deployment of portable tritium recovery devices as applicable.
- The Darlington RP Department meets on a quarterly basis with site CNSC personnel and CNSC RP specialists from Ottawa to review and discuss RP related topics such as:
 - RP Performance Indicators – monthly metrics.
 - Ongoing and new initiatives.
 - Outage performance and preparation for upcoming outages.
 - Planned updates/changes related to RP procedures.
 - Review of action items and outstanding items from previous meetings.
 - Additional Items – Station Condition Records, trend reports and Operating Experience.
 - Self-Assessments and nuclear oversight audits.
- Darlington NGS provides the necessary information and support for various requests during CNSC audits, including inspections such as Type I, Type II, Desktop and field inspections as well as compliance assessments. These audits are often conducted numerous times over a given licensing period. The scope of the audits involves OPG's response, correction, and/or closure to CNSC observations and findings related to RP matters.
- OPG is an active member of COG and participates in Peer Team meetings to exchange lessons learned and best practices from industry peers. The COG Peer Team also establishes various working level task teams to align industry best practices.

2.8 Conventional Health and Safety

OPG is committed to preventing workplace injuries and ill health, and continuously improving employee health and safety performance. The goal of OPG's Conventional Health and Safety program is to ensure a healthy and injury-free workplace by managing risks resulting from the activities, products, and services associated with OPG's Darlington NGS operations.

The following sections provide a description of updates since the application submission in this area. More information on the Conventional Health and Safety SCA is available in Section 2.8 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.8.1.1 – Accident Frequency Rate

The following provides an update on the Darlington NGS Accident Frequency Rate statistics:

The Accident Frequency is the sum of the fatalities, lost-time injuries and medically treated injuries multiplied by 200,000 person hours worked at a Nuclear Power Plant, per exposure hours.

OPG’s commitment to continuously improve performance is reflected by setting challenging targets for safety performance metrics. Darlington NGS has continually tightened its target rate for disabling injuries, and its safety performance has been below (better than) target since 2019 to Q3 2024. The figure below provides an update to Figure 21 of the 2025 Licence Renewal Application (Reference 1) to include the Q3 2024 data.

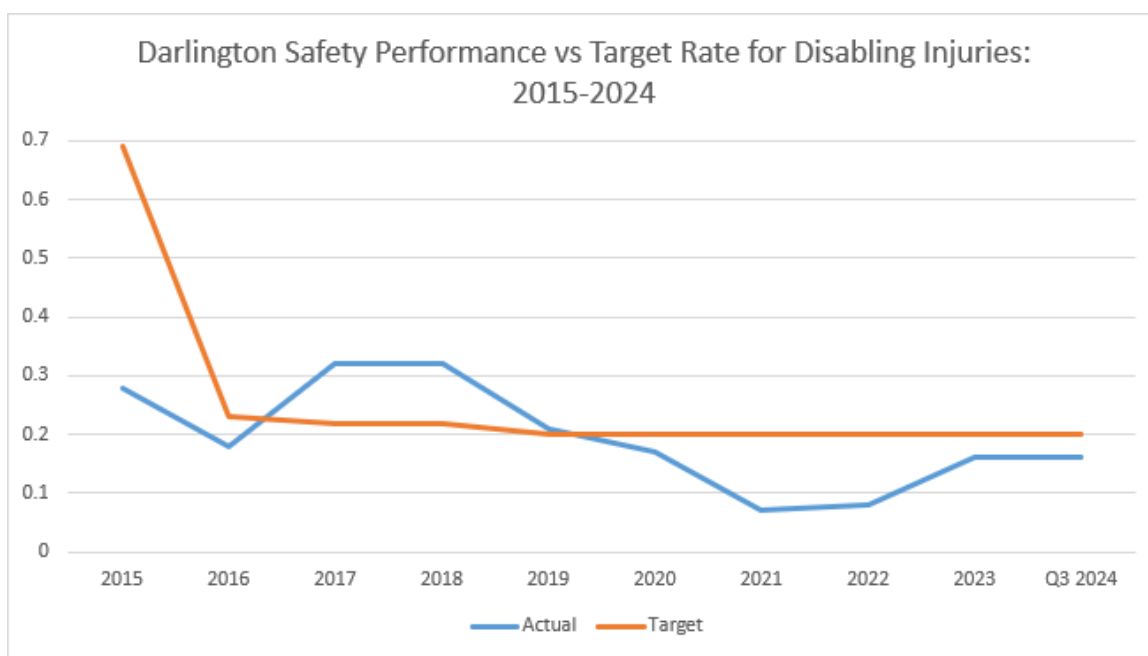


Figure 2: Darlington NGS – Accident Frequency Rate 2015-Q3 2024

2025 Licence Renewal Application, Section 2.8.1.2 – Industrial Safety Accident Rate (ISAR)

The following provides an update on the Darlington NGS Industrial Safety Accident Rate statistics:

The ISAR is a frequency rate based on the number of lost-time injuries for Nuclear Power Plant (NPP) personnel per 200,000 hours worked (excluding contractors).

The Darlington NGS has upheld a consistent record of zero lost time injuries from 2019 up to Q3 2024. The figure below provides an update to Figure 22 of the 2025 Licence Renewal Application (Reference 1) to include the Q3 2024 data.

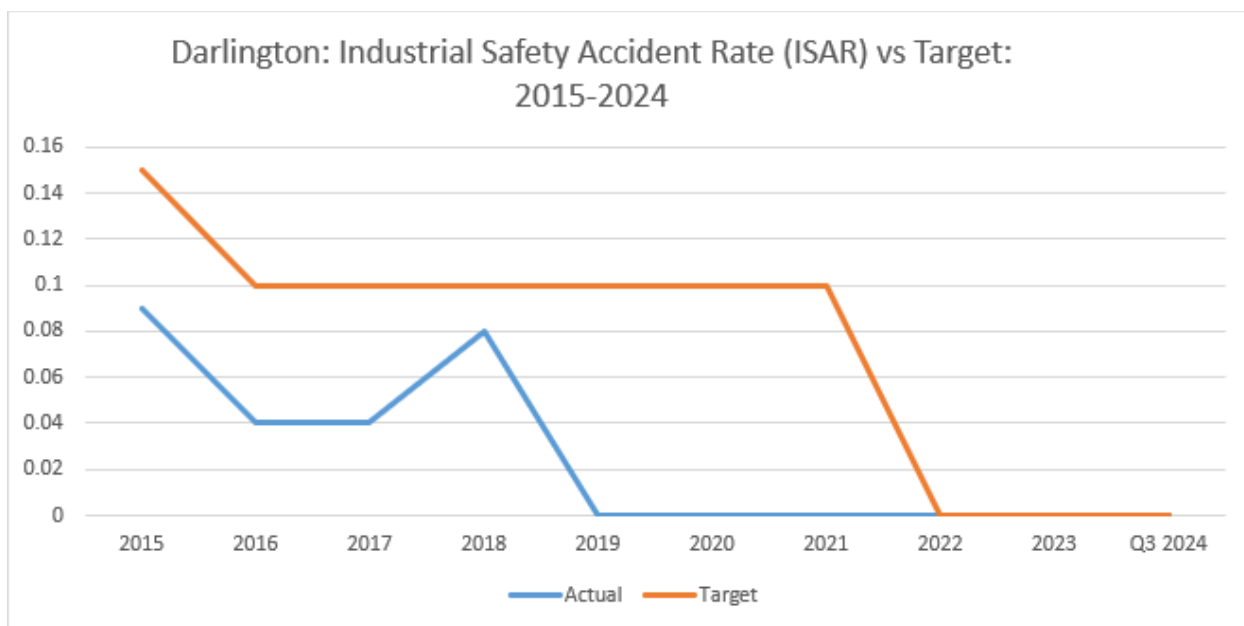


Figure 3: Darlington NGS – Industrial Safety Accident Rate (ISAR) vs. Target 2015-Q3 2024

2025 Licence Renewal Application, Section 2.8.1.3 – Accident Severity Rate (ASR)

The following provides an update on the Darlington NGS Accident Severity Rate statistics:

The ASR is the number of days lost multiplied by 200,000 person hours worked at a Nuclear Power Plant, per exposure hours.

Darlington NGS has upheld a consistent record of zero lost time injuries, resulting in no lost time days up to Q3 2024 since 2019. The figure below provides an update to Figure 23 of the 2025 Licence Renewal Application (Reference 1) to include the Q3 2024 data. There are no targets set for ASR.

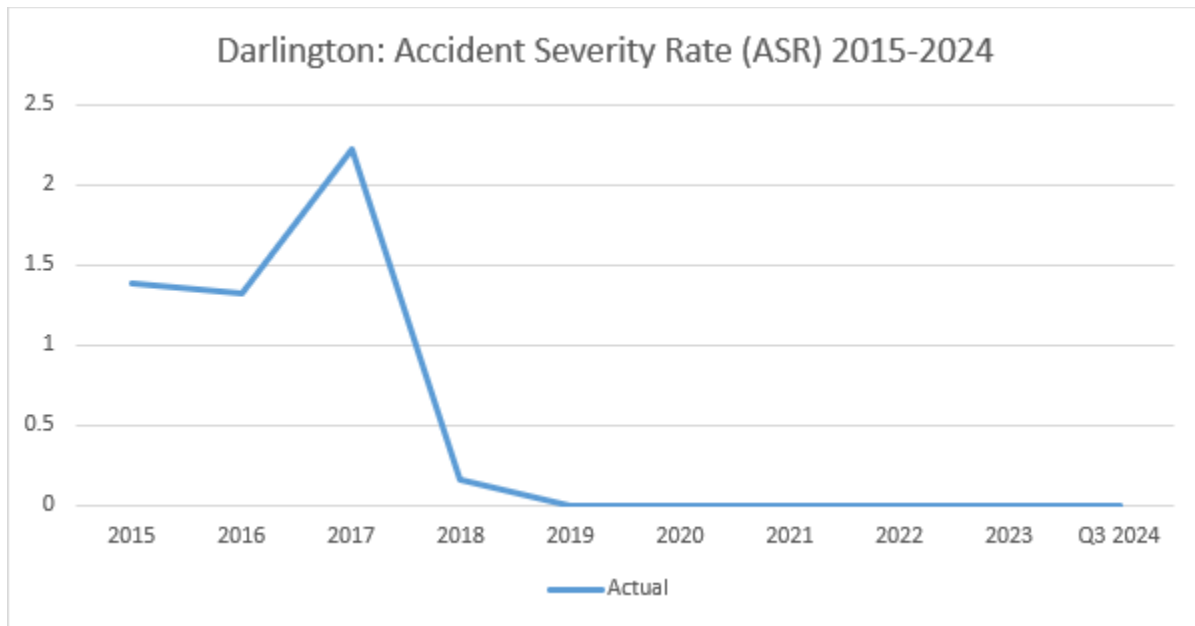


Figure 4: Darlington NGS – Accident Severity Rate (ASR) 2015-Q3 2024

2025 Licence Renewal Application, Section 2.8.1.4 – Serious Injury Incidence Rate (SIIR)

The following provides an update on the Darlington NGS Serious Injury Incidence Rate statistics:

The SIIR is defined as the number of work-related accidents for all OPG employees that result in serious injuries or fatalities, per 200,000 person-hours worked. This metric focuses on more serious injuries, assists in maintaining attention on high-consequence hazards, and accounts for the actual injury instead of the type of medical treatment.

Darlington NGS SIIR has remained at zero since the introduction of the new safety performance metric in 2020 up to Q3 2024.

2025 Licence Renewal Application, Section 2.8.1.5 – Timely Completion of Safety Corrective Actions (TCSCA)

The following provides an update on the Darlington NGS Timely Completion of Safety Corrective Actions Annual Comparison:

TCSCA aims to prioritize completion of safety related actions in a timely manner. TCSCA is the percentage of corrective actions, arising from safety events, that are completed on or before the initial due date (zero extensions).

Darlington NGS consistently demonstrates its commitment to prioritizing safety-significant work since the introduction of the leading indicator metric in 2019. Darlington NGS has performed better than target since the introduction of the metric and maintained 100% for the past 4-years. The figure below provides an update to Figure 24 of the 2025 Licence Renewal Application (Reference 1) to include Q3 2024 data.

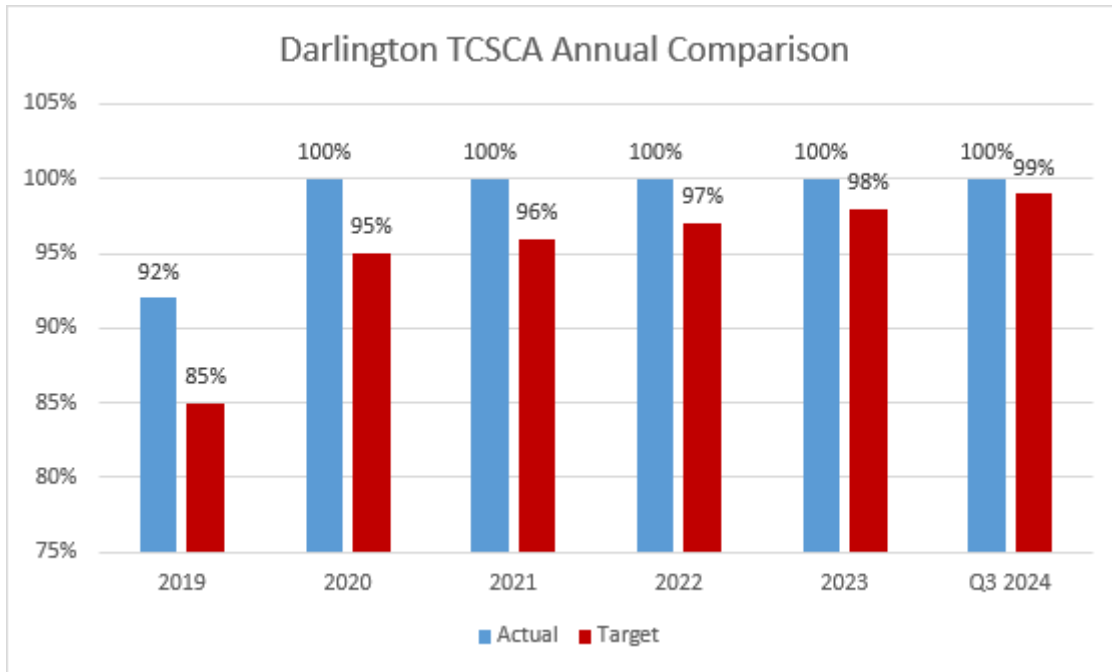


Figure 5: Darlington NGS – TCSCA Annual Comparison

2.9 Environmental Protection

OPG's comprehensive environmental protection programs aim to continually minimize impacts from the station operation on the environment and human health. This is achieved by ensuring that there are multiple barriers in place to control and minimize emissions to the environment and to ensure emissions are monitored.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Environmental Protection SCA is available in Section 2.9 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.9.1 – Environmental Management System

The following is an update on the status of OPG's ISO Environmental Management System 14001 re-certification:

OPG maintains an Environmental Management System (EMS) that implements the requirements of OPG's Environmental Policy and is consistent with the International Organization for Standardization (ISO) 14001, *Environmental Management System Standard*.

OPG successfully obtained a renewed ISO 14001 EMS certificate following a recertification audit in 2024. The renewed certificate is valid for 3-years and expires July 4, 2027.



2025 Licence Renewal Application, Section 2.9.1.2 – Regulatory Compliance

The following provides an update on Darlington NGS environmental infractions during the licence period:

The Darlington NGS site operates under numerous environmental regulations governing plant operations. The primary regulators from an environmental perspective are the CNSC, Fisheries and Oceans Canada, Environment and Climate Change Canada, and the Ministry of the Environment, Conservation and Parks.

At OPG, infractions are regulatory non-compliances that have moderate potential for regulatory actions and/or involvement. There have been four additional infractions since the application was submitted, bringing the total to 13 infractions (as of September 30, 2024) for the current licence period. Most of these infractions were related to Environmental Compliance Approvals.

2025 Licence Renewal Application, Section 2.9.2 – Environmental Risk Assessment

The following is an update on the status of the 2024 Darlington Environmental Risk Assessment (ERA) Addendum:

OPG has prepared an Addendum to the 2020 ERA to support the renewal of the Darlington NGS PROL. D-REP-07701-00002 R000, *2024 Environmental Risk Assessment Addendum for the Darlington Nuclear Site*, serves as an interim update to the 2020 ERA ahead of the next routine ERA update in 2026. The 2024 ERA Addendum was submitted to CNSC staff in September 2024 (Reference 10) with a subsequent update in Reference 11, and focuses on activities that occurred during the years 2020 to 2022 (including some of 2023, where data was available at the time of preparation).


The 2020 ERA concluded that the Darlington NGS site is operating in accordance with approved limits and measures are taken to ensure regulatory compliance is maintained. The 2024 ERA Addendum confirms that the Darlington NGS site continues to be operating in a manner that is protective of human and ecological receptors residing in the surrounding area. The 2020 ERA is available on www.opg.com and the 2024 ERA Addendum will also be posted online.

OPG is committed to engaging with the Williams Treaties First Nations (WTFNs) and a summary of key issues raised by Indigenous Nations and communities during engagement sessions is included in the 2024 ERA Addendum. OPG shared the 2024 ERA Addendum report with Indigenous Nations and communities ahead of submission to CNSC staff and although no feedback has been provided to date, OPG will incorporate any feedback into future assessments as appropriate. OPG continues to work with Indigenous Nations and communities to develop comprehensive and ongoing engagement, including invitations to participate in monitoring activities.

2025 Licence Renewal Application, Section 2.9.4 – Effluent and Emission Control

The following provides additional information regarding OPG governance addressing regulatory requirements:

Section 6 of the *Class I Nuclear Facilities Regulations* requires that an application for a licence to operate a Class I nuclear facility shall contain the following information:

- 
- (i) *the proposed location of points of release, the proposed maximum quantities and concentrations, and the anticipated volume and flow of releases of nuclear substances and hazardous substances into the environment, including their physical, chemical and radiological characteristics.*
 - (j) *the proposed measures to control releases of nuclear substances and hazardous substances into the environment*

The information required by section 6 (i) is summarized in NK38-PLAN-03480-10001, *Darlington Effluent Monitoring Plan* (for nuclear substances). As discussed in subsection 2.9.4.1 of the 2025 Licence Renewal Application (Reference 1), NK38-PLAN-03480-10001 is developed as a requirement of N-STD-OP-0031, *Monitoring of Nuclear and Hazardous Substances in Effluents*, and addresses design requirements, reporting requirements, and sampling/analytical procedures use, in alignment with CSA N288.5, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*. Subsection 2.9.4.1 of Reference 1 provides additional details on the objectives of the effluent monitoring program.

For hazardous substances, the following documents are relevant:

- Darlington Environmental Compliance Approval #0585-D4KP24.
- The annual OPG Written Summary Report, submitted to the Ministry of the Environment, Conservation and Parks, and provided to the CNSC, provides the emission summary tables and summarizes the year-to-year changes in Emission Summary and Dispersion Modelling. The Darlington Nuclear 2023 Written Summary Report was provided to CNSC staff in September 2024.

In addition, details on radiological emissions to air can be found in the following documents, which have been submitted to the CNSC:

- D-REP-07701-00001-R002, *2020 Environmental Risk Assessment for the Darlington Nuclear Site* (Reference 12).
- D-REP-07701-00002-R000, *2024 Environmental Risk Assessment Addendum for the Darlington Nuclear Site* (Reference 10).
- N-REP-03443-10031, *2023 Results of Environmental Monitoring Programs for Darlington and Pickering Nuclear* (Reference 13).

Regarding the information required by section 6 (j), CNSC staff requested additional details on treatment systems and other control technologies to control releases of nuclear and hazardous substances (Reference 2). Examples of treatment technologies used at Darlington NGS include:

- Radiological substances in water: Active liquid waste system, ion exchange, filtration.
- Radiological substances in air: Tritium immobilization system, vapour recovery system, portable driers, High Efficiency Particulate Air (HEPA) filters, High Efficiency Carbon Adsorber (HECA) filters.
- Conventional substances in water: Ion exchange, filtration, aeration, chemical addition, inactive drainage lagoon system aeration and detention time, dichlorination system, oily-water separator.

- Conventional substances in air: HEPA filters, HECA filters.

Further information on treatment systems and other control technologies to control releases of nuclear and hazardous substances is contained in the following documents:

- D-REP-07701-00001-R002, *2020 Environmental Risk Assessment for the Darlington Nuclear Site* (Reference 12); and,
- D-REP-07701-00002-R000, *2024 Environmental Risk Assessment Addendum for the Darlington Nuclear Site* (Reference 10).

2025 Licence Renewal Application, Section 2.9.4.1 – Radiological Emissions to Air and Water

Environmental Action Levels

The following provides an update on the Action Level for Noble Gases:

Table 15, “*Darlington Nuclear – Action Levels for Environmental Releases*” of the 2025 Licence Renewal Application (Reference 1) identified the Action Level for Noble Gases as 3.29×10^{12} Becquerel/week. The correct value is **3.30×10^{12}** Becquerel/week.

2025 Licence Renewal Application, Section 2.9.4.2 – Conventional Emissions

The following provides an update on conventional emissions during the licence period as a result of site operations:

Ozone-Depleting Substances

Ozone-depleting substances are used in refrigeration systems. Refrigerant leaks to air are minimized through routine inspections and maintenance of equipment. Ozone-depleting substances releases between 10 kg and 100 kg are reported to Environment Canada in semi-annual halocarbon release reports. Since the information in the application was gathered, Darlington NGS has experienced one additional Ozone-depleting substances release bringing the total number of releases during the licence period to seven.

2025 Licence Renewal Application, Section 2.9.4.3 – Groundwater Protection and Monitoring Program

The following provides a summary of the 2023 Darlington Nuclear groundwater monitoring program results:

The overall goal of the Darlington NGS Groundwater Protection Program is to protect the quality and quantity of groundwater by minimizing interactions with the environment from activities associated with the site, allowing for effective management of its groundwater resource. To meet this overall goal, the Darlington NGS site has a Groundwater Monitoring Program to provide timely data confirming that uncontrolled releases are not occurring and, if uncontrolled releases do occur, to signal when and where.

The NK38-REP-10140-10036, *2023 Darlington Nuclear Groundwater Monitoring Program Results* is now available on opg.com along with the GIS map for the public to access. Information from NK38-REP-10140-10036 is provided below as a supplement to the 2022 data discussed in the 2025 Licence Renewal Application (Reference 1).

Water level elevation data collected as part of the Darlington NGS site's annual Groundwater Monitoring Program has shown that groundwater flow patterns remained consistent over the licensing period. The 2023 inferred shallow groundwater contour map is provided in the figure below (NK38-REP-10140-10036, *2023 Darlington Nuclear Groundwater Monitoring Program Results*). Outside of the protected area, groundwater generally is inferred to flow from the north to the south, towards Lake Ontario. Inside the protected area and in the vicinity of the powerhouse, groundwater is inferred to flow west and north towards the Forebay. Further south of the powerhouse, groundwater is inferred to flow toward Lake Ontario.

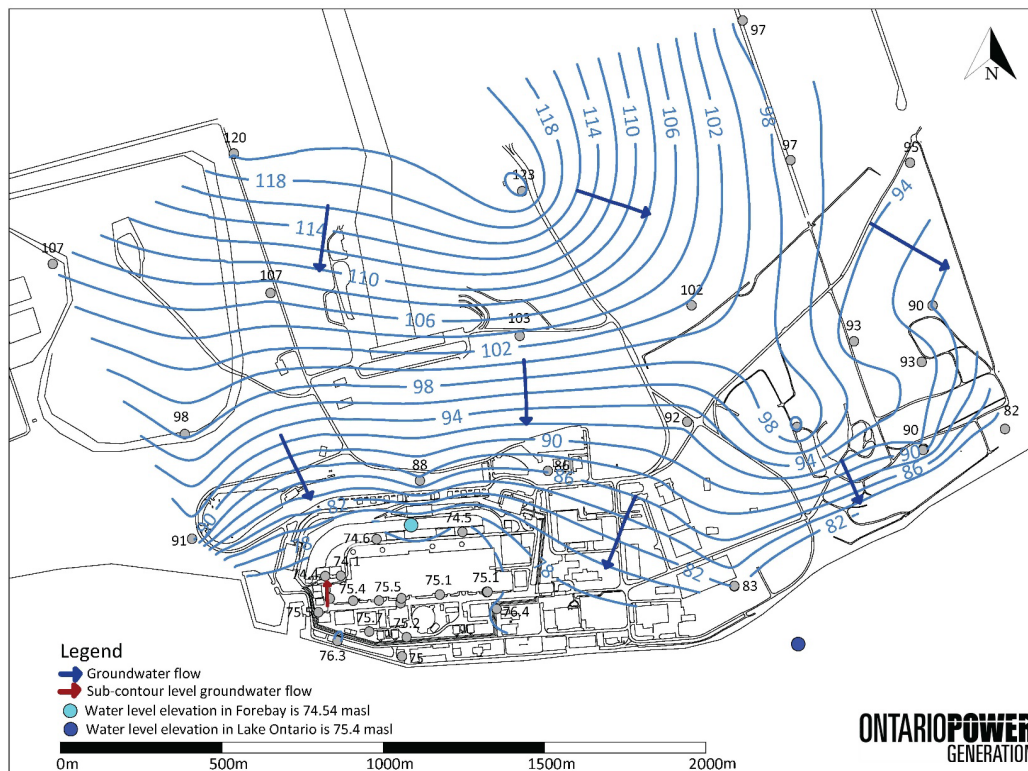


Figure 6: 2023 Inferred Shallow Groundwater Contour Map

In 2023, the majority of perimeter monitoring wells reported tritium concentrations below the method detection limit. Municipal drinking water samples collected from downstream water supply plants as part of the annual OPG Environmental Monitoring Program were well below the Ontario Drinking Water Quality Objective for tritium of 7,000 Bq/L.

2025 Licence Renewal Application, Section 2.9.4.4 – Spill Management Program

The following provides an update on environmental spills at Darlington NGS during the licence period:

At OPG, spills are classified as either Category A (Very Serious), Category B (Serious), Category C (Less Serious), or Category D (Exempted of Potential Spills). Spills are identified, classified, and reported following OPG-PROC-0041, *Environmental Event Identification, Classification, and Reporting*.

During the current licence term, there were no Category A or B spills. As of September 30, 2024, there were 16 recorded Category C spills. Although reportable, the majority of these spills were minor in nature with no expected impact to the environment.

2025 Licence Renewal Application, Section 2.9.5 – Protection of People

The following provides updated public dose data for the licence period:

The effective dose limit for members of the public as set out in the *Radiation Protection Regulations*, is 1,000 $\mu\text{Sv}/\text{year}$. Figure 28 from the 2025 Licence Renewal Application (Reference 1) has been updated below to include the 2023 public dose data. As shown in the logarithmic scale in the figure below, the annual dose to the public from operation of the Darlington NGS site is a very small fraction of the annual legal dose limit.

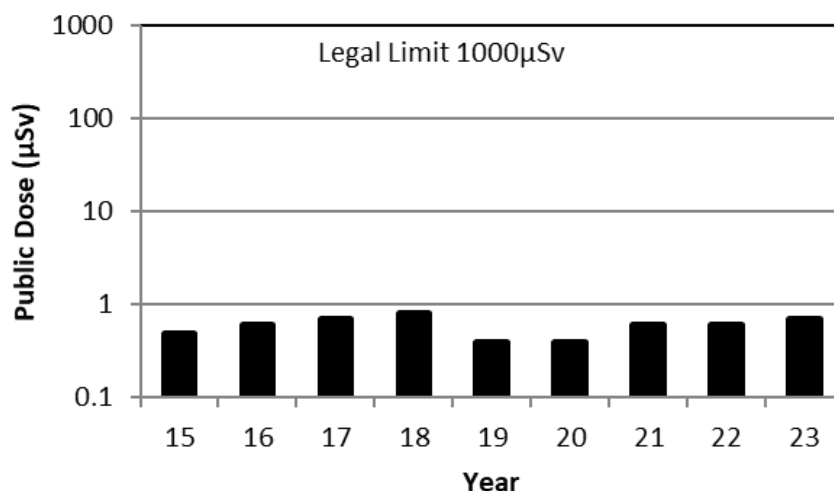



Figure 7: Public Dose Limits

2025 Licence Renewal Application, Section 2.9.7 – Thermal Plume

The following provides additional information on the thermal plume studies to be conducted under the Integrated Implementation Plan (IIP):

The Darlington NGS refurbishment follow-up monitoring program required a study of condenser cooling water plume temperatures to verify that the activities would not adversely affect the survival of round whitefish eggs laid in the plume. Temperature monitoring was conducted in the plume and at a reference location in the winter of 2017/2018.

The results of the thermal plume study documented in NK38-REP-07250-00001, *Darlington Refurbishment Follow-Up Monitoring Program: Thermal Plume Monitoring 2017-2018*, showed that the predicted effect of the plume ranged from a relative survival gain of 0.1% to a loss of 0.4%. This is a negligible effect that is not biologically significant and well below the 10% loss threshold that CNSC requires OPG to implement further mitigation measures. It was concluded that the operation of the site during the refurbishment period has not resulted in an adverse condition to the survival of round whitefish eggs laid in the plume. This confirms the prediction made in the Environmental Assessment, and no additional mitigation measures or monitoring are required during the refurbishment period.



With respect to next steps, per Environmental Assessment follow-up program activity IIP-EA-012, OPG will conduct thermal monitoring following the restart of all reactors from refurbishment. As per past practice, a summary of thermal monitoring activities will be provided in the annual Environmental Monitoring Program report. In addition, OPG will report on monitoring data collected during the Continued Operation phase and assess likely effects on the survival of round white fish embryos. OPG recognizes that monitoring activities and data are of interest to Indigenous Nations and communities and will continue to engage and share monitoring studies and data with Indigenous Nations and communities.

2.10 Emergency Management and Fire Protection

Darlington NGS has effective nuclear, conventional and fire emergency preparedness and response programs that meet or exceeds regulatory requirements and related objectives. Emergency preparedness measures and fire protection response capabilities are in place at Darlington NGS to prevent and mitigate the effects of nuclear and hazardous substances releases, both onsite and offsite, and fire hazards to protect workers, the public and the environment.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Emergency Management and Fire Protection SCA is available in Section 2.10 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.10.2.1 – Emergency Preparedness Program

The following provides an update on Indigenous Engagement with respect to Emergency Preparedness:

Since May 2024, Enterprise Emergency Management has attended Framework Meetings with each of the Michi Saagiig First Nations to provide programmatic updates, and an overview of OPG's emergency response exercises, drills and programs. As part of the discussion, OPG learned more about the Nations' interest in future engagement opportunities in emergency response exercises and drills. Additional meetings and further engagement are expected to continue into 2025 based on feedback from participants.

Provincial Nuclear Emergency Response Plan

The following provides an update on the Provincial Nuclear Emergency Response Plan (PNERP):

The PNERP, last revised in 2017, is undergoing a revision by Emergency Management Ontario to align with international best practices. The review and update of the PNERP began in 2021 and is ongoing. The Province plans to conduct a public consultation process, to be completed by March 2025, with the objective of obtaining a Cabinet approved PNERP in 2025.



2025 Licence Renewal Application, Section 2.10.3.1 – Fire Protection Program

Annual Plant Condition Inspection Report

The following provides an update on the Annual Plant Condition Inspection report:

The latest 2024 Annual Plant Condition Inspection for Darlington NGS was completed by an independent, qualified third-party vendor. The vendor reported that there was sufficient evidence to conclude that the OPG Fire Protection Program was being followed and effectively maintained to ensure compliance with the applicable requirements of CSA N293-12 (R2017), *Fire protection for nuclear power plants*, National Fire Code of Canada, and National Building Code of Canada. The 2024 Annual Plant Condition Inspection was completed in July 2024.

2025 Licence Renewal Application, Section 2.10.3.2 – Refurbishment

The following provides additional information on the term Controlling Authority, with respect to Combustible Material Safety:

The Controlling Authority term is defined as the person who is “*Evaluating Combustible Material Safety (CMS) permits and working with SME reviewers and permit owners to approve or reject the CMS permit request*”.

Additional information and detailed roles of the Controlling Authority are documented in Section 2.6, *CMS Controlling Authority (CA) or delegate* of N-PROC-RA-0054, *Minimization, Control and Combustible Material Safety Within the Site*. The Controlling Authority is a person who has control over the CMS permit process and is responsible to complete the following tasks (Section 2.6):

- Evaluates and dispositions CMS permit applications.
- Reviews and processes all CMS permits. Identifies CMS Permit Applications for Subject Matter Expert reviews in accordance with N-INS-09070-10001, *Combustible Material Safety*.
- Acts as Fire Protection Subject Matter Expert, and review Fire Protection requirements including ensuring adherence to requirements of:
 - CSA N293;
 - National Building Code of Canada; and,
 - National Fire Code of Canada.
- Engages work groups to ensure plant CMS program information is accurate.
- Maintains a database of all current and in force permits.
- Identifies issues in the CMS permit process that may impact Emergency Response Team response and notifies response staff of unusual hazards that may require specific emergency response plans or augmented fire protection features to ensure risk is adequately assessed and controlled.



2.11 Waste Management

The objective of the Darlington NGS Waste Management program is to ensure that adequate provisions are in place to limit the generation of radioactive and conventional waste and if created, control/manage its handling, storage, and disposal. This is done in an effort to ensure the safety of workers and the public; and continuously improve environmental performance in support of OPG's Environmental Policy.

The following section provides a description of updates since the application submission in this area. More information on the Waste Management SCA is available in Section 2.11 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 2.11.2.2 – High Level Waste

The following provides clarification on the number of fuel bundles that are produced each year at Darlington NGS:

Approximately, 22,000 used fuel bundles are produced by Darlington NGS each year. Used fuel is stored in the Irradiated Fuel Bays for a minimum of 10-years before being transferred into Dry Storage Containers and safely stored at the Darlington Waste Management Facility.

2025 Licence Renewal Application, Section 2.11.3 – Waste Minimization

The following provides an update on OPG's progress in meeting its annual radioactive waste diversion targets:

Darlington NGS has implemented initiatives to focus on radioactive waste minimization and segregation. Waste minimization is a shared responsibility amongst all Darlington NGS employees. It consists of spreading awareness to all waste generators on the proper handling and segregation of waste, and implementing proper guidelines, instructions, and procedures. Waste minimization and segregation is part of work planning processes. Waste generators are to follow the concept of “Reduce, Reuse, Recycle”.

OPG calculates Low Level Waste (LLW) diversion metrics on a monthly basis. As reported in the 2025 Licence Renewal Application (Reference 1), a total of 6161 m³ of LLW was diverted in 2023, with washable Personal Protective Equipment being the biggest contributor at 3136 m³. As of July 2024, nearly 2320 m³ of LLW was diverted from radioactive waste. The YTD 2024 radioactive waste diversion rate is 64.8%, with a station target of 64%. Washable Personal Protective Equipment remain the largest contributor to waste diversion, contributing 1685.8 m³ (approximately 73%).

2.12 Security

The Nuclear Security Program ensures the safe and secure operation of the station, maximizing protection against threats to security through the use of equipment, personnel and procedures.

The following sections provide a description of updates, including information related to CNSC staff's review of OPG's application in Reference 2 and OPG's response to CNSC staff's review in Reference 3, since the application submission in this area. More information on the Security SCA is available in Section 2.12 of the 2025 Licence Renewal Application (Reference 1).



2025 Licence Renewal Application, Section 2.12 – Security

The following provides additional information regarding Threat Risk Assessment, including provisions to assess security risk during abnormal operations and emergency situations:

The Threat Risk Assessment program is a strategic process governed by standard OPG-STD-0063, *Security Threat Vulnerability and Risk Assessment* for the evaluation of physical security in accordance with *Nuclear Security Regulations* Section 7.5. Nuclear Security Program N-PROG-RA-0011, *Nuclear Security*, implementing instructions contain the tactical directions to implement during abnormal operations and/or emergency situations to ensure continual compliance within the *Nuclear Security Regulations* as a whole. The implementing instructions documented in N-PROG-RA-0011 provide guidance for abnormal operations and emergency situations such as: detection, assessment and compensatory measures, defensive strategy, search, access and egress control.

Abnormal operations and or emergency situations are also covered under implementing instructions from:

- OPG-PROG-0035, *Enterprise Security*; and,
- OPG-PROG-0030, *Emergency Management Program*.

2025 Licence Renewal Application, Section 2.12.1 – Facilities and Equipment

The following provides additional information regarding the training provided to Nuclear Security Officers on sealed source security at Darlington NGS:

Initial sealed source training is provided during Basic Tactical Officer Course training and tracked under Performance Elements (PELs):

- PEL 79948, *PNGS Security PA Emergency Response*;
- PEL 79949, *DNGS Security PA Emergency Response*; and,
- PEL 70885, *Drill & Tabletop*.


OPG incorporated and completed sealed source security program familiarization during the annual 2024 Nuclear Security Officer maintenance training that took place January to February 2024.

2025 Licence Renewal Application, Section 2.12.3 – Security Practices

The following provides additional information regarding the criteria/cultural observations used by OPG to assess the Nuclear Safety and Security Culture trait of vigilance and how that informs security culture:

OPG defines the trait of vigilance as 'Being attentive for unusual observations, specifically in the cyber world and in people's behaviors'. The Continuous Behavioral Observation Program ensures all supervisors can successfully:

1. Recognize why managing insider threats and early detection of potential risks is an important part of the security program.
2. Recognize the supervisor's accountability in managing insider threats, and the importance and impact of timely intervention.

- 
3. Identify common reasons for and types of behaviors that warrant attention and response.
 4. Recognize how to effectively observe, assess and respond appropriately to behaviors that warrant attention and response.
 5. Identify processes and support networks available to assist actions being taken.

Since 2023, OPG has been performing an annual vigilance campaign focused on a variety of topics that are selected through trends. For the 2024 vigilance campaign, topics included:

- Driving (speeding, awareness, worker fatigue, safe driving);
- Vital Area expectations (access control and tailgating); and,
- Powerhouse door expectations.

Additionally, vigilance is assessed as part of the Nuclear Safety and Security Culture Assessments conducted at Darlington NGS at least every 5-years. As part of the survey for this assessment, staff are asked to rate the following statements on a 7-point scale:

- I know what types of conditions or behaviours I am required to report for nuclear security reasons.
- People here are security-conscious to the point where they would be likely to notice and report behaviours in individuals which might indicate a nuclear security concern.
- The standards and procedures for the security of information and information systems, including electronic information, are clear and easy to follow.
- Classification and control measures are understood and used by staff to protect sensitive information.
- Almost everyone here believes that cyber challenges and attacks are a real and serious threat to nuclear security.
- I know how to report a nuclear security concern.
- Almost everyone here respects the nuclear security barriers and physical controls such as monitors, screening and physical checks.
- Managers consistently communicate the importance of nuclear security and help to maintain a high level of alertness.

Results from the 2021 assessment indicate that vigilance is healthy. Preliminary results from the assessment in 2024 indicate that vigilance is healthy and continues to improve.

Vigilance attributes are also assessed by staff on an annual basis as part of continuous monitoring where they are asked to rate the following attributes on a 3-point scale.

- VI.1 Recognize Threats: Staff members identify and question unusual indications and occurrences, and report them to management, as soon as possible, using established processes. When unsure of the security significance of these events or observations, staff seek guidance.
- VI.2 Protection of Information: Classification and control measures are understood and used by staff to protect sensitive information.
- VI.3 Protocols: Staff follow security and cyber security protocols to minimize risk.

- VI.4 Screening: Screening processes match the risks and threats associated with specific roles and responsibilities.

For 2024, all of the vigilance attributes have been rated as strengths by station staff (i.e. greater than 2.2) as shown in the figure below.

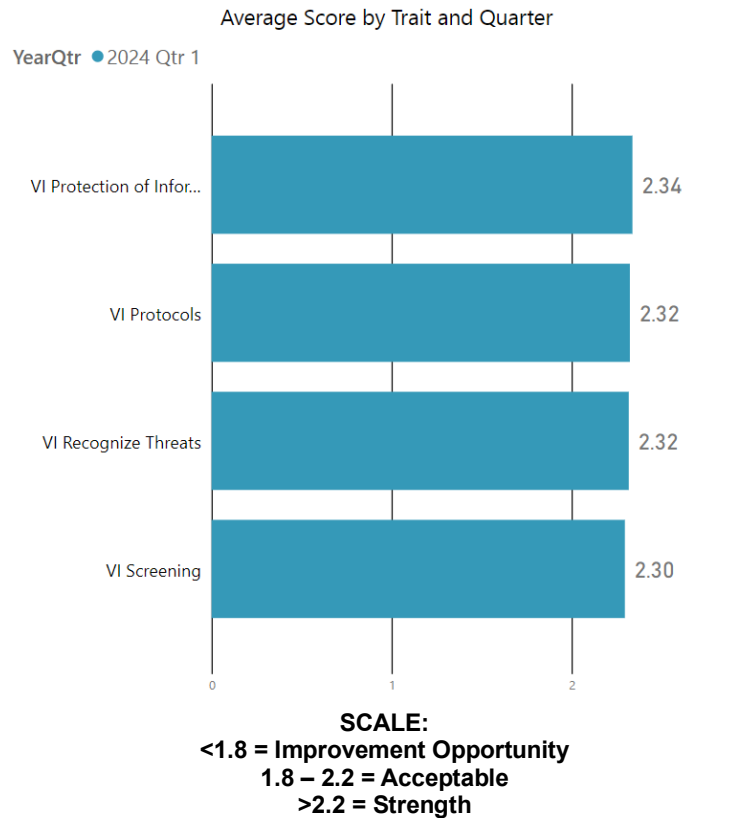


Figure 8: Nuclear Safety and Security Culture Monitoring Panel Data for Vigilance 2024

2.13 Safeguards and Non-proliferation

Darlington NGS has an effective Safeguards and Non-Proliferation program that ensures compliance with Canada's international safeguards obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements as well as other measures arising from the Treaty on the Non-Proliferation of Nuclear Weapons.

The following sections provide a description of updates since the application submission in this area. More information on the Safeguards and Non-proliferation SCA is available in Section 2.13 of the 2025 Licence Renewal Application (Reference 1).



2025 Licence Renewal Application, Section 2.13 – Safeguards and Non-Proliferation

The following provides an update on inspections performed by the IAEA since 2016 to 2024 YTD:

Throughout the current Darlington NGS licence, the OPG Safeguards program was successful in meeting all international Safeguards and Non-Proliferation agreements.

Since 2016 to 2024 YTD, Darlington NGS achieved a 95% satisfactory inspection result with only one unsatisfactory occurrence in mid-2024. The one unsatisfactory result was from a Short Notice Random Inspection. The event is non-reportable to the CNSC as per the requirements of REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*. A corrective action plan is in progress.

2025 Licence Renewal Application, Section 2.13.4 – Safeguards Equipment, Containment, and Surveillance

The following provides an update on reportable events to the CNSC related to Safeguards Equipment, Containment and Surveillance:

From 2012 to 2024 there were a total of six events reportable to the CNSC related to Safeguards Equipment, Containment and Surveillance. In each case, immediate action was taken to resolve the condition. Where practical, reoccurrence control actions were implemented following the event.

2.14 Packaging and Transport

Darlington NGS has an effective packaging and transport program that meets or exceeds all applicable regulatory requirements and related objectives. Packaging and transport of nuclear substances are conducted safely.

Information on the Packaging and Transport SCA is available in Section 2.14 of the 2025 Licence Renewal Application (Reference 1).



3.0 Facility-Specific Information

The following information is provided as updates to facility-specific information, supplementary to the information provided in Darlington NGS's May 2024, Power Reactor Operating Licence Renewal Application (Reference 1). The relevant section which is being updated is referenced to this document, referred to as the "2025 Licence Renewal Application".

3.1 Tritium Removal Facility

The Tritium Removal Facility (TRF) and Heavy Water Management Building (HWMB) reduces the tritium content of heavy water inventories for Darlington NGS and all Ontario CANDU reactors. This is accomplished through distillation, ion exchange and particulate filtration as well as extraction and immobilization of the tritium isotope for storage in a secure vault. The reduction of tritium reduces the radiation dose to OPG personnel and minimizes the tritium emissions to the environment. The facility also maintains isotopic purity requirements for heavy water at Darlington NGS. Maintaining isotopic purity of heavy water helps with the fission process by slowing down neutrons and therefore optimizing fuel burn-up.

The following sections provide a description of updates since the application submission in this area. More information on the TRF is available in Section 3.1 of the 2025 Licence Renewal Application (Reference 1).

The following updates apply to the TRF and HWMB:

From 2015 to November 2024, the TRF has removed approximately 158.6 million Curies ($5.87\text{e}+18$ Bq) of tritium.

During the current licence term, the HWMB (West Annex) was commissioned and placed into service. For clarification, this has increased OPG's heavy water storage capacity by 2100 Mgs (1900 Mgs of reactor-grade heavy water plus 200 Mgs of down-graded heavy water). The addition of this facility allows for flexibility with refurbishment, Pickering end-of-commercial operation/refurbishment activities as well as support for Bruce Power's Major Component Replacement activities.

The life extension date for the TRF should have been indicated as 2055 rather than 2060.

3.2 Refurbishment

The Darlington NGS refurbishment project is a multi-year, multi-phase, project that is enabling Darlington NGS to continue safe and reliable operation through 2055. The project includes the replacement of life-limiting critical components, the completion of upgrades to meet regulatory requirements, and the rehabilitation of components in Darlington NGS's four units.

The following sections provide a description of updates since the application submission in this area. More information on the Darlington NGS refurbishment project is available in Section 3.2 of the 2025 Licence Renewal Application (Reference 1).

The following figure provides an update to Figure 32 of Reference 1:

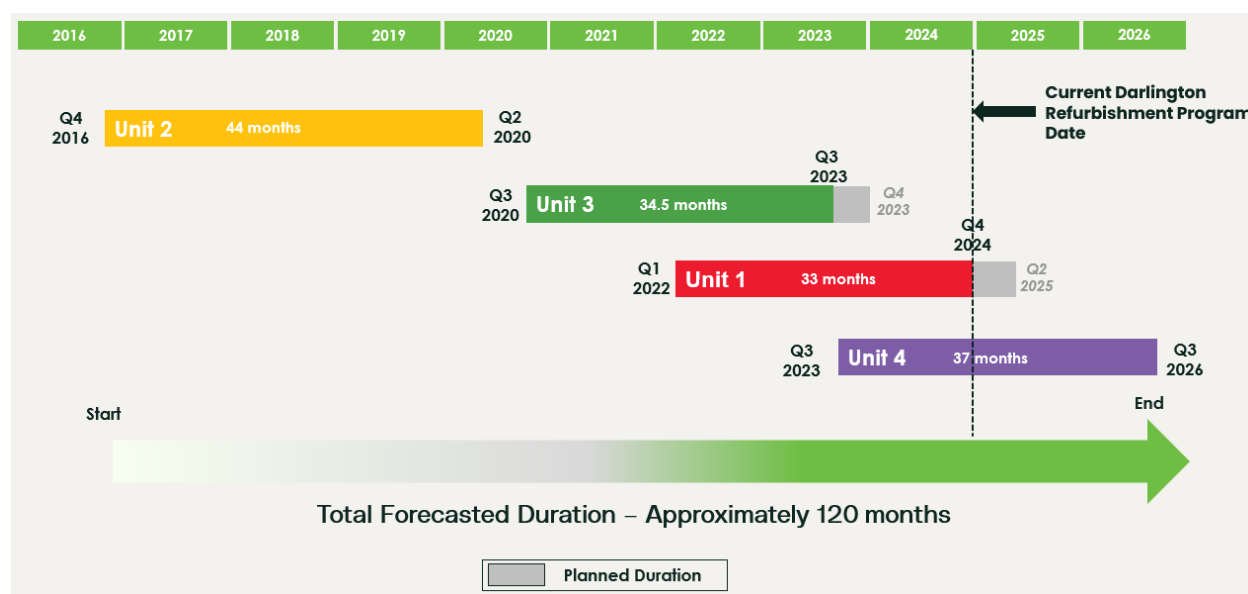



Figure 9: Refurbishment Progress

The following provides an update on the status of Unit 1 and Unit 4 refurbishment:

Update to Unit 1 Status

Unit 1 was successfully returned to service on November 27, 2024, 140 days ahead of the public commitment, following the completion of 53 Systems Available for Service declarations which supported Unit 1 return to service activities and the removal of all the Restart Control Hold Points (RCHPs) and Regulatory Hold Points (RHPs) as outlined below:

- RCHP 1, Moderator Fill, was completed on December 23, 2023.
- RCHP 2, Fuel Load, was completed on April 28, 2024. This also marks the completion RHP 1, a significant milestone in the return to service process.
- RCHP 4, Primary Heat Transport Fill, was completed on May 31, 2024.
- RCHP 3, Bulkhead Removal, was completed on August 10, 2024.
- RCHP 5, Guaranteed Shutdown State Removal, was completed on September 13, 2024. This also marks the completion of RHP 2.
- RCHP 6, Increase Reactor Power > 1%, was completed on October 10, 2024. This also marks the completion of RHP 3.
- RCHP 8, Increase Reactor Power > 35%, was completed on November 15, 2024. This also marks the completion of the final RHP 4.
- RCHP 9, Unit Available for Commercial Service, was completed on November 27, 2024. This also marks the completion of the final RCHP.



Overall, Unit 1 was completed with marked performance improvements and efficiencies versus Unit 3 with a 20% reduction in Medically Treated Injuries, 3% reduction in Collective Radiation Exposure and 80% reduction in quality events.

Update to Unit 4 Status

Unit 4 refurbishment commenced on July 19, 2023, shortly after the return to service of Unit 3, and is the last of four units undergoing refurbishment at Darlington NGS. Refurbishment activities are progressing on schedule, safely and successfully with completion of the Calandria Tube Removal in September 2024. The unit is progressing through the reassembly segment (3rd segment), forecasting completion in Q3 2025, and the overall schedule is on track to be returned to service in Q3 of 2026.

2025 Licence Renewal Application, Section 3.2.1 – Major Projects and Improvements

The following provides an update on the Integrated Implementation Plan (IIP):

While the primary focus of refurbishment is the replacement of the reactor core components, there has also been a considerable number of initiatives and improvements completed to ensure Darlington NGS's continued safe operation. These improvements are outlined in the IIP and focus on enhancing the station's safety and reliability.

The IIP presents the scope and schedule for the implementation of actions resulting from environmental assessments, integrated safety reviews, addressing code gaps, component condition assessments, and integrated aging management programs. Overall, 570 of 622 of the IIP refurbishment and continuing operation commitments have been completed up to December 12, 2024.

2025 Licence Renewal Application, Section 3.2.2 – Conventional Safety Performance

The following provides an update on Conventional Safety Performance statistics:

At the end of Q3 2024, the Program reported a 12-month rolling average Total Recordable Injury Frequency (TRIF) of 0.19 against its internal target of 0.40, reflecting six medically treated injuries, year to date in 2024.

As of Q3 2024, the Program is approaching over 56 million hours worked with one Lost Time Injury, which occurred in May 2019.

2025 Licence Renewal Application, Section 3.2.3 – Radiological Safety Performance

The following provides an update on Radiological Safety Performance statistics:

Table 9 provides an update of Table 26 in Reference 1 regarding the year-to-date summary to the end of Q3 of the radiological safety performance and includes both OPG and vendor employees. The statistics are specific to Refurbishment only. Due to the nature of the work, such as reactor component replacements, a higher person-mSv dose is expected compared to the Station statistics. The actual dose continues to be lower than the forecasted targeted dose, representing a lower radiological exposure.

Table 9: Radiological Safety Performance

	2021 Year End		2022 Year End		2023 Year End		2024 End of Q3	
	Actual	Target	Actual	Target	Actual	Target	Actual	Target
Unit 3 Collective Radiation Exposure (person-mSv)	10280	13790	3370	6330	550	950	N/A	N/A
Unit 1 Collective Radiation Exposure (person-mSv)	N/A	N/A	7220	9840	4751	5000	1340	2360
Unit 4 Collective Radiation Exposure (person-mSv)	N/A	N/A	N/A	N/A	4269	4750	8966	11850

3.3 Periodic Safety Review

The Darlington Periodic Safety Review (D-PSR) was completed in accordance with Licence Condition 3.4 of Darlington NGS PROL 13.03/2025. The D-PSR is a subsequent review which builds on previous OPG Integrated Safety Review (ISR)/PSR work such as: (1) the Pickering PSR2 (programmatic components applicable to Darlington NGS) and (2) the Darlington NGS ISR, performed in support of refurbishment and life extension. The D-PSR was conducted in accordance with the D-PSR Basis Document, NK38-REP-03680-11844, *DNGS Periodic Safety Review Basis Document*, and the requirements of CNSC regulatory document REGDOC-2.3.3, *Periodic Safety Reviews*. The planning basis for the D-PSR covers the period of operation of Darlington NGS units from November 2025 to November 2035.

The following sections provide a description of updates since the application submission in this area. More information on the D-PRS is available in Section 3.3 of the 2025 Licence Renewal Application (Reference 1).


2025 Licence Renewal Application, Section 3.3.5 – D-PSR Results

The following provides an update on the D-PSR IIP:

As discussed in the 2025 Licence Renewal Application (Reference 1), the D-PSR IIP contains 17 IIP Actions with scheduled completion dates ranging from Q4 2023 to Q4 2028. As of Q3 2024, four IIP actions have been completed and CNSC closure has been requested.

3.4 Isotope Irradiation Program

Darlington NGS Power Reactors are utilized to support the radioisotope industry in both the medical and food safety fields. Darlington NGS's support for safe production of isotopes includes the planned production of Cobalt-60 (Co-60), Molybdenum-99 (Mo-99), Yttrium-90 (Y-90) and Lutetium-177 (Lu-177) with a potential for additional growth in this fast-changing and



life-saving field. For example, Darlington NGS has recently submitted a letter of intent to the CNSC for a PROL amendment to install Target Delivery Systems on additional units (Reference 14).

The following sections provide a description of updates since the application submission in this area. More information on the Darlington NGS isotope irradiation program is available in Section 3.4 of the 2025 Licence Renewal Application (Reference 1).

Cobalt-60 (Co-60)

In April 2023, OPG submitted an application to the Commission to amend the Darlington NGS PROL in order to produce Co-60, an isotope used in medical device sterilization and in food production. About 40% of the world's single-use medical devices, such as syringes, gloves, implants and surgical instruments, are irradiated and sterilized with Co-60. Similar to its use in sterilizing medical devices, Co-60 is useful in sterilization of food products, removing pathogens and parasites.

The Commission amended the Darlington NGS PROL in June 2024 (CNSC Record of Decision DEC 24-H101 – Reference 4). With this licence amendment, Co-60 production is planned to start with the initial harvest expected in 2028.

Yttrium-90 (Y-90) and Lutetium-177 (Lu-177)

On February 26, 2024, OPG submitted an application to the Commission to amend the Darlington NGS PROL to allow for the production of the medical radioisotopes Y-90 and Lu-177 using the Target Delivery System currently installed for the production of Molybdenum-99 (Mo-99) (Reference 15).

Overall, the reliability of Darlington NGS's CANDU reactors and expanding the breadth of ways that isotopes can be generated will be a key component to strengthening the radioisotope supply chain for the coming decades. A Commission hearing for this application is scheduled for spring 2025.



4.0 Update to Indigenous Engagement

The following information is provided as updates, supplementary to the information provided in Darlington NGS's May 2024, Power Reactor Operating Licence Renewal Application, Section 4.2 (Reference 1).

In this section, OPG provides an overview of updates since May 2024 regarding:

- OPG's Reconciliation Action Plan;
- Engagement activities that have occurred with Indigenous Nations and communities,
- Summary of comments and concerns received to date from Indigenous Nations and communities; and
- Anticipated engagement activities into 2025.

4.1 Reconciliation Action Plan

In July 2024, OPG released an updated version of the company's Reconciliation Action Plan, which was originally launched in the fall of 2021. The refreshed plan recaps OPG's progress on Reconciliation Action Plan goals through 2021-23 and shares OPG's outlook for 2024 and beyond. Some key highlights and achievements include:

- Since 2022, OPG has reached \$198 million in Indigenous contract awards and \$39.4 million in equity distributions to our Indigenous partners.
- Mentoring Plus spaces offered to Indigenous employees in an effort to promote their career path development.
- Developing and initiating roll out of an Indigenous Relations 101 training program to build Indigenous relations awareness and cultural competence across the organization.
- Overall, in 2023, OPG invested a total of nearly \$600,000 in Indigenous initiatives, including a sponsorship for the annual Indspire Awards, which recognize Indigenous excellence.
- In September 2024 OPG was recertified with the Gold Designation from the Canadian Council for Indigenous Business through its Partnership Accreditation in Indigenous Relations Program.

OPG is proud of how far it has come as a company, while recognizing that there is still so much more to do to advance reconciliation. In the spirit of driving change across the industry and holding firm on our commitment to advancing reconciliation, the refreshed Reconciliation Action Plan includes the addition of over 20 new commitments that were developed through internal discussions and input from Indigenous Nations, communities and businesses.

4.2 Summary of Engagement Activities (May to November 2024)

Indigenous Engagement Plan

To guide engagement activities on the 2025 Licence Renewal Application (Reference 1), OPG developed a draft Indigenous Engagement Plan (IEP). In August and September 2024, all


Indigenous Nations and communities identified in the draft IEP received a copy of the IEP for review and comment. Between August to October 2024, OPG continued to follow-up and facilitate opportunities for Indigenous Nations and communities to provide comments on the draft IEP. Through November, OPG worked to update the IEP based on feedback received from Indigenous Nations and communities to date. For Indigenous Nations and communities that provided substantive comments on the IEP, OPG is preparing comment disposition tables to demonstrate how comments did or did not influence the IEP update. OPG anticipates issuing a final working version of the IEP as well as sharing the comment disposition tables in December 2024. The IEP is intended to be a dynamic document and, as such, can continue to be updated, as appropriate, to respond to new comments that come forward from Indigenous Nations and communities and/or any shifts in engagement priorities and needs.

Summary of Engagement Efforts and Activities

In addition to engaging on the draft IEP, OPG has made efforts to share and engage on the content of the Licence Renewal Application (Reference 1). All Indigenous Nations and communities listed in the IEP were provided with a link to the Licence Renewal Application on OPG's website when the draft IEP was initially shared. Additional information about OPG's engagement efforts and activities are further detailed below in Tables 10 and 11.

Table 10: Williams Treaties First Nations (WTFNs) Rights Holders

Community	Summary
Alderville First Nation	<ul style="list-style-type: none"> Two (2) meetings on the Licence Renewal Application (June 27, October 24). Ongoing communications via email, phone and virtual/in-person meetings. Preliminary concerns on the Licence Renewal Application shared in meetings. Further engagement planned to explore concerns.
Beausoleil First Nation	<ul style="list-style-type: none"> Continued follow-up via email and phone. No comments on IEP or Licence Renewal Application received to date.
Curve Lake First Nation	<ul style="list-style-type: none"> Four (4) meetings on Licence Renewal Application (June 25, August 27, September 24, October 22). Ongoing communication via email, phone and virtual meetings. Submitted written comments on the Licence Renewal Application at the end of October 2024. Submitted written comments on the IEP in October 2024. Further engagement planned to explore concerns.
Georgina Island First Nation	<ul style="list-style-type: none"> Continued follow-up via email and phone. No comments on IEP or Licence Renewal Application received to date.
Hiawatha First Nation	<ul style="list-style-type: none"> Two (2) meetings on Licence Renewal Application (June 25, October 22). Ongoing communications via email, phone and virtual/in-person meetings.



Community	Summary
	<ul style="list-style-type: none"> No comments on the IEP or Licence Renewal Application received to date. Continued follow-up via email, phone and virtual/in-person meetings will continue.
Mississaugas of Scugog Island First Nation	<ul style="list-style-type: none"> Three (3) meetings where Licence Renewal Application was discussed (June 13, August 29, October 10). Ongoing communication via email, phone and virtual meetings. Submitted written comments on the IEP in September 2024. Preliminary concerns on the Licence Renewal Application shared in meetings. OPG is aware the MSIFN is reviewing the Licence Renewal Application and will be providing comments, but has yet to complete a comprehensive review of the application materials. Further engagement planned to explore concerns.
Rama First Nation	<ul style="list-style-type: none"> Continued follow-up via email and phone. No comments on IEP or Licence Renewal Application received to date.

Table 11: Indigenous Nations and Communities that are Interested

Community	Summary
Huron-Wendat Nation, Quebec	<ul style="list-style-type: none"> Continued follow-up via email. Requested to be contacted for work involving archaeological assessments. No comments on IEP or Licence Renewal Application received to date.
Mohawks of Bay of Quinte	<ul style="list-style-type: none"> Continued follow-up via email. No comments on IEP or Licence Renewal Application received to date.
Métis Nation of Ontario Region 8	<ul style="list-style-type: none"> One (1) meeting to share information and updates on the Licence Renewal Application (June 10). No comments on IEP or Licence Renewal Application received to date. Advised OPG they will reach out if leadership or Regional Consultation Committees express further interest in updates or information on the Licence Renewal Application.
Saugeen Ojibway Nation (comprised of Saugeen First Nation and Chippewas of Nawash Unceded First Nation)	<ul style="list-style-type: none"> Continued follow-up via email. No comments on IEP or Licence Renewal Application received to date.
Six Nations of the Grand River	<ul style="list-style-type: none"> Two (2) meetings to share information and updates on the Licence Renewal Application (July 19 and October 18).

	<ul style="list-style-type: none"> • Preliminary questions on the Licence Renewal Application shared in meetings. • Comments received on the IEP. • No comments on Licence Renewal Application received to date.
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Summary of Comments and Concerns

Throughout OPG's engagement efforts, staff have been diligently capturing interests and concerns, asking questions to clarify understanding, sharing information to answer questions raised and work to address comments, as appropriate.


In Table 12 (see below), OPG provides a high-level summary of interests and/or concerns raised by Indigenous Nations and communities to date, including an assessment of status and next steps for engagement. Note that reference to the Application and specific sections refers to the Licence Renewal Application (Reference 1).

Table 12: High Level Summary of Interests and/or Concerns Raised by Indigenous Nations and Communities


Theme	Summary of Interests and/or Concerns	Response, Status and/or Next Steps
Length of Licence Term	<ul style="list-style-type: none"> Concerns regarding the requested 30-year licence term and what additional steps are being taken to assure meaningful consultation and engagement over a 30-year period. Concerns regarding limited engagement with respect to OPG operations aside from licence amendments and extensions and there is an interest in deepening engagement on operations. A 10-year interval provides the opportunity to delve into operational and environmental subject matter in depth more frequently. A 30-year interval is untested in terms of ensuring adequate engagement and consultation. Comments regarding international benchmarks for licensing terms and an assessment that 10-20 years is in line with licensing norms in Western countries. 	<ul style="list-style-type: none"> In OPG's view, the concept of a 30+ year licence is common in the international community. Several nuclear power generating stations around the world have 30+ years to indefinite licence terms. OPG is confident that not only will the Darlington NGS continue to operate safely and reliably throughout the requested 30-year licence term, but there will continue to be regular opportunities for Indigenous Nations and communities to engage directly with OPG and with the Commission on matters of interest related to the Darlington NGS. OPG is working to pull together information regarding the regulatory oversight mechanisms that will be available during the requested 30-year term to advance the discussion. OPG also understands that this Application would result in potentially the first 30-year licence in Canada and is aware that there may be questions or concerns about the licence term being requested. OPG wants to be a leader and is committed to working with Indigenous Nations and communities on how we can demonstrate meaningful engagement under a term of this length. OPG will continue to engage Indigenous Nations and communities to hear ideas for what an ongoing engagement framework could look like to better collaborate on measures to address them and to understand concerns with the requested 30-year term. In the meantime, OPG will continue to provide opportunities for engagement with respect to current operations (e.g. Environmental Risk Assessment (ERA) Addendum, 2026 Darlington Nuclear Site ERA, Emergency Management Programs, and other topics based on interest and capacity). OPG and the Michi Saagiig Nations have worked to initiate a Waste Table and are working to initiate an Environment Table to provide an effective forum to address interests that are not site or project specific.
Generation and Storage of Waste	<ul style="list-style-type: none"> Questions regarding the volume of waste that will be generated throughout the requested 30-year term. Concerns regarding the absence of a long-term strategy for storage of low, intermediate and high-level waste and 	<ul style="list-style-type: none"> OPG has provided a response to the volume of waste that will be generated throughout the requested 30-year term to Indigenous Nations and communities that asked. OPG recognizes Indigenous Nations and communities have raised concerns about the long-term storage plans and strategy of radioactive waste. With respect to used fuel and intermediate-level waste, OPG is supportive of the




Theme	Summary of Interests and/or Concerns	Response, Status and/or Next Steps
	lack of consent provided for the ongoing operation of waste management facilities at the Darlington site.	<p>Nuclear Waste Management Organization's initiative to advance a permanent and safe storage solution for this waste stream with the willing host communities of Wabigoon Lake Ojibway Nation and the Township of Ignace. For low-level waste, OPG is initiating a process to have two-way dialogue with Indigenous Nations and communities and municipalities on seeking solutions for the proposed eventual siting and disposal of low-level waste.</p> <ul style="list-style-type: none"> The Government of Canada is currently undertaking a collaborative process to implement the United Nations Declaration on the Right of Indigenous Peoples (UNDRIP) into Canadian domestic law, through the UNDRIP Act and the Action Plan released in June 2023. While that process to develop practical guidance is ongoing, OPG is not in a position to determine how the concept of free, prior and informed consent might factor into government approval processes. OPG will continue to apply a robust engagement framework which is consistent with our Reconciliation Action Plan, our Indigenous Relations Policy and regulatory and legal requirements.
Reflection of Indigenous Nations & communities in Sections Throughout (Biodiversity)	<ul style="list-style-type: none"> Interest in having Indigenous Nations and communities better reflected in certain sections of the Application. In the Biodiversity section (2.9.1.1), seeking acknowledgement of partnership with Indigenous Nations and communities on biodiversity initiatives as stewards and caretakers of the lands and waters. 	<ul style="list-style-type: none"> Under OPG's Reconciliation Action Plan, Environmental Stewardship is one of the five main pillars. OPG's goal is to be a trusted partner in environmental stewardship and to collaborate with Indigenous communities on biodiversity conservation initiatives. OPG acknowledges this specific interest raised and for OPG's ongoing operations at Darlington NGS, OPG understand the importance of deepening our collaboration on biodiversity initiatives with the WTFNs as the stewards and caretakers of the lands and waters.
Reflection of Indigenous Nations & communities in Sections Throughout (Fish Impingement & Entrainment)	<ul style="list-style-type: none"> Interest in having Indigenous Nations and communities better reflected in certain sections of the Application. In the Fish Impingement and Entrainment section (2.9.6), seeking acknowledgement of OPG and the Michi Saagiig WTFN's intent to establish an Environment Table. 	<ul style="list-style-type: none"> Based on feedback from the Michi Saagiig WTFNs, OPG and the Michi Saagiig WTFNs are taking steps to initiate and establish an OPG-Michi Saagiig Environment Table to support engagement on strategic matters and issues that are non-site specific in nature.



Theme	Summary of Interests and/or Concerns	Response, Status and/or Next Steps
Reflection of Indigenous Nations & communities in Sections Throughout (Emergency Drills and Exercises)	<ul style="list-style-type: none"> Interest in having Indigenous Nations and communities better reflected in certain sections of the Application. In the Emergency Drills and Exercises section (2.10.22), seeking acknowledgement of OPG and Michi Saagiig WTFN's intent to facilitate involvement and participation in OPG's Emergency Drills and Exercises. 	<ul style="list-style-type: none"> OPG is aware that Indigenous Nations and communities are interested in better understanding and being involved in OPG's emergency response program. In WTFN territory, OPG has recently met with each of the Michi Saagiig Nations to share information about OPG's emergency management program and to better understand the priorities of the Nations for further learning and engagement, including potential engagement opportunities through OPG's Emergency Drills and Exercises. OPG is committed to further exploring the interests of the Michi Saagiig Nations with respect to emergency management and finding ways to address priorities, interests and concerns as appropriate.
Indigenous Engagement	<ul style="list-style-type: none"> Concerns with "Indigenous Engagement" section in the Application being under "Other Matters of Regulatory Interest". Interest in Indigenous Engagement be a stand-alone section. 	<ul style="list-style-type: none"> OPG appreciates this concern being brought to our attention. To address this interest and ensure our application materials reflect the unique relationship OPG holds with Indigenous Nations and communities, OPG has made the Indigenous Engagement section of the supplemental into its own section. In addition, OPG will share this feedback with other staff at OPG to ensure this interest is addressed in future applications.
Alert Ready System	<ul style="list-style-type: none"> Concerns regarding the "Alert Ready" system not requiring Indigenous specific notifications during an emergency. 	<ul style="list-style-type: none"> OPG is aware that Indigenous Nations and communities have concerns regarding the notifications required under the current Provincial Nuclear Emergency Response Plan (PNERP) and has encouraged the Nations to engage through the Province's upcoming public consultation process for the PNERP revision. OPG provides immediate notifications to all required offsite stakeholders under the PNERP to quickly share information pertaining to the event to enable the offsite response to be initiated appropriate to the circumstances, including protective actions and public notifications through those stakeholders with those accountabilities.
Economic Opportunities - Isotopes	<ul style="list-style-type: none"> In Section 3.4, <i>Isotope Irradiation Program</i>, seeking acknowledgement of Indigenous Nation and communities' interest in economic opportunities associated with Cobalt-60. 	<ul style="list-style-type: none"> OPG recognizes that Indigenous Nations and communities have communicated an interest in economic opportunities from ongoing operations at Darlington NGS. From OPG's perspective, economic opportunities may include procurement and/or commercial opportunities. Regarding procurement opportunities, OPG will continue to support fair, competitive, and transparent procurement opportunities aimed at maximizing Indigenous business opportunities at Darlington NGS.



Theme	Summary of Interests and/or Concerns	Response, Status and/or Next Steps
		<ul style="list-style-type: none"> OPG is open to continued exploratory discussions to better understand Indigenous Nations' and communities' interest in economic opportunities with respect to isotopes, as appropriate.
Past Grievances	<ul style="list-style-type: none"> Comment was received with respect to OPG's assessment that continued operation of the Darlington NGS does not create any new adverse impacts on Aboriginal and/or Treaty rights but does extend the known impacts and the ongoing mitigation efforts. OPG heard concerns that past grievances with respect to lack of consultation from original construction of the Darlington NGS, and lack of consent from the Michi Saagiig WTFNs, is an unresolved issue. 	<ul style="list-style-type: none"> At this time, OPG maintains the perspective that the continued operation of Darlington NGS does not create any new adverse impacts on Aboriginal and/or Treaty rights held by local Indigenous Nations and communities but does extend the known impacts and the ongoing mitigation efforts. OPG continues to engage with Indigenous Nations and communities to understand potential impacts and if additional measures are required to adequately avoid, mitigate or accommodate impacts, as appropriate. However, OPG acknowledges that legal requirements regarding Indigenous engagement and consultation have evolved significantly since the construction of the Darlington NGS began in the 1980s and that past practices would not meet current standards and expectations. Until the Government of Canada provides practical guidance on how to implement free, prior and informed consent, OPG is not in a position to determine how the concept of free, prior and informed consent might factor into government approval processes.
Two-Way Learning Opportunities	<ul style="list-style-type: none"> In Section 4.2.2, <i>Indigenous Community Meetings</i>, seeking acknowledgment and OPG's support for two-way engagement opportunities that also include OPG staff and project teams to learn more about Indigenous culture and ways of life to improve engagement outcomes. 	<ul style="list-style-type: none"> OPG appreciates this interest being brought to our attention. OPG is grateful to have been offered opportunities in the past to attend community visits to support project teams in learning about Indigenous culture and ways of life and will continue to seek out these opportunities. In addition, OPG will share this feedback with other staff at OPG to ensure this interest is addressed in future applications.
Statement of Rights	<ul style="list-style-type: none"> The below statement was provided by the MSIFN for inclusion in this supplemental submission: <i>Darlington NGS is located within the treaty and traditional lands of the Mississaugas of Scugog Island First Nation (MSIFN), Alderville First Nation (AFN), Curve Lake First Nation (CLFN), and Hiawatha First Nation (HFN), and specifically within the lands known as the "Gunshot Treaty" (1877-1888), a</i> 	<ul style="list-style-type: none"> OPG has heard the importance of incorporating and reflecting the voices of the Rights Holders in application documentation and the statement is being provided in this table with that intent and at the specific request of the MSIFN. OPG is continuing to engage with the MSIFN to understand their perspective regarding both established and asserted rights.



Theme	Summary of Interests and/or Concerns	Response, Status and/or Next Steps
	<p><i>treaty between the Crown and Anishinaabe peoples including the Michi Saagiig Nations. The Treaty rights associated with the Gunshot Treaty were re-affirmed with the signing of the Williams Treaties Settlement Agreement in 2018 between the Williams Treaties First Nations (WTFNs - the four Michi Saagiig Nations noted above and three Chippewa Nations - the Chippewas of Georgina Island First Nation, Beausoleil First Nation, and Rama First Nation). The Nations were never consulted by the Crown or facility operators when decisions were made to build and operate the Darlington NGS, and decisions to build and operate spent fuel storage facilities in the Treaty lands.</i></p> <p><i>MSIFN, together with the WTFNs, have a long history in this part of Ontario. The WTFNs' Treaty and traditional territory extends from the shore of Lake Ontario in the south, Georgian Bay in the west, the Ottawa Valley in the east, and as far north as the French River. Within these Treaty areas and traditional territory, a priority is the protection and preservation of the lands, waters, wildlife, and fisheries that the First Nations rely on. The waters, and lands under the waters, of Lake Ontario south of the Treaty area lands, are unceded and never legally given up to the Crown through a treaty or other agreement.</i></p>	

4.3 Engagement Outlook (2025 and Beyond)

OPG is steadfast in its commitment to supporting meaningful engagement during and after the licencing application process and will work in collaboration with Indigenous Nations and communities to identify approaches to engagement that is considerate of the engagement context and the interests of each Indigenous Nation and community.

In 2025, OPG is excited to launch a new energy education program focused on the questions most frequently asked by Indigenous Nations and communities OPG works with. Called Generation for Generations, this fact-based and accessible educational program takes participants on an energy learning journey through seven stories about Ontario's electricity system and includes an overview of the future of electricity in Ontario.

For ongoing engagement on the Licence Renewal Application, OPG will continue to leverage the Indigenous Engagement Plan that is intended to guide engagement activities on the Licence Renewal Application in an approach that aligns with Indigenous Rights Holders and those who that are interested in learning more about ongoing activities at Darlington NGS.

Through ongoing engagement, OPG will aim to identify concerns and thoughts on the future of the Darlington NGS. OPG has heard preliminary concerns on the Licence Renewal Application from Indigenous Nations and communities and will continue to engage and explore them through future engagement activities in attempt to address or mitigate those concerns, as appropriate.

OPG recognizes the importance of meaningful engagement and building and maintaining meaningful relationships with Indigenous Nations and communities. We are dedicated to ensuring that our engagement efforts are not viewed as a one-time obligation about relicensing, but a commitment to continued and sustained engagement on Darlington NGS operations.

5.0 Additional Matters of Regulatory Interest

The following information is provided as updates to information on additional matters of regulatory interest, supplementary to the information provided in Darlington NGS's May 2024, Power Reactor Operating Licence Renewal Application (Reference 1). The relevant section which is being updated is referenced to this document, referred to as the "2025 Licence Renewal Application".

5.1 Environmental Assessment

The following section provides a description of updates since the application submission in this area. More information on Environmental Assessment (EA) is available in Section 4.1 of the 2025 Licence Renewal Application (Reference 1).

2025 Licence Renewal Application, Section 4.1, subsection Mitigation and Follow-up Activities

The following provides an update on the status of IIP-EA actions:


Since submission of the 2025 Licence Renewal Application (Reference 1), OPG has submitted a request for Commission approval to process a new revision of the *Darlington NGS Integrated Implementation Plan*, NK38-REP-03680-10185 R004. The proposed revision to the IIP includes amendments to IIP-EA-012, "Aquatic Thermal Study" and IIP-EA-013, "Aquatic Impingement and Entrainment Study" beyond the current IIP timeline (Reference 16). These IIP actions are associated with aquatic studies comprising of actions prior to, throughout and following the completion of the Darlington Refurbishment Project. As the comprehensive schedule for the Darlington Refurbishment project has evolved, the remaining timelines for these aquatic studies require an amendment.

OPG plans to engage with Indigenous Nations and communities on the development of these aquatic studies and subsequently sharing results. In terms of what's coming up first, currently OPG is targeting to develop the sampling plans for impingement and entrainment in 2026.


A summary of all IIP-EA actions is provided in the Table below; these actions and their status was discussed in Section 4.1 of the licence renewal application. An update on the status of IIP-EA-012 and IIP-EA-013 is provided in the Table.

Table 13: Summary of IIP-EA Actions


IIP-EA Action Number	Description	Status / Notes
IIP-EA-001	Offsetting for fish impingement and entrainment losses.	Closed
IIP-EA-002	Demonstrating that the implementation of good industry management practices are effective in minimizing air/soil/water quality effects on humans and biota.	Closed
IIP-EA-003	Reducing traffic disruption during peak periods and maintaining safe traffic	Closed



IIP-EA Action Number	Description	Status / Notes
	conditions both on-site and off-site during the Refurbishment phase.	
IIP-EA-004	Monitoring and consulting municipalities on land-use policies and future developments proposed in the vicinity of the Darlington NGS site with focus on sensitive land uses (e.g. hospitals, schools) which may result in incompatible uses and effects on implementation of the emergency plans.	Closed
IIP-EA-005	(Socio-Economics) relates to informing neighbours and the public of the refurbishment project and on-going activities of the Darlington NGS operations.	Open - This includes annual activities from 2014 to 2025.
IIP-EA-006	(Socio-Economics) relates to minimizing the disruption of recreation facilities and amenities on the Darlington NGS site, which includes maintaining public access to the Waterfront Trail. This will include undertaking a Recreational User Survey of the Darlington NGS site recreation facilities for two seasons in one year after the restart of all reactors and reviewing the survey results.	Open - These activities are anticipated to be completed in 2026.
IIP-EA-007	Protecting and avoiding the potential Van Camp cemetery which has potential archaeological and cultural heritage resource interest.	Closed
IIP-EA-008	Maintaining emergency response procedures to protect the health and safety of people and the environment in the context of specific Accident & Malfunctions scenarios.	Closed
IIP-EA-009	(Accidents & Malfunctions) relates to design modifications for various systems. The open item is for the provision of an alternate and independent supply of water to the primary heat transport system.	Open - This is anticipated to be completed by 2026 (based on the Unit 4 refurbishment outage restart, which is the last refurbishment Unit).
IIP-EA-010	Characterizing the conventional chemical (i.e., non-radiological) parameters present in Darlington NGS effluent streams.	Closed
IIP-EA-011	Confirming the effectiveness of mitigation measures to protect stormwater quality in the area subject to refurbishment activities (i.e., Protected Area).	Closed
IIP-EA-012	(Aquatic) relates to confirming the accuracy of the predictions made in the EA concerning changes in lakewater temperatures in the vicinity of the Condenser Cooling Water (CCW) discharge, and their associated possible	Open – OPG has submitted a request for Commission approval to process a new revision of the IIP, NK38-REP-03680-10185 R004, including amendment of the remaining timelines for these aquatic studies (Reference 16).



IIP-EA Action Number	Description	Status / Notes
	effects on survival rates for round whitefish embryos.	<p>The descriptions and timeline of the current open activities for this IIP objective are to:</p> <p>(1) Conduct thermal monitoring after the restart of all reactors (continued operations phase) and report monitoring data collected during this phase and assess likely effects on the survival of round white fish embryos (proposed target completion by 2030, pending Commission approval); and,</p> <p>(2) If the performance threshold is exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available (proposed target completion by 2031, pending Commission approval).</p>
IIP-EA-013	(Aquatic) relates to impingement and entrainment, including characterizing early life stages of fish and macro invertebrates being entrained and fish impinged by station operations, monitoring at a level capable of detecting fish Species at Risk and aquatic species of conservation concern, and determining the total fish and macro invertebrate losses and associated impact.	<p>Open – OPG has submitted a request for Commission approval to process a new revision of the IIP, NK38-REP-03680-10185 R004, including amendment of the remaining timelines for these aquatic studies (Reference 16).</p> <p>An entrainment study assessing impacts to fish and macro invertebrates was conducted in 2015 prior to refurbishment with the submitted report reviewed and approved by the CNSC and Fisheries and Oceans Canada. The open activities for this IIP objective are incorporated into OPG's amended Fisheries Act Authorization (FAA) for Darlington NGS (Reference 17). The combined IIP and FAA open activities are:</p> <p>(1) To prepare a sampling plan for fish impingement and entrainment by 2028 (OPG is currently targeting to complete the individual sampling plans for impingement and entrainment in 2026); and,</p> <p>(2) Pending Commission approval for dates, conduct associated 24-month impingement monitoring in 2027 and 2028, and entrainment monitoring in spring 2027 to spring 2029, and submit reports to Fisheries and Oceans Canada (copied to the CNSC) documenting the findings of each study by March 31, 2030.</p>



IIP-EA Action Number	Description	Status / Notes
		<p>If the performance threshold(s) are exceeded, available mitigation options will be reviewed to determine if additional technically and economically feasible opportunities are available (proposed target completion by 2031, pending Commission approval).</p> <p>A new activity is also proposed to complete the best available technically and economically feasible opportunity to mitigate the impingement and entrainment losses or further reduce the potential for effects (proposed target completion by end of 2026, pending Commission approval).</p>
IIP-EA-014	(Accidents & Malfunctions) relates to updating the station Probabilistic Risk Analysis (PRA) to confirm that the assignment of probabilities appropriately represents the Safety Improvement Opportunity (SIO) changes.	Open - The anticipated completion date of this action is 2026.
IIP-EA-015	Confirming the liquefaction potential of foundation materials in the Protected Area is acceptably low.	Closed

5.2 Financial Guarantee, Nuclear Liability Insurance and Cost Recovery

Information on the Financial Guarantee, Nuclear Liability Insurance and Cost Recovery is available in Section 4.3 of the 2025 Licence Renewal Application (Reference 1).

5.3 Public Information and Disclosure Program

OPG believes in open and transparent communication in a timely manner to maintain positive and supportive relationships and the confidence of key stakeholders and the public. OPG's *Nuclear Public Information Disclosure and Transparency Protocol*, posted on OPG's website, describes our communication principles and information requirements and reporting. Public information and disclosure involves the provision to inform, in a timely and transparent manner, accurate information to stakeholders and the public in the vicinity of OPG's nuclear facilities regarding events, activities and operations. OPG's protocol adheres to regulatory requirements as outlined in CNSC REGDOC-3.2.1, *Public Information and Disclosure*.

The following section provides a description of updates since the application submission in this area. More information on the Public Information and Disclosure Program is available in Section 4.4 of the 2025 Licence Renewal Application (Reference 1).



2025 Licence Renewal Application, Section 4.4.4 – Community Outreach

The following provides additional information regarding OPG's initiatives aimed at educating youth about various forms of electricity generation:

OPG has undertaken a number of initiatives targeting youth of varying ages to share information and provide meaningful dialogue and learning opportunities associated with energy production, the benefits of different forms of electricity generation (including nuclear power) and environmental stewardship. This includes a new program called Electrifying Education which reached over 2,500 school-aged children in our host community since its inception in the fall of 2023.


The following provides an update regarding community engagement:

Each year since 2023, we have engaged with nearly 50,000 members of the public at 30+ Durham Region community events and festivals, and through OPG programming where staff are available to discuss OPG's operations and have open dialogue with the public.



6.0 References

1. OPG letter, A. Grace to C. Salmon, “Darlington NGS – Application for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence 13.03/2025”, May 30, 2024, CD# NK38-CORR-00531-25450.
2. CNSC letter, A. Baig to A. Grace, “Darlington Nuclear Generating Station: CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence”, August 1, 2024, e-Doc# 7334720, CD# NK38-CORR-00531-25589.
3. OPG letter, A. Grace to A. Baig, “Darlington NGS – OPG Response to CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence: Action Item OPG-2024-33652”, August 16, 2024, CD# NK38-CORR-00531-25595.
4. CNSC Record of Decision DEC 24-H101, “Application to Amend Power Reactor Operating Licence PROL-13.03/2025 to Authorize the Production of Cobalt-60 at the Darlington Nuclear Generating Station”, June 5, 2024, e-Doc# 7295750 (PDF), CD# NK38-CORR-00531-25501.
5. OPG letter, A. Grace to A. Mathai, “Darlington NGS – Response to CNSC Staff’s Request for Implementation Plans or Justification for Identified Documents to be Guidance in the Darlington Licence Conditions Handbook”, March 19, 2024, CD# NK38-CORR-00531-25234.
6. OPG letter, A. Grace to A. Mathai, “Darlington NGS – OPG Response to CNSC Staff’s Review of Justifications for Identified Documents to be Guidance in the Darlington Licence Conditions Handbook”, September 27, 2024, CD# NK38-CORR-00531-25642.
7. CNSC letter, A. Mathai and R. Richardson to R. Geofroy and J. Franke, “Darlington NGS and Pickering NGS: Implementation of Sections 5.1 and 5.5 for REGDOC-2.2.4 Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3: Withdrawn Action Item 2023-OPG-27886”, November 7, 2023, e-Doc# 7162560, CD# N-CORR-00531-23850.
8. OPG letter, A. Grace to A. Mathai, “Darlington NGS – OPG Update to CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence: Action Item OPG-2024-33652”, December 4, 2024, CD# NK38-CORR-00531-25777.
9. CNSC email, M. Hitchon to S. Woolley and T. Szewczuk, “CNSC Sufficiency Review Follow-up: Request for New Radiation Protection Dosimetry Data”, September 25, 2024, CD# NK38-CORR-00531-25751.
10. OPG letter, A. Grace to A. Mathai and S. Watt, “Darlington NGS – 2024 Environmental Risk Assessment Addendum for the Darlington Nuclear Site”, September 24, 2024, CD# NK38-CORR-00531-25312.

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11. OPG email, A. Bhardwaj to A. Mathai and S. Watt, "Darlington NGS – Update to Revision 00 of the 2024 Environmental Risk Assessment Addendum for the Darlington Nuclear Site", October 31, 2024, CD# NK38-CORR-00531-25778.
 12. OPG email, A. Bhardwaj to N. Greencom and J. Burta, "Darlington NGS – CNSC Staff's Prior Written Notification of Document Changes: D-REP-07701-00001-R002, 2020 Environmental Risk Assessment for the Darlington Nuclear Site", November 2, 2022, CD# NK38-CORR-00531-23774.
 13. OPG letter, H. Brown to R. Richardson, A. Mathai, and K. Campbell, "OPG – 2023 Results of Environmental Monitoring Programs for Darlington and Pickering Nuclear", April 25, 2024, CD# N-CORR-00531-23942.
 14. OPG letter, A. Grace to A. Mathai, "Darlington NGS – Letter of Intent for Approval to Install additional Target Delivery Systems (TDSs)", December 9, 2024, CD# NK38-CORR-00531-25801.
 15. OPG letter, A. Grace to C. Salmon, "Darlington NGS – Revised Redacted Application for Amendment to the Darlington NGS Power Reactor Operating Licence 13.03/2025 for Additional Isotope Production", November 28, 2024, CD# NK38-CORR-00531-25810.
 16. OPG letter, A. Grace and B. Vulcanovic to C. Salmon, "Darlington NGS Refurbishment – Request for Commission Approval to Revise the Darlington NGS Integrated Implementation Plan (IIP)", October 17, 2024, CD# NK38-CORR-00531-25116.
 17. Fisheries and Oceans Canada letter, S. Eddy to R. Geofroy, "Amendment of Darlington Nuclear Generation Station 14-HCAA-01267-Notice of Amendment", October 27, 2023, CD# D-CORR-00539.4-00007.

Appendix A: Commonly Used Acronyms

Acronym	Definition	Acronym	Definition
ALARA	As Low As Reasonably Achievable	ISO	International Organization for Standardization
ANDE	Advanced Non-Destructive Examination	ISR	Integrated Safety Review
CMS	Combustible Material Safety	LLW	Low Level Waste
CNSC	Canadian Nuclear Safety Commission	MSIFN	Mississaugas of Scugog Island First Nation
COG	CANDU Owners Group	NGS	Nuclear Generating Station
CRE	Collective Radiation Exposure	NSCA	Nuclear Safety and Control Act
CSA	Canadian Standards Association	OPEX	Operating Experience
DNNP	Darlington New Nuclear Project	OPG	Ontario Power Generation Inc
DLC	Darlington Learning Centre	OSR	Operational Safety Requirements
D-PSR	Darlington Periodic Safety Review	PEL	Performance Element
EA	Environmental Assessment	PLC	Pickering Learning Centre
EMS	Environmental Management System	PNERP	Provincial Nuclear Emergency Response Plan
EPRI	Electric Power Research Institute	PROL	Power Reactor Operating Licence
FAAGM	Fixed Area Alarming Gamma Monitor	PSA	Probabilistic Safety Assessment
FAATM	Fixed Area Alarming Tritium Monitor	RCHP	Restart Control Hold Points
HECA	High Efficiency Carbon Adsorber	REGDOC	Regulatory Documents
HEPA	High Efficiency Particulate Air	RHP	Regulatory Hold Point
HPD-RPP&FS	Health Physics Department-Radiation Protection Programs and Field Support	RP	Radiation Protection
HPI-FS	Health Physicist Instrumentation at HPD-RP Programs & Field Support	RTS	Return-to-Service
HFE	Human Factors Engineering	SAFS	Systems Available for Service
HSA	Hazard Screening Analysis	SCA	Safety and Control Area
HWMB	Heavy Water Management Building	SEFDR	Site Event Free Day Resets
IAEA	International Atomic Energy Agency	SIO	Safety Improvement Opportunity
IEP	Indigenous Engagement Plan	SOE	Safe Operating Envelope
IIP	Integrated Implementation Plan	TCSCA	Timely Completion of Safety Corrective Actions
INPO	Institute of Nuclear Power Operations	TRF	Tritium Removal Facility
IRIS	Industry Reporting and Information System	WTFN	Williams Treaties First Nations

Appendix B: Update to Activities and Nuclear Substances to be Encompassed by the Licence

Activities to be Licensed:

Following the submission of the Darlington NGS PROL Renewal Application (Reference B-1), PROL 13.03/2025 was amended to PROL 13.04/2025 through CNSC Commission Record of Decision – DEC 24-H101 (Reference B-2) to authorize the production of Cobalt-60 at Darlington NGS. The Table below provides an update to the Appendix C of Reference B-1 activities to be licensed.

Table B-1: Activities to be Licensed, Part IV of PROL 13.04/2025

Darlington NGS Power Reactor Operating Licence, PROL 13.04/2025
IV) LICENSED ACTIVITIES:
This licence authorizes the licensee to:
(i) operate the Darlington Nuclear Generation Station, including equipment for the production of radionuclides identified in (vi) and the Darlington Tritium Removal Facility housed within the Heavy Water Management Building (hereinafter “the nuclear facility”), at a site located in the Municipality of Clarington, in the Regional Municipality of Durham, in the Province of Ontario;
(ii) possess, transfer, use, package, manage and store the nuclear substances that are required for, associated with, or arise from the activities described in (i);
(iii) import and export nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i);
(iv) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i);
(v) possess, transfer, process, package, manage and store the nuclear substances associated with the operation of the Darlington NGS Tritium Removal Facility;
(vi) produce, possess, transfer, use, package, manage and store nuclear substances that are required for, associated with, or arise from the activities associated with operations of the Darlington Nuclear Generating station and activities described in (i) associated with production of: (1) Co-60; and (2) Mo-99 (including its decay radionuclides);

Additional activities requested to be licensed include activities associated with the production of isotopes. A request to amend the Darlington NGS PROL to include these activities was submitted in Reference B-3 and is pending Commission decision.

Nuclear Substances:

The following information provides updates, including information related to CNSC staff’s review of OPG’s application in Reference B-4 and OPG’s response to CNSC staff’s review in Reference B-5, since the application submission in this area. More information on nuclear substances is available in Appendix C of the 2025 Licence Renewal Application (Reference B-1).

The maximum quantity is interpreted as the maximum amount that can be accommodated in inventory as per design by Darlington NGS (including the Tritium Removal Facility for its operation). The Table below provides an update (where applicable) to Table 32 in the 2025 Licence Renewal Application (Reference B-1). Data provided are current as of November 2024.

Table B-2: Update to List of Nuclear Substances

Nuclear Substance	Form and Location	Maximum Quantity
Cobalt-60 (note 1)	- adjuster rods of each reactor unit - irradiated rods in spent fuel bays	79.3 MCi (2.93E06 TBq) (note 2)
	- Cobalt-60 bundle in the Irradiated Fuel Bay for calibration of the Cobalt Bundle Measurement System	expected lifetime range: 15 – 35 KCi (555 – 1295 TBq)
Enriched Uranium in Components (e.g. fission chambers)	Solid. Located within the Darlington protected area for use as needed	1.5628 g (note 3)

Notes:

1. Since submission of the 2025 Licence Renewal Application, the Darlington NGS PROL was amended to authorize the production of Cobalt-60 at Darlington NGS. Details on the maximum quantity of Cobalt-60 are provided in Reference B-6, Section 1.6 of Attachment 3.
2. Assumptions: four units operating with 16 Cobalt-60 adjuster rods (AA), one unit AAs irradiated at 1.0 Effective Full Power Years (EFPY), one at 2.2 EFPY, one at 3.0 EFPY, and one at 3.5 EFPY. Additionally assumed is two full Co-60 AA complements irradiated at 3.5 EFPY in spent fuel bays.
3. This is the current inventory. There is no design maximum and inventory may change based on operational needs.

OPG's request to amend the Darlington NGS PROL to allow for the production of the medical radioisotopes Yttrium-90 (Y-90) and Lutetium-177 (Lu-177) using the Target Delivery System currently installed for the production of Molybdenum-99 is pending Commission decision (Reference B-3). The maximum potential quantity of activated Y-90 and activated Lu-177, and information on the form of each radioisotope, is provided in Reference B-3.

The following provides additional information regarding Darlington NGS Source Characterization:

Darlington NGS Source Characterization are captured in the following documents:

Carbon-14 (Table 1)

N-REP-03400.1-10001, *An Estimate of Carbon-14 Inventory at OPG Nuclear Sites: 1971 – 1998*

Filters and IX Resins (Tables 1 to 4)

TRAN-REP-79154-00008, *Characterization of Radioactive Filters and IX Resin for the MPTP-SF & RFTP*

Retube Waste Processing Building (Section 7)

NK38-REP-09701-10326, *Darlington Retube Waste Processing Building - Safety Assessment*

Cobalt-60 (Tables 2 to 11)
NK38-REP-31780-0841462, *Source Parameters for Darlington Cobalt Flask Design Assessment*

Target Delivery System, Mo-99 Isotope Production
NK38-REP-30550-00012, *Target Delivery System System Design ALARA Assessment*

General Darlington Radionuclide Characterization (qualitative only)
N-REP-09071-10014, *Radionuclide Characterization of Smear Samples at DNGS – 2021*

Appendix B References:

- B-1. OPG letter, A. Grace to C. Salmon, “Darlington NGS – Application for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence 13.03/2025”, May 30, 2024, CD# NK38-CORR-00531-25450.
- B-2. CNSC Record of Decision DEC 24-H101, “Application to Amend Power Reactor Operating Licence PROL-13.03/2025 to Authorize the Production of Cobalt-60 at the Darlington Nuclear Generating Station”, June 5, 2024, CD# NK38-CORR-00531-25501.
- B-3. OPG letter, A. Grace to C. Salmon, “Darlington NGS – Revised Redacted Application for Amendment to the Darlington NGS Power Reactor Operating Licence 13.03/2025 for Additional Isotope Production”, November 28, 2024, CD# NK38-CORR-00531-25810.
- B-4. CNSC letter, A. Baig to A. Grace, “Darlington Nuclear Generating Station: CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence”, August 1, 2024, e-Doc# 7334720, CD# NK38-CORR-00531-25589.
- B-5. OPG letter, A. Grace to A. Baig, “Darlington NGS – OPG Response to CNSC Staff Technical Sufficiency Review of the Application to Renew the Power Reactor Operating Licence: Action Item OPG-2024-33652”, August 16, 2024, CD# NK38-CORR-00531-25595.
- B-6. OPG letter, R. Geofroy to M. Bacon-Dussault, “Darlington NGS – Addendum to the Application for Darlington Nuclear Generating Station Power Reactor Operating Licence 13.03/2025 Amendment for Production of the Cobalt-60 Radioisotope”, December 22, 2023, CD# NK38-CORR-00531-25073.

Appendix C: Update to Permits, Certificates and Other Licences

The following Licences have changed in Appendix E of the 2025 Licence Renewal Application (Reference C-1).

Class II Nuclear Facilities and Prescribed Equipment Licence

New:

Class II Irradiator (635), **12861-18-26.8** (replacement for 12861-18-26.7)

Import:

New:

Import Licence, IL-A4-30341.0/2029

Export:

New:

Export Licence, EL-A4-30343.0/2029

No longer in service:

Import Licence, IL-A2-A4-26400.0/2024

Import Licence, IL-A2-A4-26401.0/2024

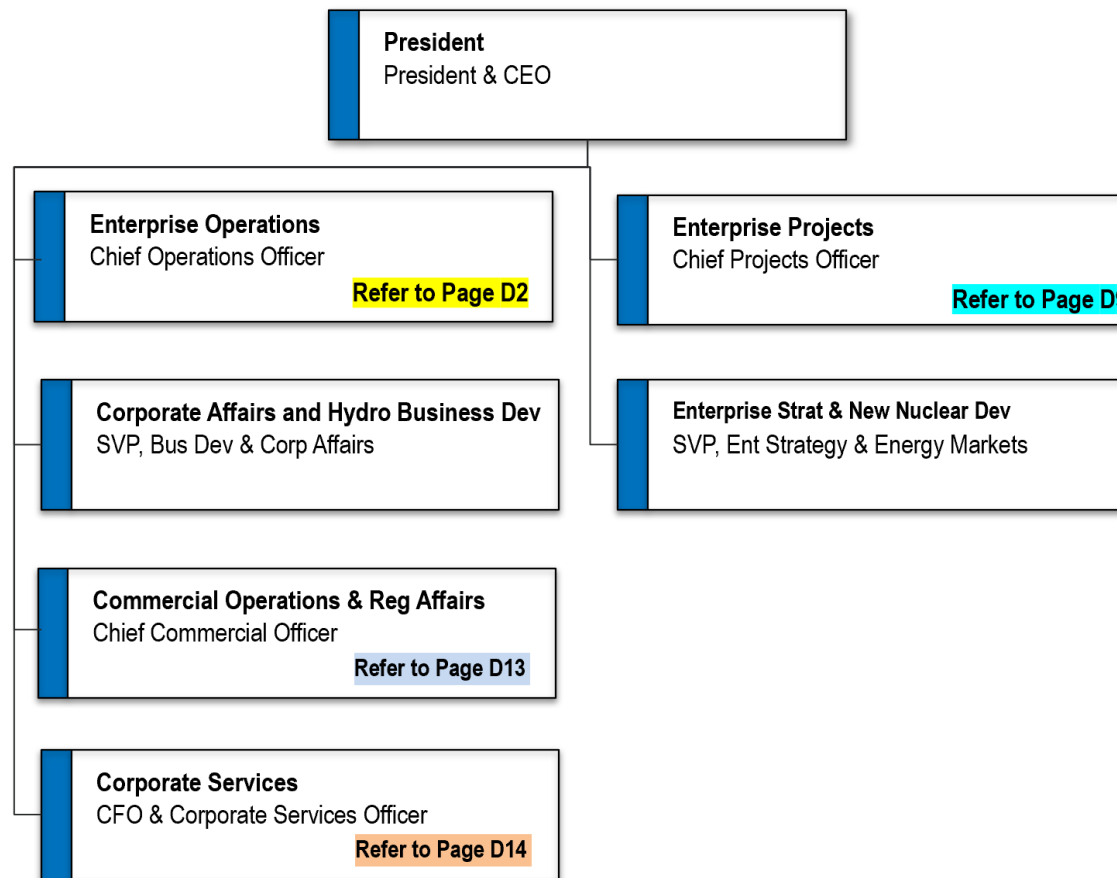
Import Licence, IL-A2-A4-27029.0/2026

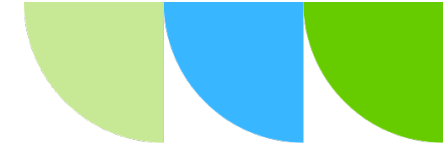
Appendix C Reference:

- C-1. OPG letter, A. Grace to C. Salmon, "Darlington NGS – Application for Renewal of the Darlington Nuclear Generating Station Power Reactor Operating Licence 13.03/2025", May 30, 2024, CD# NK38-CORR-00531-25450.

Appendix D: Darlington Organizational Structure (December 5, 2024)

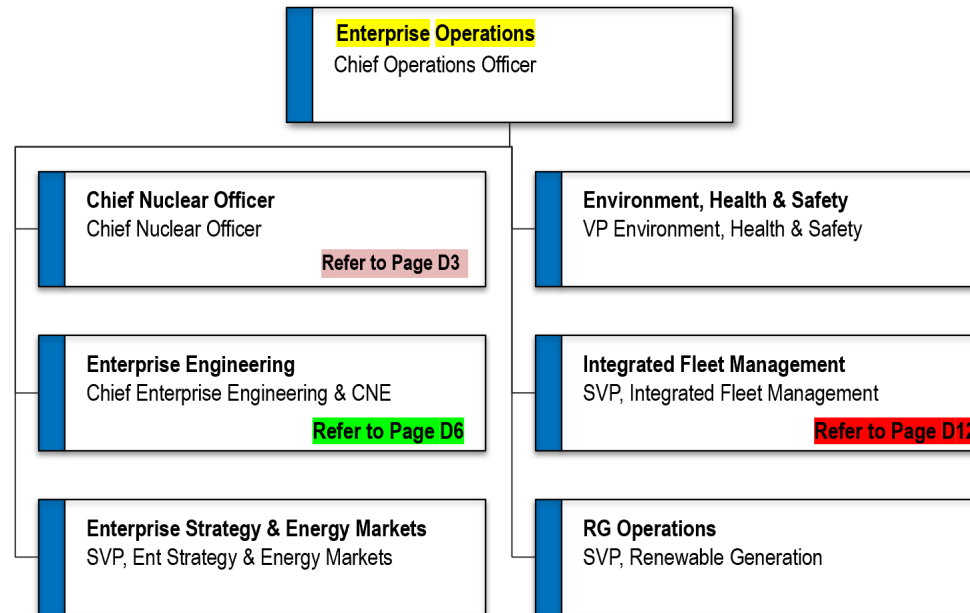
Appendix D: Nuclear Organizations





Appendix D: Nuclear Organizations

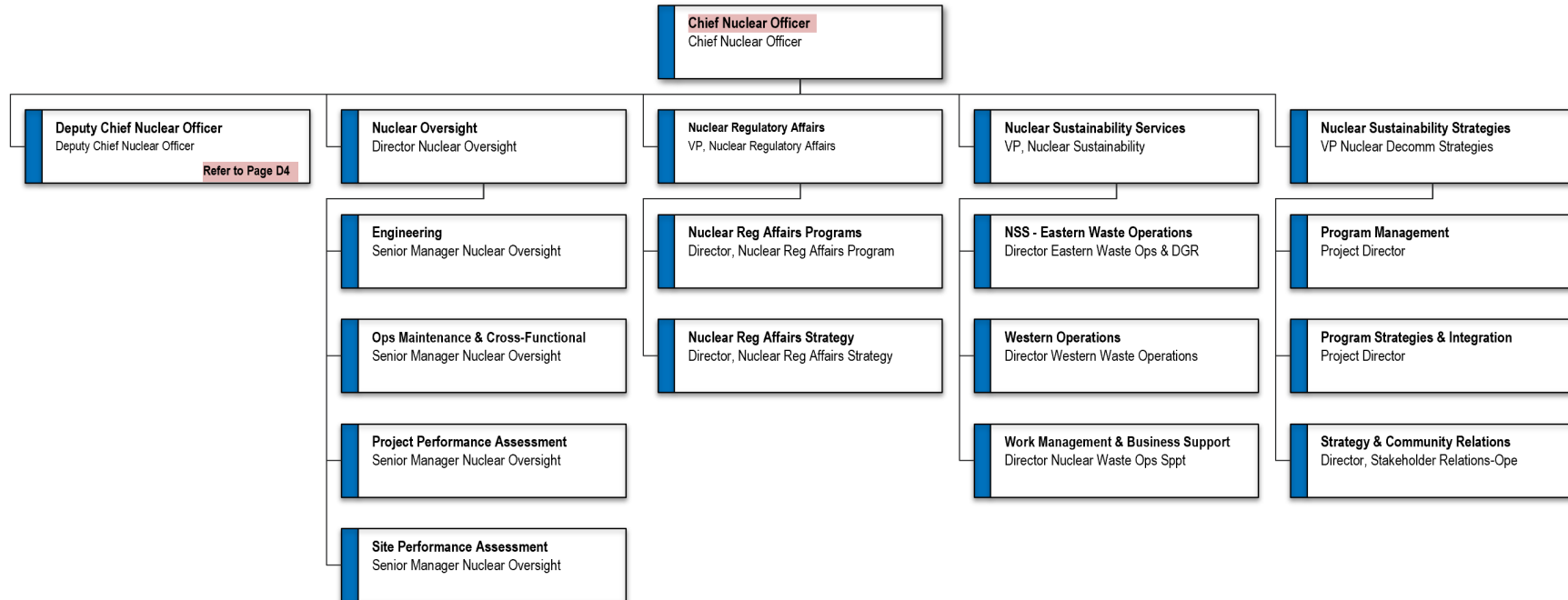
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Appendix D: Nuclear Organizations

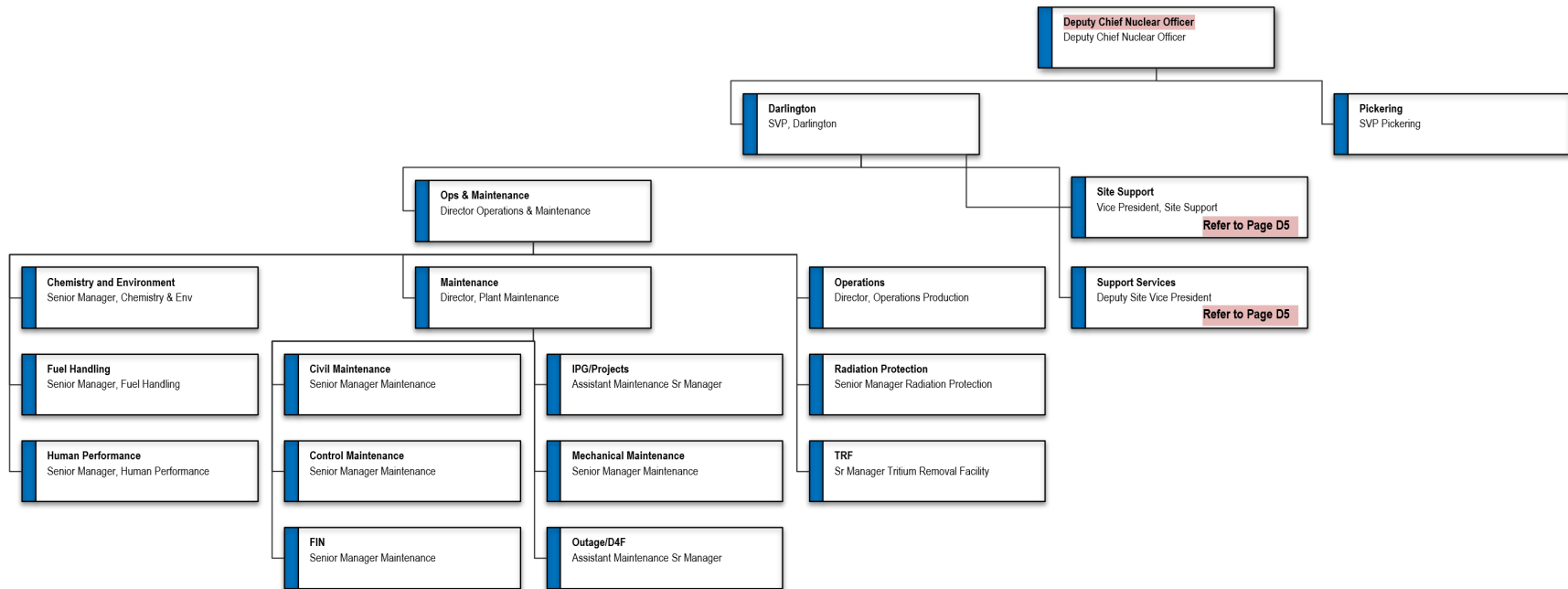
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Appendix D: Nuclear Organizations

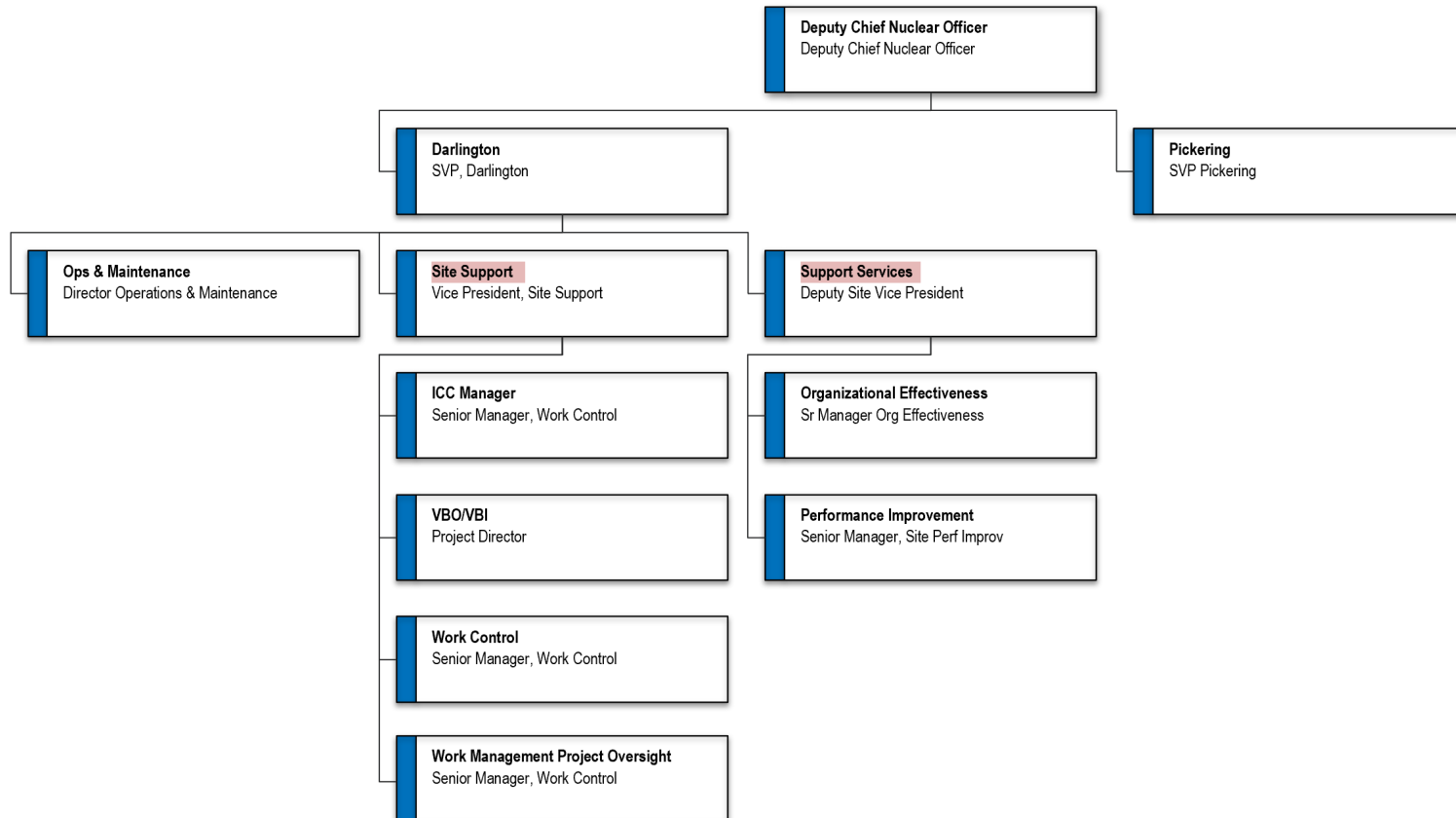
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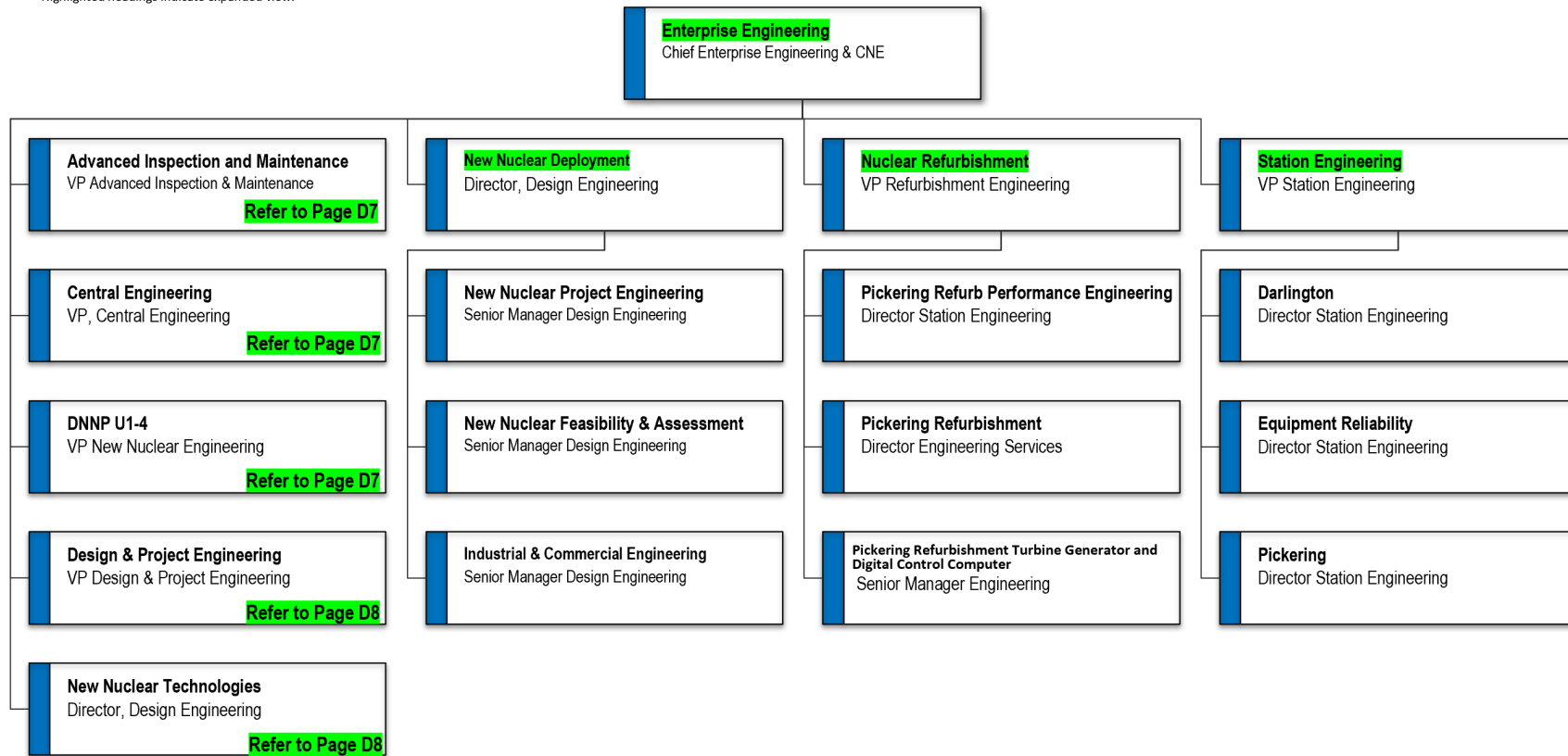
Appendix D: Nuclear Organizations

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Appendix D: Nuclear Organizations

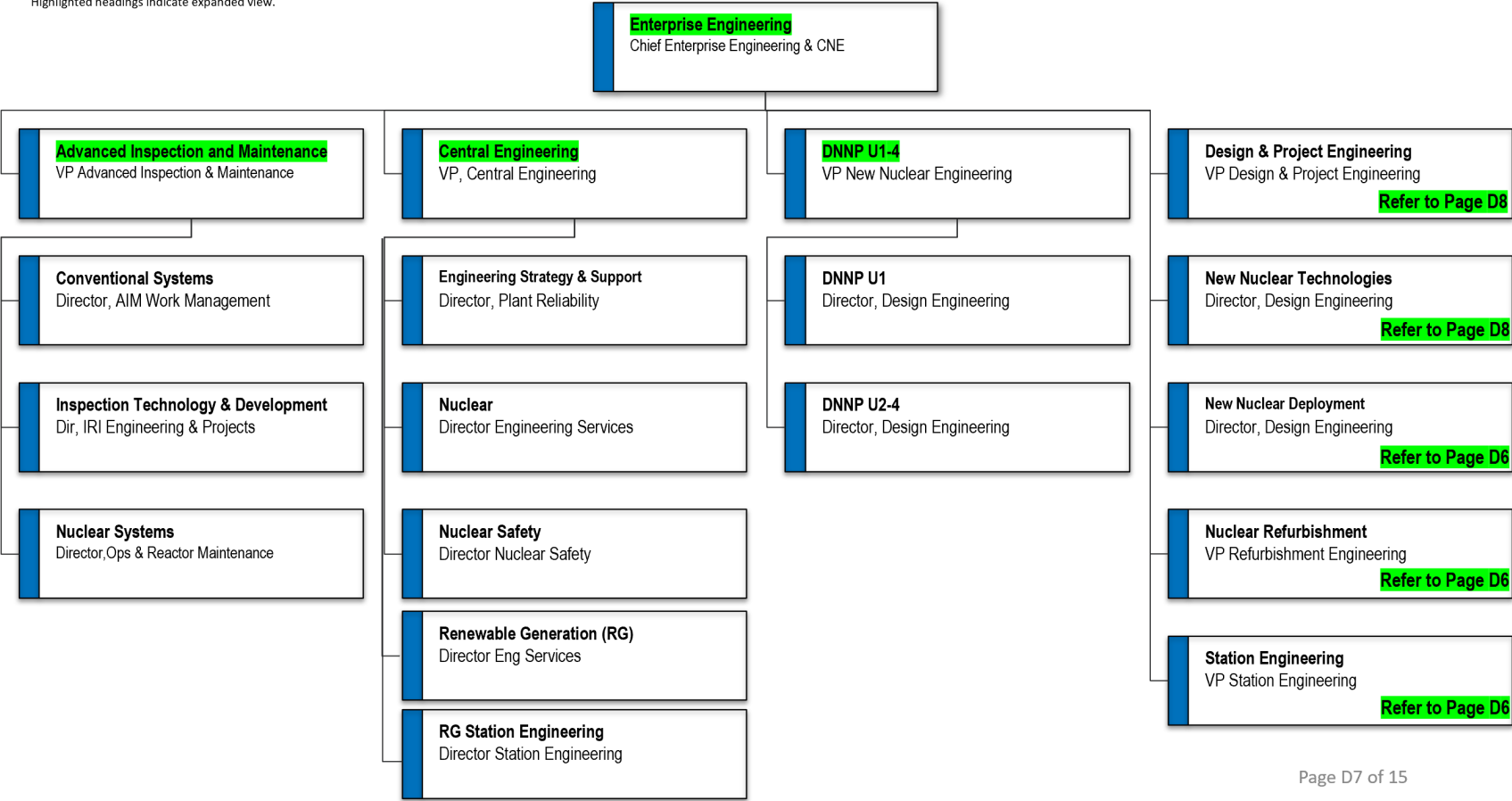
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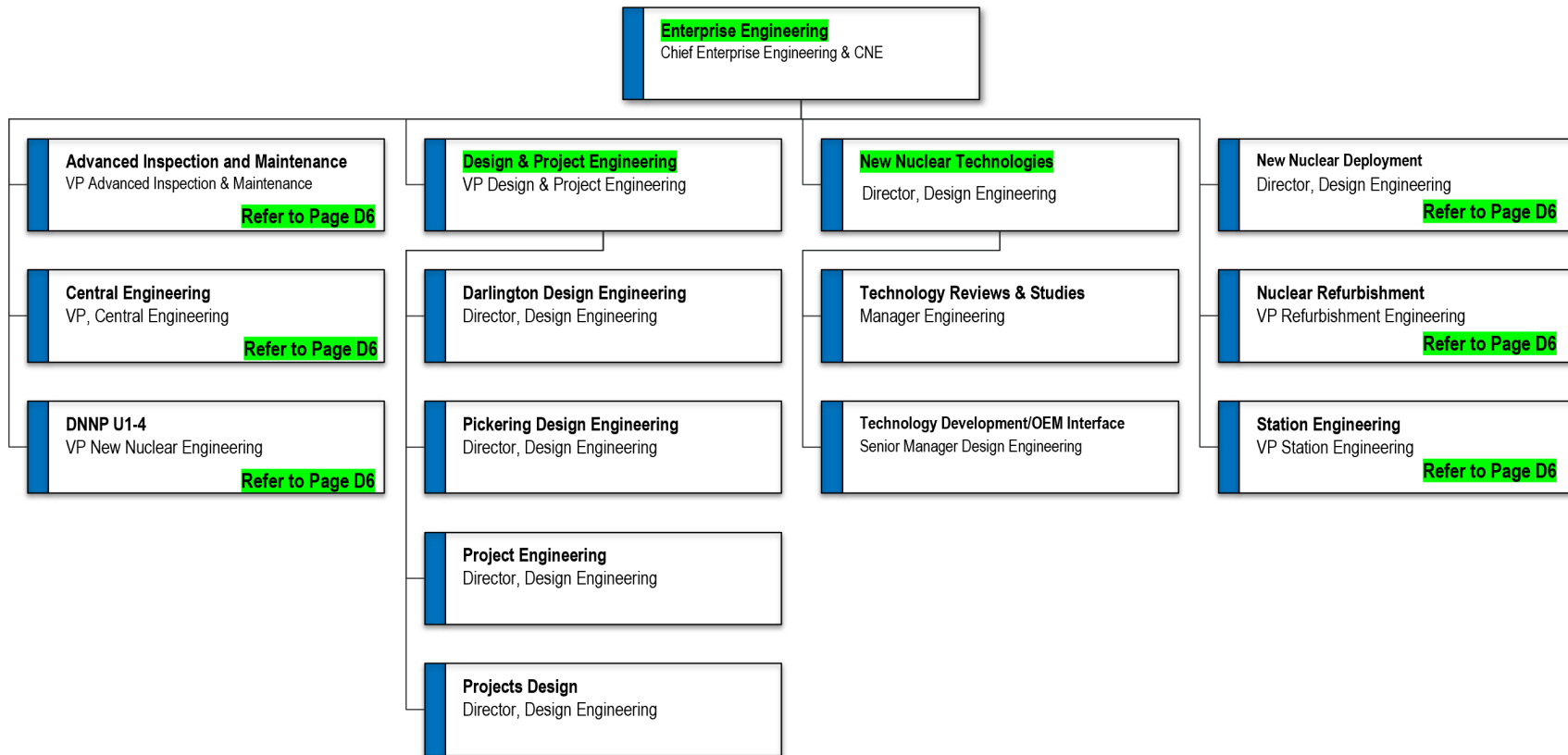
Appendix D: Nuclear Organizations

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Appendix D: Nuclear Organizations

Highlighted headings indicate expanded view.

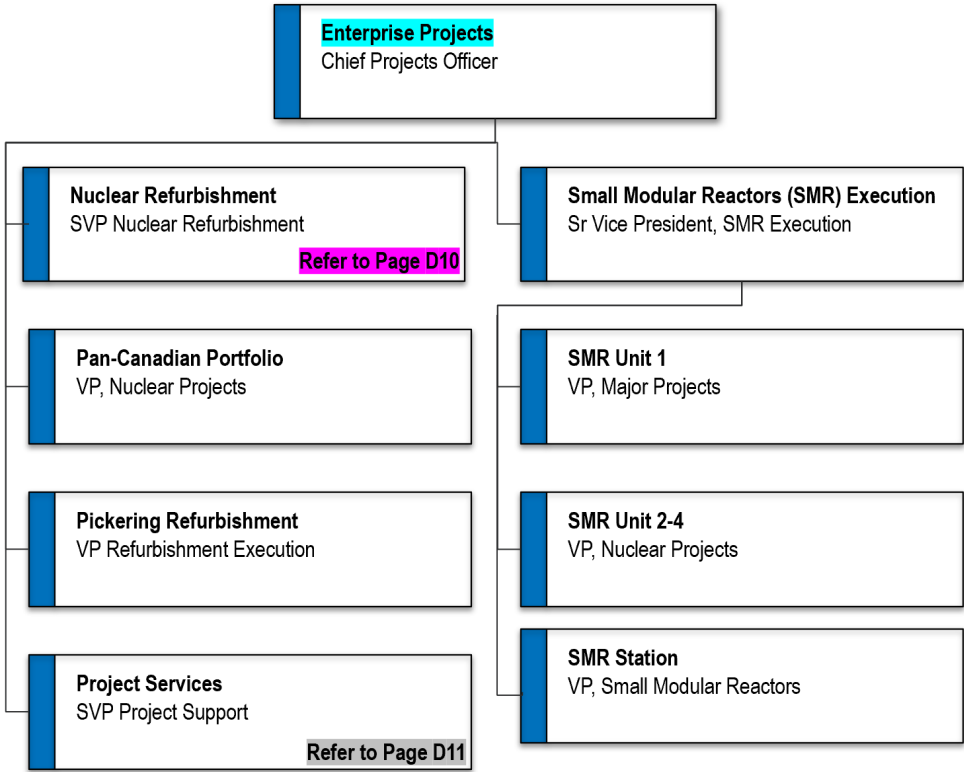


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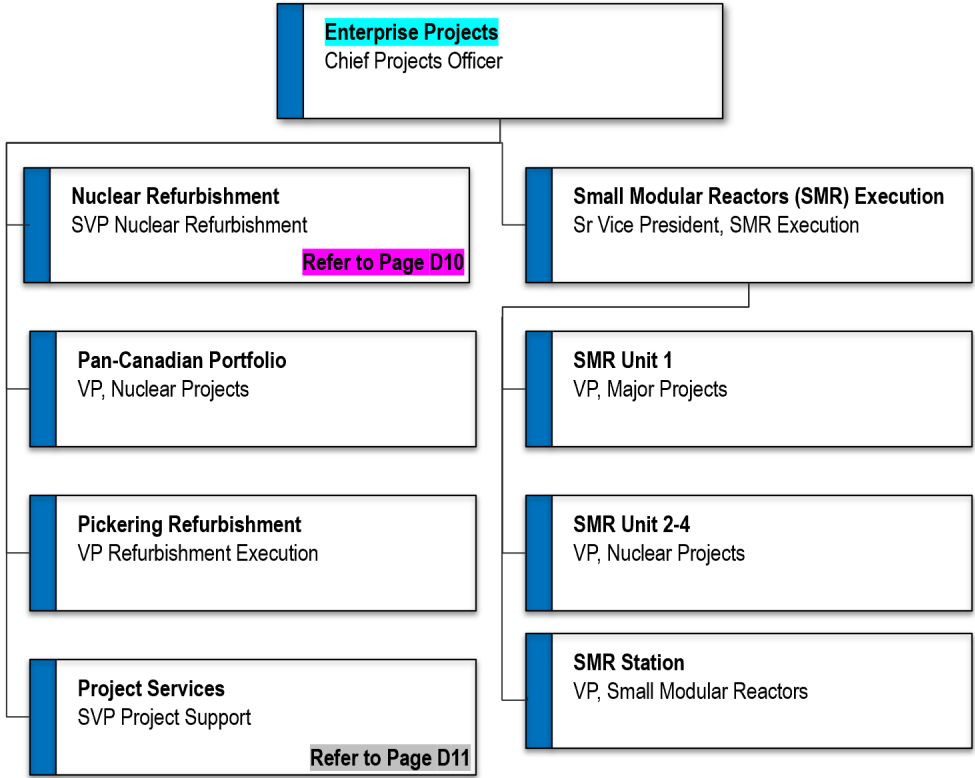
Appendix D: Nuclear Organizations

Highlighted headings indicate expanded view.



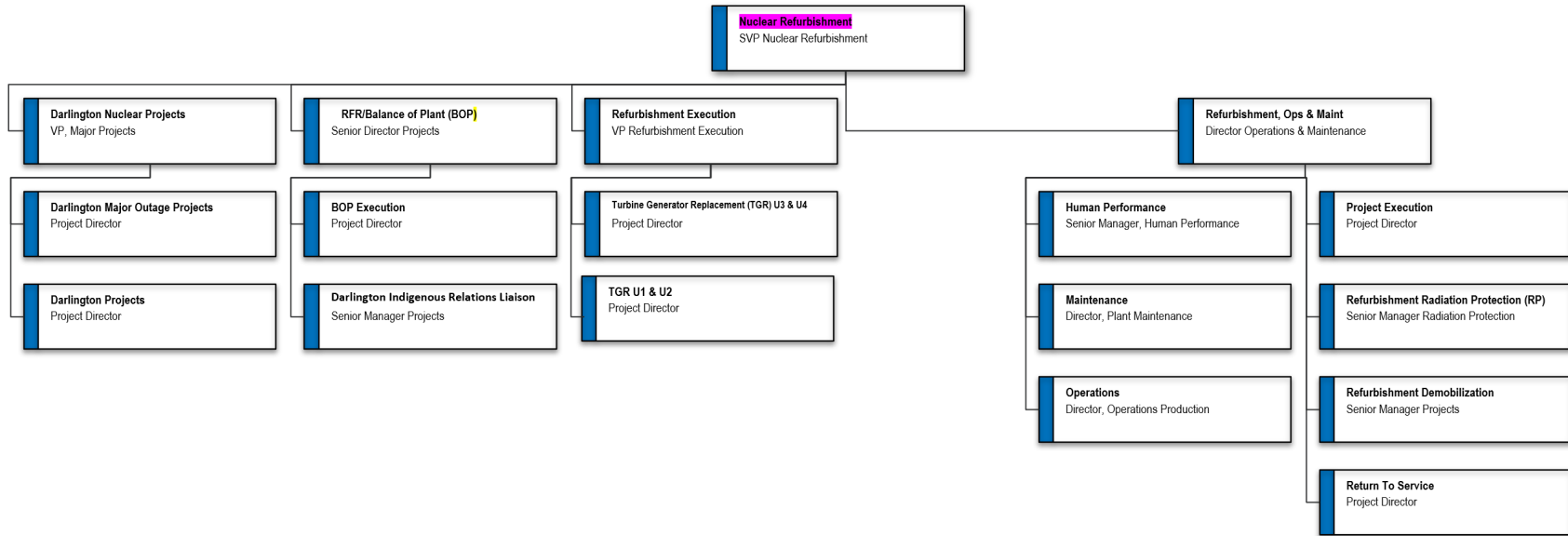
Appendix D: Nuclear Organizations

Highlighted headings indicate expanded view.



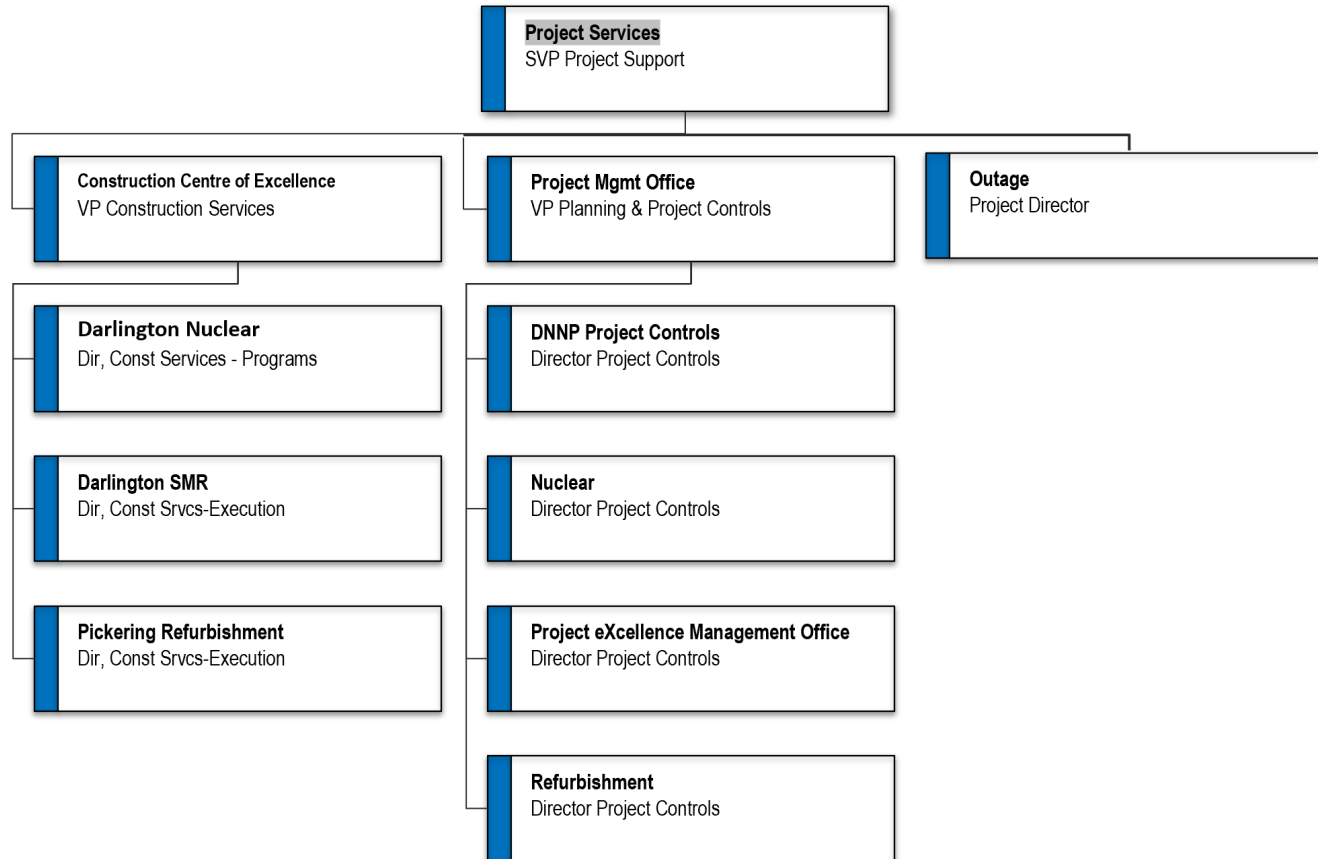
Appendix D: Nuclear Organizations

Highlighted headings indicate expanded view.



Appendix D: Nuclear Organizations

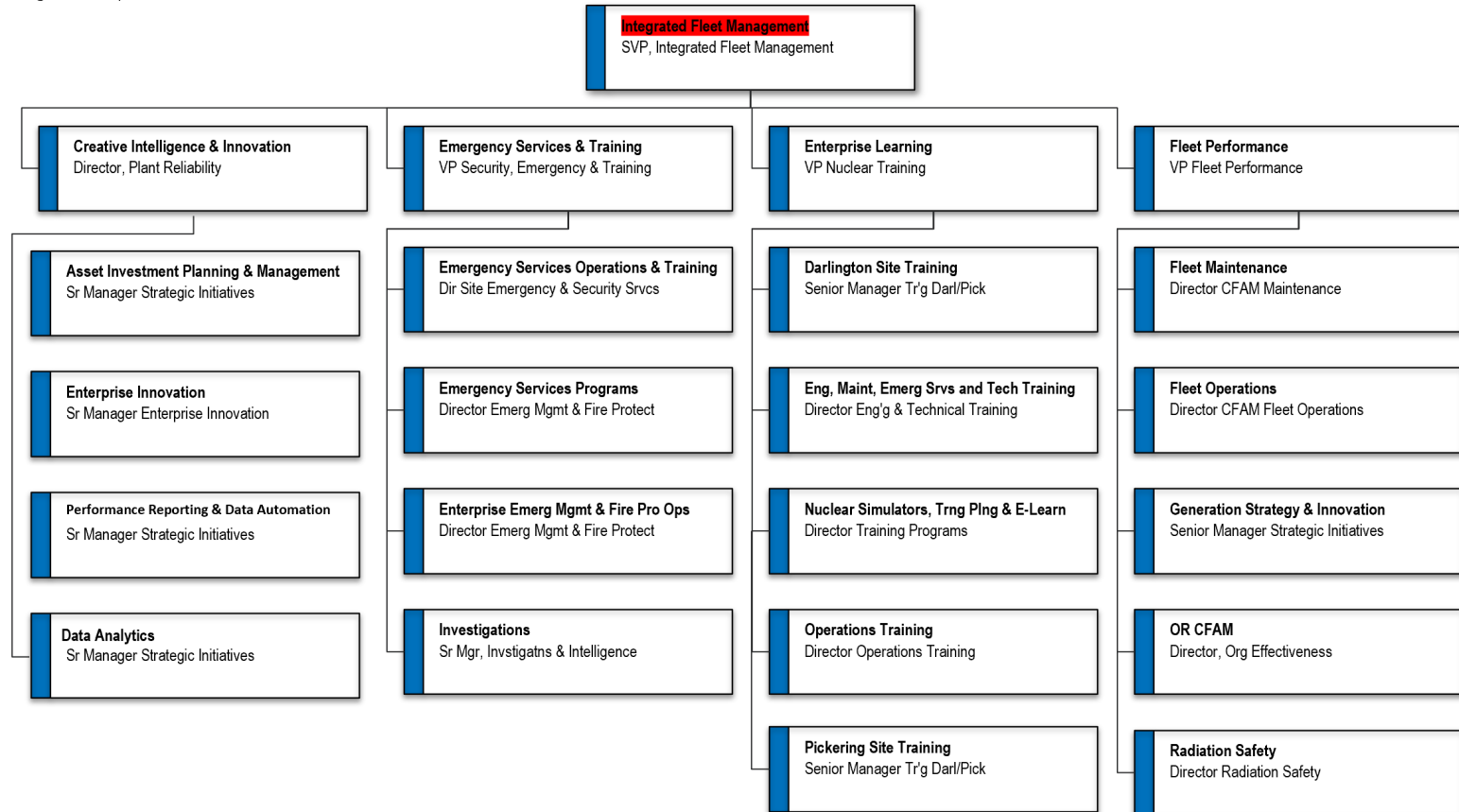
Highlighted headings indicate expanded view.



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Appendix D: Nuclear Organizations

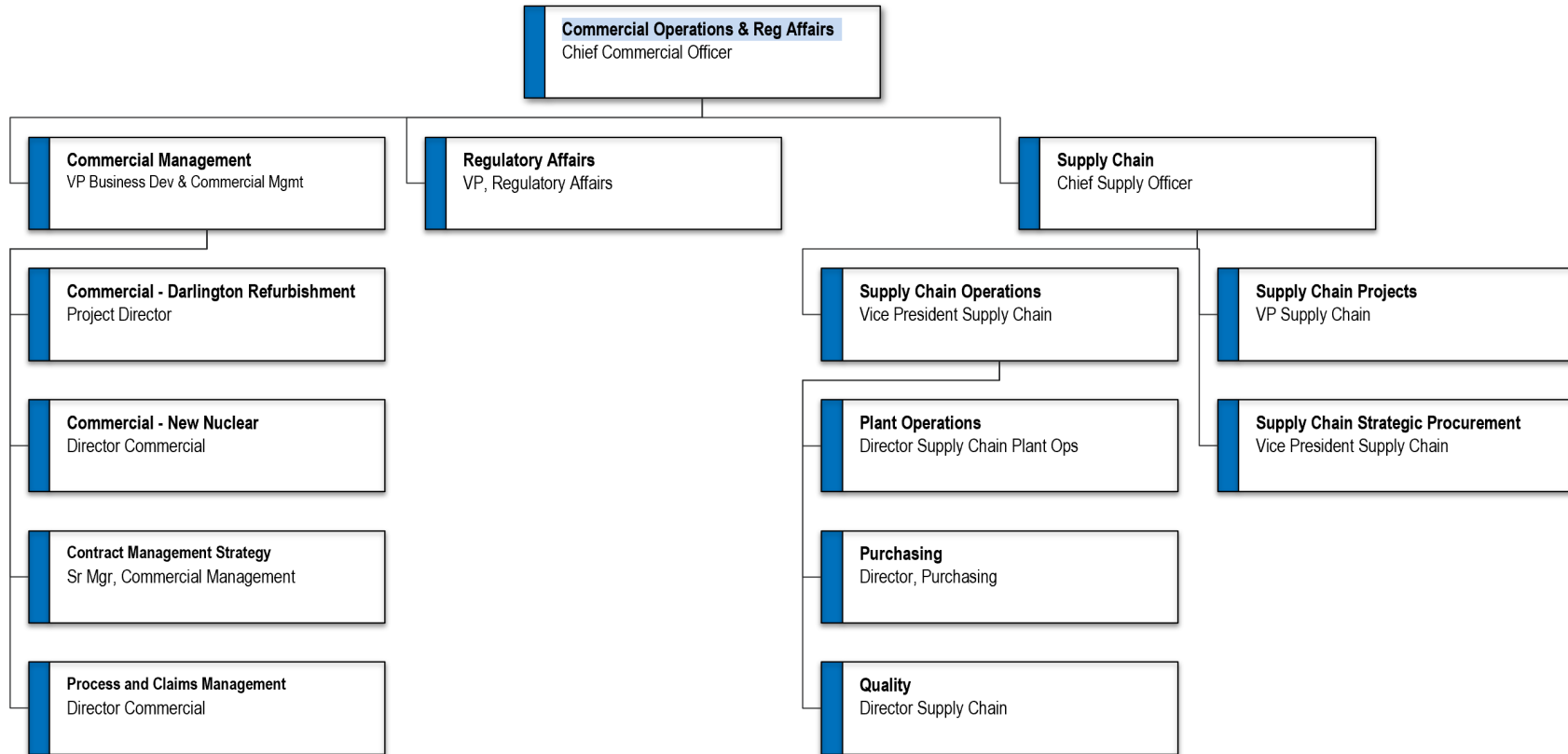
Highlighted headings indicate expanded view.



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Appendix D: Nuclear Interfacing Organizations

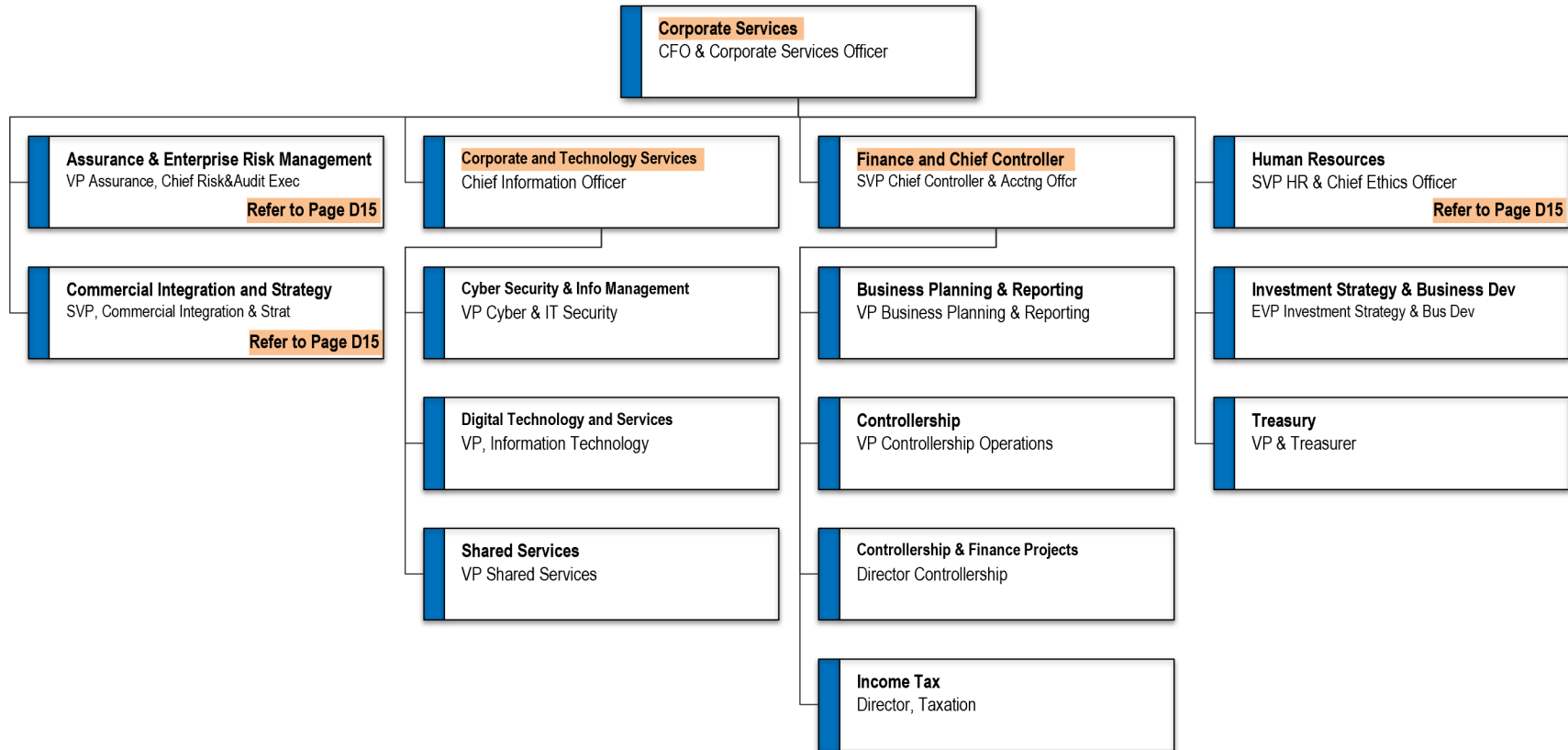
Highlighted headings indicate expanded view.



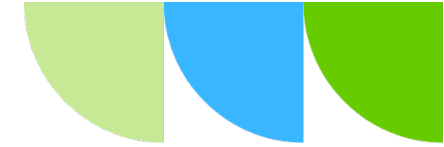
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Appendix D: Nuclear Interfacing Organizations

Highlighted headings indicate expanded view.

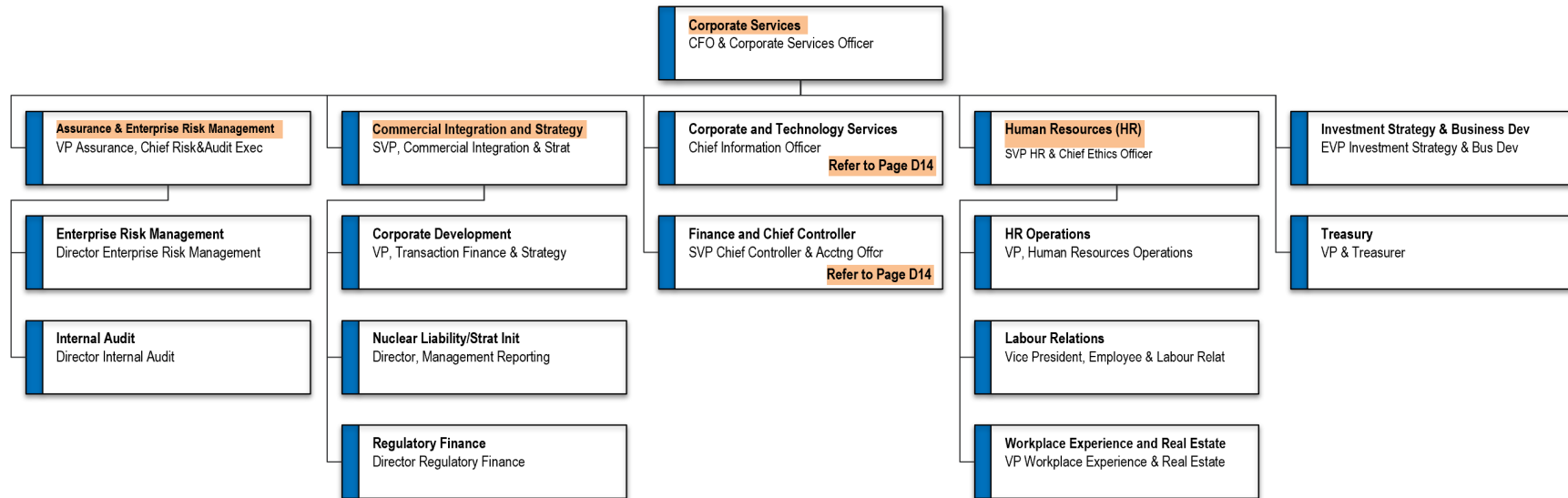


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Appendix D: Nuclear Interfacing Organizations

Highlighted headings indicate expanded view.



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OPG



Excellence
Commit
to better



OPG



Inclusion
Commit
to us all



OPG



Innovation
Commit
to what
could be



OPG



Integrity
Commit
to truth



OPG



Safety
Commit
to care



**Summary of Regulatory Commitments, Regulatory Obligations and Regulatory
Management Actions Made/Concurrence Requested**

CD# NK38-CORR-00531-25844 P

Submission Title: **Darlington NGS – Supplemental Update in Support of the Power
Reactor Operating Licence Renewal Application**

Regulatory Commitments (REGC):

No.	Description	Date to be Completed
	None	

Regulatory Management Action (REGM):

No.	Description	Date to be Completed
	None	

Regulatory Obligation Action (REGO):

No.	Description	Date to be Completed
	None	

**Concurrence
Requested:** None.