



CMD 26-H7.1B

Date: 2026-09-09

Supplementary Information

Written Submission from Ontario Power Generation

In the matter of

Ontario Power Generation

Application to refurbish Pickering Nuclear
Generating Station and to renew licences
for the Pickering Nuclear Generating
Station and Waste Management Facility

Commission Public Hearing Part 2

October 2026

Renseignements supplémentaires

Mémoire d'Ontario Power Generation

À l'égard de

Ontario Power Generation

Demande concernant la réfection de la
centrale nucléaire de Pickering et le
renouvellement de ses permis pour la
centrale et l'installation de gestion des
déchets

Audience publique de la Commission Partie 2

Octobre 2026

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

© Ontario Power Generation Inc., 2026. This document has been produced and distributed for Ontario Power Generation Inc. purposes only. No part of this document may be reproduced, published, converted, or stored in any data retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of Ontario Power Generation Inc.

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

P-REP-03680-00087-R000

2026-09-08

Order Number: N/A

Other Reference Number: N/A

OPG Proprietary

Prepared by:

Taylor Lovett *Mona Ghafouri Azar*

Sept. 8, 2026

Sept. 8, 2026

Mona Ghafouri Azar &
Taylor Lovett
Senior Technical
Engineers/Officers
PNGS Refurbishment -
Reactor Safety

Reviewed by:

Naqeeb Ali

Sept. 8, 2026

Naqeeb Ali
Manager Projects
PNGS Refurbishment -
Reactor Safety

Reviewed by:

Lawrence Yu 2026-Sep-08

Lawrence Yu
Senior Manager
PNGS Refurbishment -
Reactor Safety

Approved by:

Jenny Leung

9-Sept-2026

Jenny Leung
Director
PNGS Refurbishment -
Station Engineering

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 2 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary
--

Table of Contents

	Page
1.0 PURPOSE.....	7
2.0 BACKGROUND.....	7
3.0 OVERVIEW OF THE GLOBAL ASSESSMENT PROCESS	10
3.1 Overview of Pickering Refurbishment Activities	11
4.0 GLOBAL ASSESSMENT METHODOLOGY	11
5.0 SUMMARY OF FINDINGS FROM SAFETY FACTOR REPORTS, EXPERT PANEL AND CNSC STAFF REVIEWS OF PSR3 REPORTS	15
6.0 REVIEW OF IIP ACTIONS FROM PSR2 AND PSR2-B	15
7.0 DEVELOPMENT OF GLOBAL ISSUES	16
7.1 Consolidation of Gaps into Global Issues	16
7.2 Assessment of Interfaces Between the Various Safety Factors and Aggregated Impact of Global Issues	19
8.0 PRIORITIZATION OF GLOBAL ISSUES	20
8.1 Medium Safety Significance Level	20
8.2 Low/Very Low Safety Significance Level	21
9.0 DEVELOPMENT OF PROPOSED RESOLUTION PLANS.....	22
10.0 RANKING OF PROPOSED RESOLUTION STATEMENTS	23
11.0 PNGS-B STRENGTHS IDENTIFIED IN PSR3	23
12.0 DEFENCE-IN-DEPTH ASSESSMENT	24
12.1 Methodology.....	24

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 3 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

12.1.1	Defence-in-Depth Concept	24
12.1.2	Method	25
12.2	Plant Design and Operation	25
12.2.1	Plant Design Features	25
12.2.2	Programs and Processes	27
12.2.3	Management and Organization	28
12.2.4	Continuous Improvement.....	28
12.3	Provisions for Control, Cool, and Contain	28
12.3.1	CONTROL – Control of Reactivity	29
12.3.2	COOL – Removal of Heat from Fuel.....	30
12.3.3	CONTAIN – Confining the Radioactive Material.....	31
12.3.4	Safety Functions Relevant to all Fundamental Safety Functions	33
12.4	Assessment of Defence-in-Depth	33
12.4.1	Level 1 – Prevention of Abnormal Operation and Failures.....	33
12.4.2	Level 2 – Control of Abnormal Operation and Detection of Failures	35
12.4.3	Level 3 – Control of Accidents within the Design Basis.....	35
12.4.4	Level 4 – Control of Severe Plant Conditions.....	37
12.4.5	Level 5 – Mitigation of Radiological Consequences.....	38
12.4.6	Common Mode Barrier Challenges	38
12.5	Adequacy of Provisions.....	40
12.5.1	Safety Analysis and Assessment.....	40
12.5.2	Plant Performance	40
12.6	DiD Assessment Conclusion.....	41
13.0	CONCLUSION OF THE ASSESSMENT OF OVERALL ACCEPTABILITY OF OPERATION OF THE PLANT	43

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 4 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

Revision Summary

Revision Number	Date	Comments
R000	2026-09-08	Initial issue. This Global Assessment Report Summary is developed at the time of submission of the PSR3 Global Assessment Report to the CNSC, and hence it does not include potential CNSC comments and feedback or required dispositions.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 5 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

Executive Summary

Ontario Power Generation (OPG) is performing a Periodic Safety Review (PSR) in support of the Pickering Nuclear Generating Station (PNGS) licence renewal. The PSR (henceforth referred to as “PSR3”) is a comprehensive, subsequent PSR as defined in CNSC REGDOC-2.3.3, “Periodic Safety Reviews”, and is consistent with the International Atomic Energy Agency (IAEA) Safety Guide SSG-25, “Periodic Safety Reviews for Nuclear Power Plants”. Both PNGS and Darlington NGS (DNGS) have previously performed a number of (now called) PSRs in support of life extension and re-licensing for their respective licensing periods. PSR3 builds upon previous assessments for OPG nuclear facilities.

PSR3 is being performed in support of the refurbishment of PNGS Units 5 to 8 (PNGS-B) for 30+ years of commercial operation. This report is the PSR3 Global Assessment Report (GAR) Summary, with a focus on the Global Issues (GIs) identified and Defence-In-Depth. The GAR integrates and evaluates the results of the Safety Factor Reviews against the Basis Document to determine the overall safety status of the station, identify Strengths and Gaps, and establish priorities for improvement.

The resulting GIs provide the basis for proposed resolution plans, which are used to develop the Integrated Implementation Plan (IIP) Actions, as applicable. The PSR3 GAR identified seven strengths in a wide range of areas where PNGS exceeds modern requirements, consistent with plant performance indicators showing safe and reliable operation. In addition, Gaps were identified and consolidated into 26 GIs covering a broad range of topics. The GIs were prioritized with respect to their importance to nuclear safety to determine their Safety Significance. Resolution Plans were then developed for each GI based on the assigned GI Safety Significance Level.

- None of the 26 GIs were assessed as having high safety significance or assigned Safety Significance Level 1.
- Seven GIs were assessed as having medium safety significance and assigned Safety Significance Level 2 (GI-9, GI-10, GI-13, GI-15, GI-17, GI-21, and GI-23). Resolution plans have been established to address these areas, including fitness-for-service, irradiated fuel bay heat load management, singleton vulnerabilities, and fire protection needs.
- Eleven GIs were assessed as having low safety significance and assigned Safety Significance Level 3 (GI-1, GI-3, GI-7, GI-11, GI-14, GI-18, GI-19, GI-20, GI-22, GI-24, GI-26). These issues are primarily associated with updated industry codes and standards. Resolution plans include actions to adopt newer code and standard requirements where practical and where they provide a safety benefit.
- Eight GIs were assessed as having very low safety significance and assigned Safety Significance Level 4 (GI-2, GI-4, GI-5, GI-6, GI-8, GI-12, GI-16, GI-25). Most of these issues relate to OPG governance processes or administrative matters. Given their very low safety significance, several were dispositioned as Acceptable Deviations.

The majority of GIs either have low or very low safety significance. This reflects the maturity of PNGS and improvements made since initial station operation. GIs with medium safety significance are either being addressed through ongoing actions or as part of the refurbishment project.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 6 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

The Defence-in-depth assessment concluded that PNGS maintains effective barriers across all applicable levels of defence-in-depth and has achieved significant plant improvements.

The assessment also evaluated the cumulative impact of Acceptable Deviations (ADs) from both the current and previous PSRs (PSR2/PSR2-B) and determined that, in addition to individual gaps not being significant, their combined effect remained very low at all levels of defence-in-depth.

Resolution statements (RSs) were subsequently developed and ranked, with the highest-ranked actions primarily focused on enhancing confidence in the fitness for service of structures, systems, and components (SSCs) to support post-refurbishment operation, with additional actions supporting improvements in SSC design and safety analysis. All RSs provide input to the Integrated Implementation Plan (IIP) phase of PSR3.

In summary, the plant design, operation, processes, and management system will ensure continued safe operation of PNGS. The Resolution Plans resulting from the GIs will be addressed through the appropriate process, with Resolution Statements carried forward to the IIP phase for development into IIP actions, as appropriate, to further support and enhance the ongoing high standard of safe operation of PNGS.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 7 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

1.0 PURPOSE

OPG is conducting a Periodic Safety Review (PSR3) for the Pickering Nuclear Generating Station (PNGS) in support of the PNGS licence renewal. The Pickering PSR3 is subsequent to previous PSRs and the Integrated Safety Review (ISR). The purpose of PSR3 is to perform a comprehensive and systematic assessment of plant safety to support refurbishment and the continued operation of Pickering Units 5–8 for 30+ years of commercial operation.

The review is conducted in accordance with regulatory requirements of CNSC REGDOC-2.3.3, “Periodic Safety Reviews” with guidance from the International Atomic Energy Agency (IAEA) Safety Guide SSG-25, “Periodic Safety Reviews for Nuclear Power Plants” and CSA N290.18, “Periodic Safety Review for Nuclear Power Plants”. The GAR integrates the results of the Safety Factor Reviews and evaluates whether the plant can continue to operate safely during the PSR3 period.

The objective of the GAR is to provide an overall assessment of the safety of the plant, and to assess the acceptability of PNGS for Pickering Units 5 to 8 post-refurbishment operation including an assessment of the defence-in-depth capability of PNGS. The purpose of this report is to summarize the PNGS PSR3 GAR.

2.0 BACKGROUND

PSR3 is performed to support the life extension of Pickering Units 5–8. The current Power Reactor Operating Licence (PROL 48.04/2028) is valid until August 31, 2028. PSR3 is being performed to support the PNGS Refurbishment for the life extension of PNGS Units 5-8 for an additional 30+ years of operating life.

In accordance with CNSC REGDOC-2.3.3, the PSR3 is being conducted in four phases:

1. Preparation of the PSR3 Basis Document;
2. Conduct of Safety Factor reviews and identification of Gaps and Strengths;
3. Analysis of the Gaps and identification of potential safety enhancements for Pickering NGS in the Global Assessment Report;
4. Preparation of a plan for the implementation of safety enhancements (Integrated Implementation Plan).

The elements of PSR3 are shown in a process flowchart in Figure 1.

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

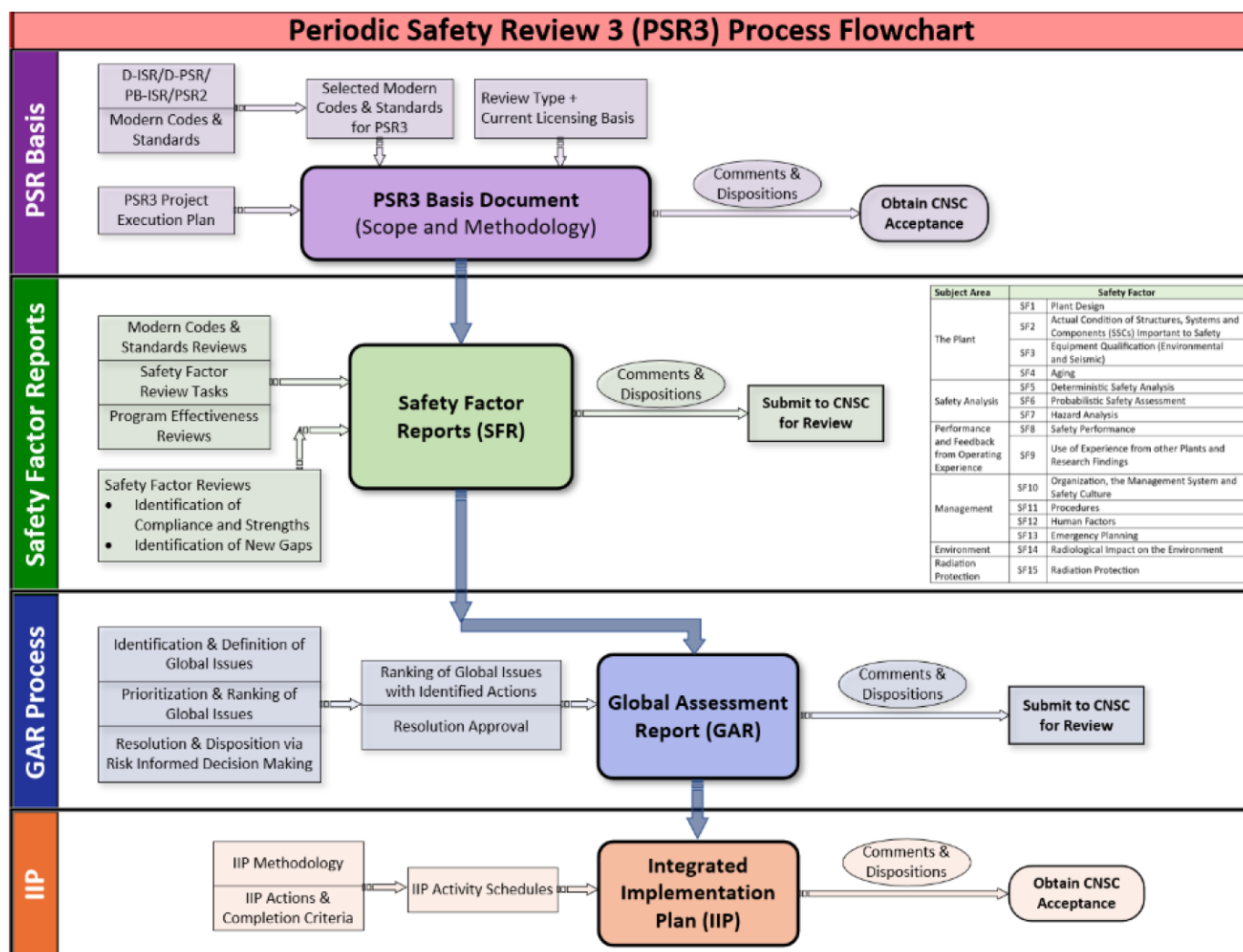


Figure 1: PSR3 Flowchart

The PSR3 Basis Document, the first phase of the PSR3 process, describes the scope and methodology for PSR3. PSR3 is a subsequent PSR, building on the review basis of earlier OPG ISR/PSR work:

- Darlington Periodic Safety Review (D-PSR), which has programmatic components applicable to Pickering NGS.
- Pickering Periodic Safety Review 2 (PSR2), performed in support of the evaluation of continued operation of the PNGS units beyond the year 2020 to 2024. Subsequent amendments have been made to PSR2 to support extended operation of Units 5-8 to the end of 2026, which are referred to as PSR2-B.

Report

OPG Proprietary		
Document Number:	Usage Classification:	
P-REP-03680-00087	N/A	
Sheet Number:	Revision Number:	Page:
N/A	R000	9 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

- The Pickering B Integrated Safety Review (PB-ISR), performed in support of potential refurbishment and continued operation of the Pickering 5-8 units.
- Darlington ISR (D-ISR), which was performed in support of refurbishment and life extension of the Darlington units.

The second phase of the PSR3 process involves completion of Safety Factor reviews. The Safety Factors cover aspects important to the safety of an operating Nuclear Power Plant (NPP). There are 15 Safety Factors shown in Table 1.

Table 1: PSR3 Safety Factors

Subject Area	Safety Factor	
The Plant	SF1	Plant Design
	SF2	Actual Condition of Structures, Systems and Components Important to Safety
	SF3	Equipment Qualification (environmental and seismic)
	SF4	Aging
Safety Analysis	SF5	Deterministic Safety Analysis
	SF6	Probabilistic Safety Assessment
	SF7	Hazard Analysis
Performance and Feedback from Operating Experience	SF8	Safety Performance
	SF9	Use of Experience from other NPPs and Research Findings
Management	SF10	Organization, the Management System and Safety Culture
	SF11	Procedures
	SF12	Human Factors
	SF13	Emergency Planning
Environment	SF14	Radiological Impact on the Environment
Radiation Protection	SF15	Radiation Protection

The results of the Safety Factor reviews are documented in Safety Factor Reports. Each review addresses the associated Review Tasks for the Safety Factors and documents the results of the assessments of PNGS with respect to applicable modern Laws, Regulations, Codes and Standards (LRCs) identified in the PSR3 Basis Document. An effectiveness review of OPG programs used to demonstrate compliance with the PSR3 Assessment Basis was also performed using recent audit and self-assessment results.

The third phase of the PSR3 process is documented in the Global Assessment Report (GAR). The objective of the Global Assessment is to provide an overall assessment of the safety of the plant, and to assess the acceptability of PNGS for continued operation over the periods of PSR3, including an assessment of the defence-in-depth capability. The Global Assessment takes into account the Gaps identified during the Safety Factor reviews and any findings from CNSC staff reviews of the Safety Factor Reports.

Preparation of the Integrated Implementation Plan (IIP), which is the fourth phase of the PSR3 process, involves transforming the proposed Resolution Plans resulting from the Global

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 10 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

Assessment into actions with corresponding schedules for implementation during the next licensing period.

The major milestones for PSR3 are shown in Table 2:

Table 2: PSR3 Major Milestones

Activity	Milestone Dates
PSR3 Basis Document	March 5, 2024 (Submitted. Accepted by the CNSC.)
Safety Factor Reports	May 19, 2025 (Submitted. CNSC comments received and addressed.)
Global Assessment Report	August 8, 2026 (Submitted. CNSC review in progress.)
Integrated Implementation Plan	August 31, 2027

3.0 OVERVIEW OF THE GLOBAL ASSESSMENT PROCESS

The Global Assessment process consists of the following elements:

1. Identification of Strengths and Gaps from Safety Factor Reports (including any additional items identified during the Global Assessment), and consideration of CNSC feedback on PSR3 deliverables.
2. Review of IIP Actions from previous Pickering NGS ISR/PSRs.
3. Development of Global Issues:
 - a. Consolidation of Gaps into Global Issues.
 - b. Assessment of interfaces between the various Safety Factors, as well as the aggregate impact of Global Issues.
4. Prioritization of Global Issues and Gaps.
5. Development of proposed Resolution Plans with consideration of safety benefit, practicability, and the interfaces between the Gaps and Global Issues.
6. Assessment of Defence-in-Depth, including Strengths, and the aggregate impact of Acceptable Deviations from previous and current PNGS ISR/PSRs.
7. Ranking of Global Issue Resolution Statements.
8. Third Party/Expert Panel Review of Gaps, Global Issues, and Proposed Resolution Plans.
9. Assessment of overall acceptability of plant operation over the period considered in PSR3.
10. Preparation of the Global Assessment Report to summarize the assessments and document the Global Assessment.

Each of the above sections is described in more detail in Section 4.0.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 11 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

3.1 Overview of Pickering Refurbishment Activities

PNGS Units 5–8 are authorized under the current PROL to operate until the end of 2026, after which they will shut down and enter layup until refurbishment begins. It is planned that each unit will Return-to-Service (RTS) at staggered dates starting in 2031 through 2034. The Pickering Refurbishment Project is intended to extend station life, and its planned activities provide important context for the PSR3 Global Assessment. Key refurbishment work includes replacement of major reactor and balance-of-plant components (notably pressure boundary components and all 48 boilers), upgrades to turbine-generator and auxiliary systems, replacement of standby generators and digital control computers, improvements to fuel handling and fire protection, and supporting infrastructure/environmental and waste-management activities, alongside preventative maintenance and backlog reduction. The scope also incorporates Safety Improvement Opportunities (SIOs) focused on enhanced core cooling (improved emergency water supply and heat sink diversity), containment enhancements (filtered venting and calandria vault overpressure protection), and strengthened protection against external hazards such as high winds. These refurbishment activities are considered throughout the Global Assessment process.

4.0 GLOBAL ASSESSMENT METHODOLOGY

The objective of the Global Assessment is to provide an overall assessment of the safety of the plant, and to assess the acceptability of PNGS for continued operation over the PSR3 period, including an assessment of the defence-in-depth capability.

This assessment takes into account:

- Safety enhancements identified in the Global Assessment (plant and process modifications),
- Strengths and residual Global Issues/Acceptable Deviations that impact on aggregate effects of the results, and
- Consideration of existing planned safety enhancements and recent overall station safety performance.

The Global Assessment process consists of the following elements:

- a. Identification and Consolidation of Gaps and Strengths from the Safety Factor Reports: The Strengths and Gaps from the 15 Safety Factor Reports are consolidated and grouped by topic area to support the Global Assessment.
- b. Development of Global Issues (GIs): The consolidation of Gaps into Global Issues provides a means to assemble Gaps of a common nature, facilitating the assessment of safety impact and identifying and assessing practical and effective resolutions. The Global Issues are tabularized, tracking sources of the issues, to facilitate further review and assessment.
- c. Assessment of the Interfaces Between Various Safety Factors and Aggregate Impact of Global Issues: With the assembly of Global Issues and Strengths, the aggregate impact of the Global Issues is assessed. Through this process, the interaction between issues is

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 12 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary
--

identified. New Global Issues may be identified as part of this consolidation review. This supports the prioritization and ranking of Global Issues as described below.

- d. Prioritization of Global Issues and Gaps: PSR3 Global Issues and associated Gaps are prioritized with respect to their importance to nuclear safety, to determine the Safety Significance Level associated with each Global Issue. This supports the resolution evaluation method and the outcome of the resolution process. This methodology is consistent with OPG's prioritization processes used in previous ISRs, PSRs, and industry practice. The Safety Significance Level incorporates deterministic and probabilistic safety analysis considerations, where relevant. Probability levels selected for delineation between categories are based on significance, as applied in previous ISRs and PSRs. These values account for overall safety and align, where appropriate, with requirements and limits in relevant safety standards. These levels represent safety significance 1-High, 2-Medium, 3-Low, and 4-Very Low (Table 3).

Table 3: Safety Significance Level

Safety Significance Level	Safety Significance
1	High
2	Medium
3	Low
4	Very Low

- e. Development of Resolutions/Dispositions of Global Issues and Gaps: Resolution options are developed and assessed using risk-informed decision-making techniques. The development of the resolution utilizes the following strategy:
- In assessing potential dispositions, defence-in-depth elements are considered in developing the resolutions. Consideration of overall safety significance guides the resolution process.
 - For Global Issue resolution, the process is to:
 - Evaluate the Global Issue to understand safety basis and intent of the requirement.
 - Consider possible options for resolution/mitigation. Consider safety significance and defence-in-depth elements.
 - Evaluate options with respect to effectiveness, overall safety, schedule, and practicality. For potential plant modifications, this may require an evaluation of the safety considerations, both deterministic and probabilistic. If it is not practicable to fully resolve a Global Issue, other mitigation options are considered for enhancements.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 13 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

- Evaluate the practicality of a proposed resolution in terms of overall safety significance, resources, and schedule.
 - Propose recommended resolution/mitigation.
 - Document the decision-making process.
 - Items of high or medium safety significance require a more in-depth analysis to fully understand the issue and potential condition, and to develop the proposed recommended resolution/mitigation.
 - Items of very low safety significance are generally deemed as Acceptable Deviations within the context of PSR3 (with the rationale provided), and while these items will not be tracked beyond the Global Assessment, they will be shared with the accountable organizations for consideration as potential enhancement initiatives for their future work program planning purposes. This will allow the organizations to prioritize the initiatives as part of their integrated programs to ensure the focus is on the right overall priorities.
 - For items assessed as having low safety significance where a preferred long-term solution has not yet been identified, OPG applies a structured evaluation and management approach. This includes maintaining appropriate controls and identifying practicable improvements as further information, technology, or project opportunities become available.
 - In some cases, the development of resolutions/dispositions to the Global Issues may be part of an ongoing or planned OPG or industry initiative. Alternatively, the resolution and development of options may require more detailed analysis and assessment, extending beyond the timelines for submission of PSR3. In these instances, the status of the initiative and plans will be included in the disposition. The work will be included in the Global Assessment to facilitate continued tracking.
 - Previous Global Assessment resolutions for the same Global Issue/Gap are considered in the review.
 - If, in the assessment, it is determined that a Global Issue/Gap has been closed, due to work performed in the interim or for other reasons, the rationale will be documented, and the Global Issue/Gap is resolved and closed.
 - An alternate process/resolution may be utilized for a particular Global Issue/Gap.
- f. Assessment of Defence-in-Depth and Aggregate Impact of Acceptable Deviations: An important element of the development of proposed recommendations is to assess the overall defence-in-depth and aggregate impact of the residual Global Issues/Acceptable Deviations. After evaluating a range of resolutions for Global Issues, and determining a recommended resolution to be selected, the impact on defence-in-depth, considering both deterministic and probabilistic elements, is evaluated to assess the aggregate impact on overall safety. It may be necessary to refine the proposed resolutions based on the results

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 14 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

of this review. This overall assessment is an important element in supporting the enhancement plans and the planned operational strategy over the period of PSR3. For each of the five levels of defence listed below, the Defence-in-Depth assessment considers the overall plant as well as the identified strengths, acceptable deviations, and the proposed resolutions to the Global Issues listed in the global assessment.

- Level 1: Prevention of abnormal operation and failures;
 - Level 2: Control of abnormal operation and detection of failures;
 - Level 3: Control of accidents within the design basis;
 - Level 4: Control of severe plant conditions, including prevention of accident progression and mitigation of the consequences of severe accidents;
 - Level 5: Mitigation of radiological consequences of significant releases of radioactive materials.
- g. Ranking of Global Issue Resolution Statements: All Global Issues whose resolution involves identified actions are ranked. The ranking process considers factors such as the priority previously determined, the contribution to defence-in-depth, the source of the issue and the degree of non-compliance with the PSR3 Assessment Basis. The ranking process also accounts for the extent of impact on multiple safety factors or areas. The Global Issue resolution statements and ranking are confirmed by OPG subject matter experts.
- h. Third Party/Expert Panel and OPG Senior Management Review: The results of the Global Assessment are reviewed by a panel of industry experts independent of the Global Assessment Team. The enhancements identified in the PSR3 Global Assessment, with their priority and safety basis, are then presented to OPG senior management for approval. This review ensures alignment with the resolutions proposed, their basis and context, and is the means to obtain concurrence that the proposed enhancements are practicable and effective. This also allows the senior leadership team to consider potential realignment of overall priorities based on the insights from PSR3.
- i. Assessment of Overall Acceptability of Operation of the Plant over the Period Considered in PSR3: As a final step in the assessment process, the overall acceptability of operation of the plant over the period considered in PSR3 is assessed. This entails a review of the results of the Safety Factor reviews, a consideration of enhancements planned (both newly identified in PSR3 and from other station plans), and a consideration of plant performance and initiatives.
- j. Preparation of the Global Assessment Report (GAR): The Global Assessment Report presents the results, assesses the overall defence-in-depth of the plant, and documents the conclusions, corrective actions, and enhancements to be considered. The GAR includes a ranked list of the Global Issues with identified actions, with rationale for the ranking using an established decision support methodology. Residual Global Issues and acceptable deviations are noted in the GAR, summarizing the assessed aggregate impact on safe operations. The Global Assessment Report includes a statement of OPG's assessment of the overall acceptability of plant operation.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 15 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

5.0 SUMMARY OF FINDINGS FROM SAFETY FACTOR REPORTS, EXPERT PANEL AND CNSC STAFF REVIEWS OF PSR3 REPORTS

OPG completed the Safety Factor Reviews and submitted all 15 Safety Factor Reports to the CNSC. OPG's Safety Factor Reviews concluded that no fundamental safety issues were identified at PNGS and that OPG has effective programs and processes in place to ensure continued safe operation before, during, and after refurbishment. The Safety Factor Reviews also identified areas where improvements could be made to further enhance nuclear safety at PNGS.

CNSC staff reviewed the PSR3 Basis Document. CNSC staff subsequently reviewed the contents of the Safety Factor Reports against the PSR3 Basis Document and CNSC REGDOC-2.3.3. No additional Gaps were identified as a result of the review of the Safety Factor Reports. Relevant CNSC feedback was considered to the development of the Global Assessment Report.

The deliverables from the first three phases of PSR3 (PSR3 Basis Document, the 15 Safety Factor Reports, and the Global Assessment Report) were reviewed by an independent Expert Panel. The Expert Panel is comprised of experienced individuals familiar with the design and operation of PNGS, as well as other nuclear power plants. The panel's expertise includes extensive knowledge of CANada Deuterium Uranium (CANDU) design, extensive backgrounds in nuclear safety, engineering, plant operations, and experience in senior leadership roles, along with familiarity with current industry standards.

The Expert Panel concluded that the Safety Factor Reports and the Global Assessment Report were prepared in accordance with the Basis Document and applicable regulatory and international practices. The main improvements identified by the Expert Panel, and subsequently incorporated into the reports, involved providing additional supporting evidence and clarifying certain topics. The Expert Panel was satisfied with the resolution of all comments. The fourth-phase deliverable, the Integrated Implementation Plan, is scheduled for completion in 2027 and therefore not included in the scope of this Expert Panel Review.

6.0 REVIEW OF IIP ACTIONS FROM PSR2 AND PSR2-B

The PSR2 and PSR2-B IIP presents the scope and schedule for IIP Actions identified through the previous safety reviews to enable safe operation of PNGS-A and PNGS-B to 2024 and 2026 respectively. The results from PSR2 and PSR2-B were reassessed during the Safety Factor review phase to identify outstanding IIP actions relevant to PSR3 and determine if the action has been completed or remains open. OPG verified that all PSR2 and PSR2-B IIP actions have been fully completed and remain closed.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 16 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

7.0 DEVELOPMENT OF GLOBAL ISSUES

The third step in the Global Assessment methodology is the development of Global Issues. There are two aspects to this step, as follows:

- Consolidation of Gaps into Global Issues.
- Assessment of the interfaces between the various Safety Factors and the aggregate impact of Global Issues.

7.1 Consolidation of Gaps into Global Issues

The PSR3 Gaps are grouped into GIs according to their topical similarities, (i.e., based on the related discipline, governing process, or relevant modern codes and standards) with consideration of any interfaces, overlaps and similarities among the Gaps.

A total of 26 GIs were identified for PSR3 and are outlined below:

GI-1: Shutdown System Requirements

The goal of GI-1, Shutdown System Requirements, is to demonstrate an appropriate degree of conformance to the requirements of CSA N290.1-13 "Requirements for the shutdown systems of nuclear power plants" (R2023) and CSA N290.0-17 "General requirements for safety systems of nuclear power plants" (R2022).

GI-2: Emergency Core Cooling System Requirements

The goal of GI-2, Emergency Core Cooling System Requirements, is to demonstrate an appropriate degree of conformance to the requirements of CSA N290.2-17 "Requirements for emergency core cooling systems of nuclear power plants" (R2022).

GI-3: Containment System Requirements

The goal of GI-3, Containment System Requirements, is to demonstrate an appropriate degree of conformance to the requirements of CSA N290.3:22 "Requirements for containment system of nuclear power plants".

GI-4: General Requirements for Safety Systems

The goal of GI-4, General Requirements for Safety Systems, is to demonstrate an appropriate degree of conformance to the requirements of CSA N290.0-17 "General requirements for safety systems of nuclear power plants" (R2022).

GI-5: Periodic Inspection of Non-Containment Components

The goal of GI-5, Periodic Inspection of Non-Containment Components, is to demonstrate an appropriate degree of conformance to the requirements of CSA N285.4:23 "Periodic inspection of CANDU nuclear power plant components" and CSA N285.8:23 "Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors".

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 17 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary
--

GI-6: Periodic Inspection of Containment Components

The goal of GI-6, Periodic Inspection of Containment Components, is to demonstrate an appropriate degree of conformance to the requirements of CSA N285.5:22 “Periodic inspection of CANDU nuclear power plant containment components”.

GI-7: Periodic Inspection of Balance of Plant Systems and Components

The goal of GI-7, Periodic Inspection of Balance of Plant Systems and Components, is to demonstrate an appropriate degree of conformance to the requirements of CSA N285.7:21 “Periodic inspection of CANDU nuclear power plant balance of plant systems and components”.

GI-8: Performance Testing of Nuclear Air-Cleaning Systems at Nuclear Facilities

The goal of GI-8, Performance Testing of Nuclear Air-Cleaning Systems at Nuclear Facilities, is to demonstrate an appropriate degree of conformance to the requirements of CSA N288.3.4-13 “Performance testing of nuclear air-cleaning systems at nuclear facilities” (R2022).

GI-9: General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants

The goal of GI-9, General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants, is to demonstrate an appropriate degree of conformance to the requirements of CSA N285.0:23 “General requirements for pressure-retaining systems and components in CANDU nuclear power plants”.

GI-10: Condition Assessments and Fitness for Service

The goal of GI-10, Condition Assessments and Fitness for Service, is to ensure the Gaps related to outstanding component condition and fitness for service (FFS) assessments are adequately addressed in PSR3.

GI-11: Seismic Qualification and Monitoring

The goal of GI-11, Seismic Qualification and Monitoring, is to demonstrate an appropriate degree of conformance to the seismic requirements from the CSA N289 series of Standards (relating to seismic design and qualification) as well as the National Building Code of Canada (NBCC) (2020).

GI-12: Reliability and Maintenance

The goal of GI-12, Reliability and Maintenance, is to demonstrate an appropriate degree of conformance to the reliability and maintenance requirements from CSA N290.9:19 “Reliability and maintenance programs for nuclear power plants”, CSA N290.11:21 “Requirements for reactor heat removal capability during outage of nuclear power plants”, and REGDOC-2.5.2 “Design of Reactor Facilities: Nuclear Power Plants” Version 2.1 (2023).

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 18 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary
--

GI-13: Environmental Qualification (EQ) of Equipment for CANDU Nuclear Power Plants

The goal of GI-13, EQ of Equipment for Nuclear Power Plants, is to demonstrate an appropriate degree of conformance to the requirements of CSA N290.13:18 “Environmental qualification of equipment for CANDU nuclear power plants”.

GI-14: Safety-Related Structure (Non-Containment) Requirements

The goal of GI-14, Safety-Related Structure (Non-Containment) Requirements, is to demonstrate an appropriate degree of conformance to the requirements of CSA N291:19 “Requirements for nuclear safety-related structures for CANDU nuclear power plants” and the National Building Code of Canada (NBCC, 2020).

GI-15: Aging Management

The goal of GI-15, Aging Management, is to ensure the Gaps related to the Aging Management (AM) program and its implementation are adequately addressed in PSR3.

GI-16: Environmental Management

The goal of GI-16, Environmental Management, is to demonstrate an appropriate degree of conformance to the requirements of the CSA N288 series of Standards (relating to environmental considerations), as well as updates to the Fleet Environmental Monitoring Program.

GI-17: Management of Irradiated Fuel

The goal of GI-17, Management of Irradiated Fuel, is to ensure there is adequate storage space and sufficient cooling of irradiated fuel during refurbishment and post-refurbishment operations.

GI-18: Radiation Protection

The goal of GI-18, Radiation Protection, is to demonstrate an appropriate degree of conformance to the requirements of REGDOC-2.7.1 “Radiation Protection” and the radiation protection (RP) requirements of CSA N293:23 “Fire protection for nuclear power plants”.

GI-19: Probabilistic Safety Assessment

The goal of GI-19, Probabilistic Safety Assessment, is to identify measures to further enhance margins to OPG’s Probabilistic Safety Assessment (PSA) safety goals for Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF).

GI-20: Level 2 Defence-in-Depth Analysis and Design

The goal of GI-20, Level 2 Defence-in-Depth Analysis and Design, is to complete any outstanding activities related to improving the Deterministic Safety Analysis, such as identification of Anticipated Operational Occurrences (AOOs).

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 19 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

GI-21: Singleton Failure Analysis and Design

The goal of GI-21, Singleton Failure Analysis and Design, is to perform analysis and design activities related to reducing single failure criterions such that no single failure of a component can result in the safety system being unavailable to meet its minimum allowable performance requirements.

GI-22: National Fire Protection Association (NFPA)

The goal of GI-22, National Fire Protection Association (NFPA), is to demonstrate an appropriate degree of conformance to the requirements of the NFPA 20 “Standard for the Installation of Stationary Pumps for Fire Protection” and NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances”.

GI-23: Fire Protection

The goal of GI-23, Fire Protection, is to demonstrate an appropriate degree of conformance to the requirements of CSA N293:23 “Fire protection for nuclear power plants” and the National Building Code of Canada (NBCC) (2020).

GI-24: Design of New Reactor Facilities

The goal of GI-24, Design of New Reactor Facilities, is to demonstrate an appropriate degree of conformance to the requirements for new reactor facilities per REGDOC-2.5.2 “Design of Reactor Facilities: Nuclear Power Plants” Version 2.1 (2023).

GI-25: Human Performance, Safety Performance and Governance

The goal of GI-25 is to address Gaps related to Human Performance, Safety Performance and Governance.

GI-26: Accident and Emergency Management

The goal of GI-26, Accident and Emergency Management, is to ensure Gaps associated with accident and emergency management are addressed.

7.2 Assessment of Interfaces Between the Various Safety Factors and Aggregated Impact of Global Issues

Following the consolidation of PSR3 Gaps into GIs a further review of the GIs is performed to confirm that the interfaces between Safety Factors are appropriately considered in the development of the GIs.

The results of the aggregate assessment of GIs found that for a given functional topic comprising more than one GI, there are no interfaces or aggregate effects that warrant a change to GI descriptions or proposed Resolution Plans. Rather, in many cases it was found that OPG programs in place will ensure a consistent approach to the resolution of GIs on the same functional topic. In addition, for some cases the proposed Resolution Plans already cross-reference other GI Resolution Plans, indicating that interfaces are already explicitly considered.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 20 of 47

Title:
Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

In other cases, GIs within a group are distinct and unrelated, again resulting in no aggregate effect or need to modify proposed Resolution Plans.

8.0 PRIORITIZATION OF GLOBAL ISSUES

Global Issues are prioritized based on their safety significance, assigning a Safety Significance Level of High, Medium, Low, and Very Low. The ranking of Global Issues ensures focus on items that most affect safety barriers and defence-in-depth. The prioritization process uses deterministic and probabilistic considerations, aligned with past PSR/ISR experience. Table 4 below groups each Global Issue safety significance:

Table 4: Distribution of PSR3 GIs by Safety Significance Level

Safety Significance Level	Safety Significance	Number of GIs	GI IDs
Level 1	High	0	None
Level 2	Medium	7	GI-9, GI-10, GI-13, GI-15, GI-17, GI-21, GI-23
Level 3	Low	11	GI-1, GI-3, GI-7, GI-11, GI-14, GI-18, GI-19, GI-20, GI-22, GI-24, GI-26
Level 4	Very Low	8	GI-2, GI-4, GI-5, GI-6, GI-8, GI-12, GI-16, GI-25

The GAR process has resulted in no High Safety Significance Level GIs. In previous PSRs high Safety Significance Level GIs were related to fitness for service of major components. For Pickering Refurbishment, major components are being replaced and therefore gaps associated with fitness for service and life extension were not identified in PSR3.

8.1 Medium Safety Significance Level

OPG has proactively captured modification and inspection scope for refurbishment and will develop plans for further assessments as required. The PSR3 GAR has identified 7 Medium Safety Significance Global Issues:

GI-9: General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants

For Nuclear Grade Class 1 components that are not scheduled for replacement as part of refurbishment, OPG will maintain and update service-life assessments throughout the post-refurbishment operating period. These assessments will support confirmation that the components remain fit for service for their intended operating life, consistent with applicable regulatory requirements and OPG's aging management programs.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 21 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

GI-10: Condition Assessments and Fitness for Service

OPG has already initiated work on inspections and potential replacements of Buried Piping and Electrical Cables. The Fuelling Machine Bridge Ball Screws are being replaced. Civil programs are developing inspection plans to support long-term structural integrity management, including adding H-Pile testing devices to the PNGS site for long term monitoring. Fitness for service will be demonstrated for these SSCs.

GI-13: Environmental Qualification of Equipment for CANDU Nuclear Power Plants

OPG will update the EQ documentation following the EQ program for refurbishment and post-refurbishment, including developing strategies for maintenance and replacements when required. The Program will be updated prior to unit RTS.

GI-15: Aging Management

OPG has revised Life Cycle Management Program documents to reflect refurbishment. OPG will develop long term plans to re-instate the obsolescence program and to update the appropriate Time Limited Aging Assessments.

GI-17: Management of Irradiated Fuel

OPG has completed an assessment to account for the additional fuel load in the Irradiated Fuel Bay due to refurbishment and will execute the IFB fuel removal strategy, to support refurbishment and post-refurbishment operation.

GI-21: Singleton Failure Analysis and Design

OPG will implement the Safety Improvement Opportunity to duplicate an Emergency Water System valve and flow path to increase redundancy. In addition, OPG plans to assess singletons and identify potential improvements where practicable and with significant improvement to safety.

GI-23: Fire Protection

OPG will replace select sprinklers, hydrants, and valves in the Fire Water Supply system. Additionally, OPG is conducting a gap analysis against the latest version of CSA N293 and NBCC to determine where further fit-for-purpose enhancements can derive significant nuclear safety improvements.

8.2 Low/Very Low Safety Significance Level

The majority of GIs identified in PSR3 have been categorized as Low and Very Low Safety Significance GIs. OPG will credit approved refurbishment scope to address these topics and will implement governance and procedural changes as required.

11 GIs (GI-1, GI-3, GI-7, GI-11, GI-14, GI-18, GI-19, GI-20, GI-22, GI-24, GI-26) were assessed as having Low safety significance and assigned Safety Significance Level 3. These GIs are

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 22 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

related to specific requirements in modern codes and standards, in some cases for design of new plants.

8 GIs (GI-2, GI-4, GI-5, GI-6, GI-8, GI-12, GI-16, GI-25) were assessed as having Very Low safety significance and assigned Safety Significance Level 4. The majority of these GIs are related to OPG governance or specific requirements in modern codes and standards or are administrative in nature.

9.0 DEVELOPMENT OF PROPOSED RESOLUTION PLANS

Resolution Plans are developed using a risk-informed decision-making process, taking into consideration the safety basis, requirements and safety significance of the Global Issue. Resolution Plans provide quality solutions to the Global Issue (and the Gaps that form the Global Issue) reflective of its importance to nuclear safety. The following are factors in the decision-making process:

- Safety Benefit- the extent to which the proposed action enhances nuclear safety and supports defence-in-depth.
- Practicability- if the resolution is feasible and if the effort required justifies the safety enhancement. Alternative mitigating options may be considered for the safety enhancement.
- Interfacing between the Global Issues- a proposed resolution may benefit more than one Global Issue, in whole or in part.

The Resolution Plans are developed for the entire contents of the Global Issue and may consist of one or more elements to address various Gaps within the Global Issue. The Resolution Plans elements fall into four categories:

- Resolution Statement (RS) – Proposed activities/actions to address the Gap.
- Acceptable Deviation (AD) – The deviation in the Gap(s) has been assessed to have a Very Low Safety Significance Level or are Low Safety Significance Level and a practicable resolution is not readily evident.
- No Further Action (NFA) – Work is completed or is underway outside of PSR3 to address the related Gap(s), or new information has been found to obviate the Gap.
- Cross Reference (XRF) – An action that addresses the Gap is covered by a proposed Resolution Statement under a different Global Issue.

Resolution Plans have been developed for each Global Issue consisting of the various categories above. Each Global Issue and Resolution Plan has also been reviewed with Expert Panel input.

10.0 RANKING OF PROPOSED RESOLUTION STATEMENTS

All resolution statements are ranked relative to each other. The goal is to identify which resolution statements will most effectively enhance safety. Each resolution statement is reviewed following a decision-making process considering safety related objectives that enhance confidence in modern safety design practices, fitness-for-service, safety analysis, safety performance, management processes, radiation and environmental protection.

Each resolution statement is scored for each objective, with a time and impact attribute applied to produce the overall resolution statement score which is ranked from highest to lowest.

11.0 PNGS-B STRENGTHS IDENTIFIED IN PSR3

This section describes the identification of Strengths in the PNGS-B design, operations, and performance. Strengths were identified as part of the Safety Factor reviews using the following criteria:

- For reviews of Safety Factor Review Tasks, a Strength indicates that either the safety review or the intent of the Review Task is exceeded.
- For clause-by-clause reviews of modern Laws, Regulations, Codes, and Standards (LRCSs), a Strength indicates that the safety requirement is exceeded.
- Where a high-level review has been performed, a Strength indicates that the intent of the safety requirement is exceeded.
- Where an incremental review has been performed, a Strength indicates that the change in the safety requirement, per the topical review, is exceeded.

A total of seven Strengths were identified for PSR3, as listed in Table 5.

Table 5: PSR3 Strengths

SFR Strength ID	Title of Strength
SF9-S1	OPEX Database
SF9-S2	Monitoring and Diagnostic (M&D) Centre
SF10-S1	Nuclear Safety and Security Culture Monitoring Panels
SF10-S2	Management of Low and Intermediate-Level Radioactive Waste
SF13-S1	OPG Resilience Training for Accident Management
SF13-S2	The Programs and Processes Related to the Management of Equipment Important to Emergency Response (EITER)
SF14-S1	Radioactive Waste Management

Report

OPG Proprietary		
Document Number:	P-REP-03680-00087	Usage Classification: N/A
Sheet Number:	N/A	Revision Number: R000
		Page: 24 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

The PSR3 Strengths are used in the Defence-in-Depth Assessment to demonstrate the extent to which the safety requirements of Defence-in-Depth are fulfilled, as required by CNSC REGDOC-2.3.3, and to support mitigation of GIs. The Defence-in-Depth Assessment also includes a description of PNGS-B design features that support Defence-in-Depth and evaluates the proposed PNGS-B enhancements identified in the GI Resolution Statements and PSR3 Strengths.

12.0 DEFENCE-IN-DEPTH ASSESSMENT

12.1 Methodology

The Defence-in-Depth (DiD) Assessment is carried out based on the five levels of Defence-in-Depth, which together aim to prevent abnormal operation, detect and control deviations, mitigate accident consequences, manage severe accidents, and provide emergency response capabilities. These levels and their objectives are summarized in Table 6.

12.1.1 Defence-in-Depth Concept

Table 6: Defence-in-Depth Levels

Level of Defence-in-Depth	Objective	Means of Achievement
Level 1	To prevent deviations from normal operation, and to prevent failures of structures, systems, and components (SSCs) important to safety.	Conservative design and high-quality construction and operation to provide confidence that plant failures and deviations from normal operations are minimized and accidents are prevented. This entails careful attention to selection of appropriate design codes and materials, design procedures, equipment qualification, control of component fabrication and plant construction, and use of operational experience.
Level 2	To detect and intercept deviations from normal operation, in order to prevent Anticipated Operational Occurrences (AOOs) from escalating to accident conditions and to return the plant to a state of normal operation.	Control plant behaviour during and following a postulated initiating event using both inherent and engineered design features to minimize or exclude uncontrolled transients to the extent possible.
Level 3	To minimize the consequences of accidents by providing inherent safety features, fail-safe design, additional equipment and mitigating procedures.	Provision of inherent safety features, fail-safe design, engineered design features, and procedures that minimize the consequences of Design Basis Accidents (DBAs). These provisions are capable of leading the plant first to a controlled state, and then to a safe shutdown state, and maintaining at least one barrier for the confinement of radioactive material. Automatic activation of the engineered design features minimizes the need for operator actions in the early phase of a DBA.
Level 4	To ensure that radioactive releases caused by severe accidents are kept as low as practicable.	Provide equipment and procedures to manage accidents and mitigate their consequences as far as practicable. Adequate protection is provided for the confinement function by way of a robust containment design. This includes the use of

Report

OPG Proprietary

Document Number:

P-REP-03680-00087

Usage Classification:

N/A

Sheet Number:

N/A

Revision Number:

R000

Page:

25 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

Level of Defence-in-Depth	Objective	Means of Achievement
		complementary design features (CDFs) to prevent accident progression and to mitigate the consequences of Design Extension Conditions (DECs). The confinement function is further protected by severe accident management procedures.
Level 5	To mitigate the radiological consequences of potential releases of radioactive materials that may result from accident conditions.	Provide adequately equipped emergency support facilities, and plans for onsite and offsite emergency response.

12.1.2 Method

The PSR3 process for conducting the DiD Assessment encompasses a systematic evaluation of the same aspects of DiD in an NPP as outlined in IAEA SRS-46 “Assessment of Defence-in-Depth for Nuclear Power Plants”, but uses a different topical approach based on the 15 Safety Factors outlined in CNSC REGDOC-2.3.3. The findings of the Safety Factor reviews and the proposed resolutions to the GIs are used together with DiD elements from IAEA SRS-46 to develop an integrated approach to summarize the DiD provisions of an operating plant.

12.2 Plant Design and Operation

This section describes the plant design features, programs and processes, management system and organization that are in place to maintain effective barriers between radioactive material and workers, and the public and the environment, during normal operation and accidents.

12.2.1 Plant Design Features

PNGS incorporates inherent, passive, and engineered safety features, as well as administrative controls to maintain effective barriers that protect workers, the public, and the environment. The design of PNGS is grounded in conservative engineering and incorporates redundancy, diversity, and functional separation of safety significant systems.

12.2.1.1 Major Modifications Since Initial Operation

Numerous modifications have been made to the plant since the units commenced operation. These improvements reflect OPG’s continuous improvement philosophy and bring the station into closer alignment with modern codes and standards. These include the installation of:

Passive Autocatalytic Recombiners (PARs): PARs passively remove hydrogen from containment during beyond design basis accidents, reducing the risk of hydrogen combustion or detonation if hydrogen igniters are unavailable.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 26 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary
--

Beyond Design Basis Accident (BDBA) Management Framework: The BDBA Management Framework provides a symptom-based strategy, using Severe Accident Management Guidelines (SAMGs), and emergency resources to prevent severe core damage and mitigate the consequences of severe accidents.

Emergency Mitigating Equipment (EME) Implementation: EME consists of portable pumps, generators, and supporting infrastructure that provide backup cooling water and electrical power to critical plant systems during severe accidents for both short-term and extended event response.

Third Emergency Power Generator: The Third Emergency Power Generator system adds three diesel generators to provide an additional 2.5 MW source of emergency electrical power and increase redundancy of the Emergency Power System.

SG Governor and Controls Upgrade: The SG Governor and Controls Upgrade improves the reliability and availability of Standby Class III Power Generators by modernizing their fuel control, delivery, and governing systems.

Auxiliary Power System (APS): The APS is a turbine-generator-backed emergency power system that supplies selected Class IV electrical loads following a total loss of off-site power and bulk electrical system failures.

Automated Source Term Gamma Monitoring System (ASTGMS): ASTGMS provides real-time radiation monitoring and remote reporting during major nuclear accidents, reducing the need for manual radiation surveys and minimizing worker exposure.

Automated Near Boundary Gamma Monitoring System (ANBGMS): ANBGMS automatically monitors and reports gamma radiation levels at the site boundary during emergencies, reducing the need for off-site survey activities and associated personnel exposure.

12.2.1.2 Planned Assessments and Modifications to Support Refurbishment and Life Extension

Significant safety improvements are planned to be undertaken as physical plant modifications to improve long term plant reliability and to increase safety and operational margins of PNGS Units 5 to 8. Planned scope during the next licence period includes, but is not limited to:

- Replacement of all Pressure Tubes, Calandria Tubes and Feeders
- Replacement of all 48 Boilers
- Replacement of all 6 Standby Generators
- Replacement of Digital Control Computers
- Fuel Handling Equipment Improvements
- Fire Protection Equipment Improvements

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 27 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

- Deep Water Intake

12.2.1.3 Current Design Features Important to Defence-in-Depth

The Pickering B design evolved with improvements from other OPG and Atomic Energy of Canada Limited (AECL) reactor designs (e.g., Pickering NGS A, Bruce A, Nuclear Power Demonstration (NPD) and Douglas Point). It also has an appropriate combination of inherent, passive safety characteristics, as well as engineered and administrative safety features. These characteristics and features prevent and mitigate accident progressions. The key design features that are important to the DiD assessment include:

- High quality construction and rigorous design standards.
- Redundancy, separation, and diversity, including the two-group design philosophy.
- Multiple physical barriers between radionuclides and the public. As Low As Reasonably Achievable (ALARA) focused radiation protection features.
- Credited reactor control, shutdown, heat removal, and containment systems.
- Multiclass and seismically qualified power supplies.
- Built in protections against common mode events (e.g., seismic, fire, internal flooding, turbine missiles).
- BDBA management measures including Severe Accident Management Guidelines (SAMGs) and EME.

These design features collectively ensure strong preventive and mitigative capability across all levels of defence-in-depth.

12.2.2 Programs and Processes

The design of PNGS is supported by a comprehensive suite of programs and processes aligned with regulatory requirements and international best practices. These programs ensure equipment reliability, strong operational performance, and sustained safety culture.

12.2.2.1 Nuclear Management System

OPG maintains a Nuclear Management System that governs plant activities ranging from human performance, engineering, operations, maintenance, environmental management, and supports nuclear safety at all levels of defence-in-depth. OPG's Nuclear Management System is maintained in accordance with the operating licence and associated Licence Conditions Handbook (LCH). The fundamental objective of OPG's Nuclear Management System is to ensure OPG nuclear facilities are operated and maintained using sound nuclear safety and defense-in-depth practices to ensure radiological risks to workers, the public, and the environment are ALARA, and in keeping with the OPG Nuclear Safety and Security Policy and the best practices of the international nuclear community.

OPG Proprietary		
Document Number:	Usage Classification:	
P-REP-03680-00087	N/A	
Sheet Number:	Revision Number:	Page:
N/A	R000	28 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

12.2.2.2 Process Improvements Since Initial Operation

As a continuous improvement organization, OPG regularly identifies opportunities to improve the efficiency and effectiveness of its internal programs and processes. Recent examples of such process improvements include benchmarking of performance indicators, virtual training adaptations, automation of system and component health monitoring, and transition of applications for equipment monitoring.

12.2.3 Management and Organization

Nuclear safety and security are core values at OPG, which is reflected in OPG's Nuclear Safety and Security Policy. The policy places nuclear safety and security as the overriding priority above that of cost, schedule, or production. Clear lines of accountability supported by qualified staff, succession planning, centralized support organizations, and oversight mechanisms ensure safe operation. A suite of formal programs governs design modification, equipment reliability, aging management, safety analysis, radiation protection, environmental management, and public engagement. The management structure ensures that resources, leadership, and governance support safe operation at all levels.

12.2.4 Continuous Improvement

The continuous improvement process through which OPG strives to improve the safety and performance of its nuclear power plants, is longstanding, ongoing, and covers all aspects of operation. The utility evaluates performance against industry standards, incorporates internal and external operating experience, engages with industry peers (WANO, INPO, COG, CSA, EPRI), and applies lessons learned from global events. Enhancements from post-Fukushima assessments (particularly for severe accident management and emergency power/water supplies) have strengthened safety margins and improved resilience. OPG also applies PSA insights to prioritize improvements in areas such as accident management, emergency response, and design modifications. These activities ensure the plant evolves in alignment with modern expectations and safety standards.

12.3 Provisions for Control, Cool, and Contain

The Canadian reactor safety philosophy embodies the concept of Defence-in-Depth against the release to the environment of significant quantities of radionuclides.

The defence-in-depth concept consists of five physical barriers between the radionuclides and the public. They are the uranium dioxide fuel matrix, fuel cladding, coolant system boundary, containment boundary, and exclusion radius around the station.

For both accident prevention and mitigation, the Fundamental Safety Functions (FSFs) are to Control reactor power, to Cool the nuclear fuel, and to Contain radioactive material. For accident prevention, the Control, Cool, and Contain functions prevent any releases; for accident mitigation, the Control, Cool, and Contain functions maintain releases within acceptable levels. The three FSFs are subdivided into 21 Safety Functions.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 29 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

12.3.1 CONTROL - Control of Reactivity

The Reactor Regulating System (RRS) must Control reactor power under all normal modes of operation to prevent power increases from overheating the fuel. The Shutdown Systems contribute to the Control function by reliably terminating any anticipated transients for the same reason.

IAEA SRS-46 identifies four Safety Functions relevant to the Control function, which are described below.

Safety Function 1: Prevent Unacceptable Reactivity Transients

Protection for loss of control events is provided by a number of protective and safety system functions such as the Reactor Regulating System (RRS) and Shutdown Systems. RRS is used to monitor important plant parameters and reduce reactor power if any parameter is beyond its setpoint. There are two independent shutdown systems each capable of detecting the need to shutdown the reactor through rapid insertion of significant negative reactivity. Shutdown System 1 (SDS1) employs neutron-absorbing rods that are referred to as shutoff rods. Shutdown System 2 (SDS2) injects a concentrated solution of gadolinium nitrate in heavy water into the moderator to shut down the reactor.

Safety Function 2: Maintain Reactor in a Safe Shutdown Condition

Three provisions are provided for Pickering NGS to maintain the reactor in a safe shutdown condition. The Over-poisoned Guaranteed Shutdown State (GSS) involves adding poison to the moderator. The Drained GSS involves draining the moderator into separate storage tanks. The Rod-based GSS involves all Shutoff Rods, Control Absorber Rods, and Adjuster Absorbers locked in the reactor core and appropriate controls are established to prevent their inadvertent removal. Poison is added to the moderator for extra subcriticality margin as a conservative measure.

Safety Function 3: Shutdown Reactor as Necessary

RRS will reduce the reactor power if abnormal conditions are detected using the Setback or Stepback functions. Setback is a function which reduces reactor power upon detection of parameters outside prescribed normal limits. Stepback can control reactivity induced accidents and also reduce reactor power.

In the event of a control system failure or negative reactivity beyond the primary control devices is needed, independent fast acting shutdown devices (SDS1 and SDS2) operate to rapidly reduce reactor power and shut down the reactor.

Safety Function 18: Maintain Subcriticality of Fuel Outside Reactor Coolant System

This safety function is to prevent criticality of used fuel stored outside the reactor but within the site. This safety function is not applicable to PNGS B. A lattice of used natural uranium fuel bundles and light water cannot be made critical in any configuration. Therefore, a criticality hazard is not possible with irradiated natural uranium fuel bundles stored in the Irradiated Fuel Bays (IFBs).

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 30 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

12.3.2 COOL – Removal of Heat from Fuel

Accident prevention is aimed at protecting the barriers that separate radioactive material from the surrounding environment, namely the fuel matrix, fuel sheath and the reactor coolant pressure boundary. Challenges to these barriers are dealt with by ensuring not only reliable reactor power control (and, if necessary, rapid shutdown), but also by providing a number of heat removal systems to Cool the fuel during the expected range of operating conditions and transients.

IAEA SRS-46 identifies six safety functions relevant to Cool function, as described below.

Safety Function 4: Maintain Sufficient Coolant Inventory for Non-LOCA Accidents

The inventory in the Heat Transport System (HTS) at PNGS B is managed by the Heat Transport (HT) Pressure and Inventory Control System. The feed and bleed circuits are primarily for inventory control of the HTS.

For non-LOCA accidents, where the HT Pressure and Inventory System cannot maintain HTS inventory, the Emergency Coolant Injection (ECI) System is initiated to compensate for primary coolant shrinkage.

Safety Function 5: Maintain Sufficient Coolant Inventory for all Design Basis Events

The D2O recovery system returns heavy water collected from a leak in the HTS to the D2O pressurizing pumps suction. However, should an accident occur which requires coolant makeup beyond the capacity of the HT Pressure and Inventory Control System, the ECI system is poised to inject light water into the HTS.

Safety Function 6: Remove Heat from the Core Under LOCA Conditions

For small leaks, the HT Pressure and Inventory System can compensate for the slow loss-of-coolant. Additionally, the D2O Recovery System recovers heavy water from the small leaks and returns it to the suction of the HT feed pumps.

In the case of a Loss of Coolant Accident (LOCA), the provision provided for this safety function is through the ECI System. The initial phase of the ECI is to provide high-pressure injection of light water. The next phase provides long-term recovery and recirculation of the light and heavy water mixture recovered from the recovery sump.

Safety Function 7: Remove Heat from the Core Under Non-LOCA Conditions

The HTS, Shutdown Cooling (SDC) System, and Emergency Water Supply (EWS) maintain core cooling during non-LOCA events.

As part of the DiD principle of the PNGS B design, the decay heat removal capacity is assured by the Steam Reject Valves (SRVs), Boiler Emergency Cooling System (BECS), and Boiler water inventory, and in the longer term, supplied by the EWS system.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 31 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

Safety Function 8: Transfer Heat from Safety Systems to Ultimate Heat Sink

Depending on the event, the plant design provides for a number of long-term heat sinks. For all upset or accident conditions, there is sufficient time available to establish at least one of these heat sinks. LOCA events involve use of the ECI System to inject water into the system at high pressure. Non-LOCA events utilize transfer of heat to the boilers through use of HTS pumps, thermosyphoning, or natural circulation. Additionally, decay heat can be removed by the SDC System where it rejects heat through separate heat exchangers.

Safety Function 17: Remove Decay Heat from Fuel Outside the Reactor Coolant System

The irradiated fuel handling facilities consist of discharge and transfer equipment in the Reactor Building and irradiated fuel receiving, inspection, and storage facilities in the IFB. The transfer of irradiated fuel between the Reactor Buildings fuel transfer elevator and the IFB receiving bay is by a conveyor running through ducts filled with light water.

12.3.3 CONTAIN – Confining the Radioactive Material

The uranium dioxide fuel matrix, the Zircaloy fuel cladding, and the coolant system boundary are the first three barriers that prevent radioactive release accidents. The concrete containment boundary, and the exclusion radius around the station come into play to mitigate doses when all of the first three barriers are breached, such as in a large LOCA.

IAEA SRS-46 identifies eight safety functions relevant to Contain function, which are described below.

Safety Function 10: Maintain Acceptable Cladding Integrity in the Core

High-quality standards are applied to the manufacturing of the fuel elements to prevent radioactive material from leaking into the HTS. During normal at-power operation, the cladding integrity is maintained by providing cooling of the fuel with heat being removed by the HTS coolant to the boilers and then to the turbine and condenser. When the reactor is shut down for maintenance, the SDC System removes residual heat. For LOCA and non-LOCA scenarios, cooling is provided through the safety functions and provisions identified in 13.3.2.

Safety Function 11: Maintain Reactor Coolant System Integrity

The HTS pressure boundary is designed to provide reliable fuel cooling, maintain coolant inventory, and must be leak tight to contain any radioactive material that might leak from the fuel into the HTS. The HTS pressure boundary is designed and built to be robust and of very high quality to minimize the likelihood of loss-of-coolant from the system. Additionally, the HTS is seismically qualified to prevent the loss of reactor coolant following a Design Basis Earthquake (DBE). In-service inspection and monitoring features incorporated in the design allow for timely corrective actions to be implemented, if required.

During all modes of normal operation, the HTS pressure is controlled through the HT Pressure and Inventory Control System. Overpressure protection of the HTS is provided through the combined effects of liquid relief valves and the Shutdown Systems.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 32 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

Safety Function 12: Limit Radioactive Release from the Containment under Accident Conditions

The Containment System forms an envelope around the nuclear components of the Reactor and the HTS. The Containment System quickly reduces the Containment pressure to sub-atmospheric following a large energy release within Containment and hence minimizes uncontrolled releases to the outside environment.

Safety Function 13: Limit Radioactive Releases from Sources Outside the Containment

The only major source of radioactive material outside the containment is the IFBs. Safety analyses performed and documented in the PNGS B Safety Report confirm the adequacy of the design and administrative provisions to limit potential releases. The evaluation of the structural integrity under sustained high temperatures has shown that cracking/leakage can be effectively mitigated through the use of EME which is established at Pickering for Beyond Design Basis Events.

Safety Function 14: Limit Radioactive Discharges During Operational States

The approach used by OPG for the management of radioactive effluents is to calculate the Derived Release Limit (DRL) for each radionuclide group in the effluent and then operate with emissions at a very small fraction of the DRL.

Internal Investigation Levels are established at the high end of normal radionuclide release rates, to help keep releases low, and to provide a warning that an Action Level could potentially be reached. Action Levels have been established for individual radionuclides or radionuclide groups, at release rates higher than the Internal Investigation Levels, but well below the Derived Release Limits. When an Action Level is reached, the cause of the high release level is investigated and corrective action taken as needed, and a report is submitted to the CNSC.

Safety Function 16: Maintain Control of Radioactive Releases from the Fuel Outside the Reactor Coolant System

Fuel handling areas employ cooling, shielding, and monitored containment to prevent fission product release from damaged fuel. Emergency measures, such as flooding rooms or activating spray systems, prevent escalation during malfunctions.

Safety Function 20: Maintain Integrity of the Containment

To ensure the structural integrity and Containment leakage rate is maintained within the design basis, pressure tests up to the design pressure are performed for each Reactor Building and for the Pressure Relief Duct (PRD). In addition, routine RB pressure rate of pressurization testing is performed to identify discrete holes in the Reactor Building or Reactor Building and PRD.

Safety Function 21: Limit Effects of Radioactive Releases on the Public and Environment

OPG's Consolidated Nuclear Emergency Plan (CNEP) documents the concepts, roles, training/qualification requirements, and resources required to implement and maintain its

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 33 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

emergency response capability to protect the public, employees, and the environment in the event of a nuclear emergency.

12.3.4 Safety Functions Relevant to all Fundamental Safety Functions

There are three Safety Functions related to all FSFs, which are described below.

Safety Function 9: Ensure Necessary Services as Support for Safety Systems

Redundant electrical systems (such as multiple classes of power, standby generators, and emergency power) ensure safety equipment remains operational during disturbances. Instrument air, service water, and auxiliary supplies also feature redundancy and fail-safe capabilities.

Safety Function 15: Maintain Control of Environmental Conditions within the Plant

The Room Conditions Manual provides normal and post-accident room conditions for different areas of the plant for each of the Harsh Environment Accident Groups as well as a list of environmentally qualified and steam protected rooms. The DBA List for PNGS B classifies the DBAs as harsh or mild and groups the DBAs for the purpose of identifying systems and equipment required for mitigation.

Safety Function 19: Prevent Failure of a System with Potential Impairment of a Safety Function

Fire protection, EQ, and physical separation safeguard against failures that could spread across systems. Redundancy and grouping ensure that no common-cause event can disable all safety critical equipment.

12.4 Assessment of Defence-in-Depth

The information regarding the provisions for each of the safety principles is based on the current PNGS B design and operation and considers information from sources such as the PSR3 Safety Factor Reports, PNGS B Probabilistic Safety Assessments, and the Safety Report. The assessments provide overall confirmation that effective and overlapping provisions are in place to meet the objectives of the safety principles.

12.4.1 Level 1 – Prevention of Abnormal Operation and Failures

The objective of the first level of defence is to prevent abnormal operation and failures. A strong Level 1 defence requires a conservative design and high-quality construction and operation. This is particularly important for the physical barriers between the fuel and the environment.

In addition to a conservative design and high-quality construction, safe operation of the plant by qualified staff and a continued focus on preventive maintenance ensures reliable functionality of plant equipment under normal operation and therefore, prevents process upsets and failures.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 34 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

12.4.1.1 Level 1 Provisions and Barriers

The assessment confirms that the Pickering NGS plant design and operation fulfill all the relevant safety principles. These safety principles address the following key aspects of the Level 1 barrier:

- Conservative plant design and sound construction;
- Processes that ensure design requirements continue to be met, and supporting processes in place to prevent SSC failures and maintain fitness for service of SSCs; and,
- Management system that supports the effectiveness of the Level 1 barrier.

12.4.1.2 Level 1 - PSR3 Findings

The PSR3 Safety Factor reviews assessed the adequacy of the Level 1 barriers. The majority of PSR3 Gaps applicable to the Level 1 barrier are related to compliance with new or revised requirements in modern codes and standards. It is noted that such Gaps do not necessarily represent a deficiency in a defence-in-depth barrier. Pickering was originally designed in accordance with the codes, standards, and regulatory requirements that were in effect at that time. Compliance with new codes, standards, and regulatory requirements as they emerge is planned and managed in accordance with licence compliance activities. PSR3 Strengths were identified where safety requirements or the intent of safety requirements or Review Tasks were exceeded. The PSR3 Strengths most relevant to Level 1 are OPG's OPEX database and Monitoring & Diagnostic (M&D) Centre. The assessment of Acceptable Deviations concluded that the aggregate impact of Acceptable Deviations associated with the first level of defence is assessed to be very low.

12.4.1.3 Level 1 - Improvement Initiatives

Planned initiatives focus on enhancing conformance with modern inspection, seismic, structural, EQ, aging management, maintenance standards, applying single failure criteria, and human-performance governance improvements as practicable. These activities are intended to strengthen preventive barriers and preserve design margins.

12.4.1.4 Level 1 Conclusions

This assessment has confirmed that effective Level 1 barriers are ensured at Pickering through the original conservative design supplemented by design improvements implemented since initial operation, comprehensive programs in place to ensure continued fitness for service and operation within the design basis, and ongoing continuous improvements based on national and international OPEX and evolving regulatory requirements. Given the focus and priority placed on addressing new requirements in modern codes and standards, and the processes in place to address equipment condition, the first level of defence will continue to be strong and effective for Pickering NGS.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 35 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

12.4.2 Level 2 – Control of Abnormal Operation and Detection of Failures

The objective of the second level of defence is to detect and intercept deviations from normal operating conditions, in order to prevent AOOs from escalating to accident conditions. A strong Level 2 defence requires control of plant behaviour using both inherent and engineered design features including both protective systems and surveillance features.

12.4.2.1 Level 2 - Provisions and Barriers

The assessment confirms that the Pickering plant design and processes fulfill all relevant safety principles. These safety principles address the following key aspects of the Level 2 barrier:

- Design provisions for transients to be detected and effectively controlled;
- Safe and conservative operational practices;
- Processes that ensure design requirements continue to be met, and supporting processes in place to prevent SSC failures and maintain fitness for service of SSCs; and,
- Management system that supports the effectiveness of the Level 2 barrier.

12.4.2.2 Level 2 - PSR3 Findings

Findings mirror Level 1 themes (modern standards, inspection concessions, single failure applications) and include updates to analysis scope (e.g., AOO identification and PSA governance consistent with current good practice). Overall, provisions are judged to be mature, with upgrades planned to enhance analytical rigor and reliability oversight.

12.4.2.3 Level 2 - Improvement Initiatives

Actions are planned to confirm conformance with shutdown/safety system requirements, refine inspection and EQ documentation, address fire and seismic standards, and strengthen Deterministic Safety Analysis (DSA)/PSA and human-performance programs. These will further reduce the likelihood of AOOs progressing to accidents.

12.4.2.4 Level 2 - Conclusions

The assessment of defence-in-depth Level 2 concludes that the provisions in place are mature and robust. Implementation of measures to ensure compliance with modern requirements for inspections and maintenance, and improvements to the DSA and PSA, will further enhance the Level 2 barrier at Pickering.

12.4.3 Level 3 – Control of Accidents within the Design Basis

The objective of the third level of defence is to minimize the consequences of accidents by providing inherent safety features, fail-safe design, additional equipment and mitigating procedures. A strong Level 3 defence is evidenced by the design and robustness of engineered

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 36 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

safety features (e.g., Special Safety Systems) coupled with correspondingly robust operating procedures.

12.4.3.1 Level 3 - Provisions and Barriers

The assessment confirms that the Pickering plant design and processes fulfill all of the relevant safety principles. These safety principles address the following key aspects of the Level 3 barrier:

- Design provisions for DBAs;
- Processes that ensure design requirements continue to be met, as well as supporting processes in place to prevent SSC failures and maintain fitness for service of SSCs; and,
- Analysis and assessments that evaluate the extent and significance of any release of radioactive material due to DBAs and demonstrate the effectiveness of Level 3 barriers;
- Operational practices to ensure that accidents within the design basis are controlled; and,
- Management system that supports the effectiveness of the Level 3 barrier.

12.4.3.2 Level 3 - PSR3 Findings

Observations emphasize continued alignment with modern standards and feasibility reviews for selected features where warranted by OPEX, together with PSA governance, scope, and uncertainty/sensitivity analysis enhancements in line with current practice. These actions are intended to reinforce the analytical demonstration of Level 3 capability.

12.4.3.3 Level 3 - Improvement Initiatives

Planned work expands conformance across shutdown/containment/inspection/environmental standards, strengthens reliability and EQ programs, and advances PSA/DSA methods to current guidance. Collectively, these initiatives aim to preserve margins and improve insights for DBA management.

12.4.3.4 Level 3 Conclusions

The PSR3 assessments and the review of safety principles demonstrate that there is an effective Level 3 barrier. Adequate and effective provisions for the control of accidents within the design basis are provided at Pickering. Operators have indications and alarms as well as the capability to perform actions from the Main Control Room (MCR) for this purpose.

The review confirms that Pickering has strong Level 3 barriers, due to the high quality of the design, that include extensive mitigating provisions and comprehensive accident management procedures. A robust set of safety analyses and assessments, which will be further enhanced through the re-assessment and re-prioritization of the REGDOC-2.4.1 "Deterministic Safety

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 37 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

Analysis” implementation at Pickering and best practices from CSA N290.17:23, demonstrate the adequacy of this level of defence-in-depth.

12.4.4 Level 4 – Control of Severe Plant Conditions

The objective of the fourth level of defence is to ensure that radioactive releases caused by BDBAs are kept as low as practicable. A strong Level 4 defence requires a robust containment design, as well as strong complementary design features and accident management strategies to prevent accident progression and mitigate the consequences of DEC.

12.4.4.1 Level 4 - Provisions and Barriers

The assessment confirms that the Pickering NGS plant design and processes fulfills all of the relevant safety principles. These safety principles address the following key aspects of the Level 4 barrier:

- Design provisions for BDBAs;
- Assessments to support accident management strategies;
- Emergency planning for the management of severe plant conditions
- Abnormal Incident Manuals, Emergency Mitigating Equipment Guidelines and SAMG; and,
- Management system that supports the effectiveness of the Level 4 barrier.

12.4.4.2 Level 4 - PSR3 Findings

The review supports reassessment of select Fukushima items in light of extended operation and evolving OPEX (e.g., filtered venting and shield-tank relief capacity) and confirms the need to update analysis plans to maintain alignment with current guidance. These activities are intended to identify practicable enhancements that improve severe-accident resilience.

12.4.4.3 Level 4 - Improvement Initiatives

Initiatives emphasize conformance with containment/environmental/seismic standards, further development of DSA/PSA for DEC, reliability and aging enhancements, and strengthening of accident and emergency management capabilities.

12.4.4.4 Level 4 - Conclusions

The measures considered at the first three levels of defence-in-depth will ensure maintenance of the structural integrity of the core and limit potential radiation hazards for members of the public. The PSR3 assessments and review of safety principles demonstrate that additional design features and procedural provisions are in place and adequate to address severe accident conditions.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 38 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

A significant number of improvements have been implemented since initial operation specifically to reinforce Level 4 defence-in-depth. BDBA is addressed through provisions in design and strategies in emergency management. Furthermore, OPG as a learning and continuous improvement organization, continues to evaluate industry OPEX, best practices and recommendations in order to identify opportunities for improving their accident management capabilities.

12.4.5 Level 5 – Mitigation of Radiological Consequences

The objective of the fifth level of defence is to mitigate the radiological consequences of potential releases of radioactive materials. A strong Level 5 defence is evidenced by a robust emergency response program consisting of adequately equipped emergency support facilities and plans for on-site and off-site emergency response.

12.4.5.1 Level 5 - Provisions and Barriers

Emergency preparedness includes on-site and off-site plans, trained Emergency Response Organizations, equipped facilities, radiation monitoring, resilient communications, and established interfaces with provincial/municipal authorities. Regular drills and exercises validate readiness as well as inform improvements.

12.4.5.2 Level 5 - PSR3 Findings

Targeted evaluations such as timing of off-site protective measures relative to containment leakage under DECAs and practices at off-site monitoring/decontamination centres-are being addressed through ongoing actions and planned analyses. These efforts are intended to refine protective strategies and logistics.

12.4.5.3 Level 5 - Improvement Initiatives

Planned actions include updating instrumentation and equipment survivability assessments to reflect configuration changes, evaluating opportunities to increase grace time (e.g., backup capacities), and reinforcing accident/emergency management where analysis indicates benefit.

12.4.5.4 Level 5 - Conclusions

OPG has plans and procedures in place to ensure capability and readiness to respond to a nuclear emergency, with the support of a coordinated effort from various response organizations. The implementation of SAMG, post-accident monitoring capability and implementation of OPEX from Fukushima have also significantly improved the existing robust barriers for the Level 5 defence-in-depth.

12.4.6 Common Mode Barrier Challenges

As part of this Defence-in-Depth Assessment, potential challenges that are common to multiple layers of defence have also been considered and assessed for their overall impact on the defence-in-depth at PNGS. These include misperceptions of design capability, changes in external conditions, procurement, nuclear safety and security culture, workforce management, human performance, and business continuity. OPG manages these challenges through a

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 39 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

combination of structured governance, rigorous programs, systematic monitoring, and timely corrective action.

The on-going implementation of REGDOC-2.4.1 “Deterministic Safety Analysis” will strengthen the knowledge of plant robustness and understanding of safety margins in the design. The latest PNGS B PSA study also provides a better understanding of overall plant risk and the safe operation of the station. The PSA is also used as a tool to evaluate potential plant design changes.

OPG’s Hazard Analysis for PNGS B was recently updated and addresses external hazards, including both human induced and natural hazards. Hazard identification and screening is reviewed periodically and updated as required. Gradual changes in external conditions due to climate change (e.g., warmer ambient and lake temperatures) may be reflected in reduced operating margins. Emergency planning also considers changes in land usage, demographics and population. Emergency preparedness documents are periodically reviewed and revised in accordance with the OPG CNEP.

For procurement related risks, including counterfeit, fraudulent, or suspect items, OPG implements a comprehensive Items and Services Management Program. This includes supplier qualification, inspection controls, and investigative processes that ensure defective or non-compliant items are identified early, quarantined, and corrected to prevent safety significant failures.

OPG mitigates cultural and organizational challenges through strong leadership oversight and a proactive Nuclear Safety Culture Monitoring Panel, which tracks cultural indicators, identifies emerging issues, and ensures timely follow-up. Oversight is reinforced through internal committees, external peer reviews, and industry benchmarking, thereby providing multiple layers of independent challenge and feedback.

To address workforce and human-performance challenges, OPG applies structured succession planning, qualification programs, and extensive training supported by human-performance tools such as pre-job briefings, procedure-use requirements, coaching, and event-analysis processes. Quantitative indicators, such as Event-Free Day Resets, allow early identification of performance trends, triggering focused recovery plans when needed.

Finally, OPG’s business continuity framework ensures that critical functions remain available during disruptive events. The organization demonstrated this capability during the COVID-19 pandemic, where the crisis-management structure enabled continued safe operation through rapid procedural adjustments, protective measures, sequestering readiness, and supply-chain monitoring.

In summary, OPG manages common-mode challenges through a mature, integrated system of hazard identification, performance monitoring, corrective action, safety culture oversight, and emergency/continuity planning. These mechanisms collectively ensure that emerging risks are promptly identified and that effective defensive barriers remain in place across all levels of defence-in-depth.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 40 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

12.5 Adequacy of Provisions

The sections above detail the various physical and programmatic provisions for each level of defence-in-depth at the Pickering NGS. The sections below describe the means to assess the adequacy of these provisions, which allows the organization to identify where corrective actions are required or where improvement opportunities exist.

12.5.1 Safety Analysis and Assessment

The DSA and PSA provide a means of assessing the adequacy of the defence-in-depth provisions in terms of physical performance of the designed barrier for each level. Therefore, the assessment of aggregate safety of a nuclear power plant entails a review of the aggregate risk prediction from the PSA and comparison to the accepted international risk targets.

The updated PSA provides a comprehensive, quantitative evaluation of plant risk for internal events, external hazards, and outage states. Results confirm that both SCDF and LRF remain below established safety goals, demonstrating low overall risk to the public.

The PSA methodology used is accepted by the CNSC under CNSC REGDOC-2.4.2 “Probabilistic Safety Assessment” and is consistent with industry good practice. The PSA incorporates modelling refinements, updated fault/event trees, and credit for severe accident management measures. It also reflects current design and operation as of its analytical freeze date and is aligned with modern regulatory expectations. Planned updates will further enhance consistency with new standards and good practice in hazard screening, uncertainty treatment, and sensitivity analysis.

The DSA confirms that safety systems and support systems can meet their required functions under a broad range of design basis events, using intentionally conservative assumptions that ensure large protective margins. It demonstrates that radiological consequences remain below applicable regulatory dose limits for all analyzed accident scenarios.

The reliability program activities for the Pickering NGS Systems Important to Safety (SIS) are integrated into the existing surveillance and performance monitoring framework. These governing programs include rigorous procedures to ensure that testing and predefined activities are completed at intervals consistent with engineering analyses and include well established internal checks to ensure any missed, deferred, or discrepant surveillance activities are rationalized.

12.5.2 Plant Performance

OPG monitors a series of performance indicators to assess the effectiveness of program implementation and business performance. A summary of recent trends (from 2019 to 2025) as a sample of performance indicators are presented and discussed below.

Event Free Day Reset

The Event Free Day Reset (EFDR) metric monitors human-performance events that challenge procedural discipline, with separate indicators for site-level and department-level events. When

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 41 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

adverse trends emerge, targeted recovery plans are implemented, including enhanced coaching, stricter procedural expectations, and increased oversight.

Forced Loss Rate

Forced Loss Rate (FLR) is an indicator used to monitor progress in minimizing outage time and power reductions that result from unplanned equipment failures, human errors, or other conditions during the operating period. Over the last several years, FLR performance has remained better than target, (more time operating at full power) reflecting the effectiveness of equipment reliability programs and prompt corrective actions addressing prior vulnerabilities.

Online Maintenance Backlog

Online maintenance backlog is used to assess the station's ability to manage and correct equipment deficiencies. Backlog levels have consistently decreased, supported by initiatives such as improved readiness reviews, daily/weekly prioritization, enhanced integration with maintenance teams, and increased scrutiny of work introduction processes. Critical corrective work has remained a priority to ensure continued equipment operability.

Training Index

The Training Index evaluates training program effectiveness against industry objectives for instructor proficiency, training quality, qualification maintenance, and performance improvements. The station has consistently exceeded training targets, supported by virtual training deployment, strengthened oversight, improved attendance governance, and enhanced leadership engagement in training performance.

Program Effectiveness Reviews

Effectiveness reviews (including internal audits, self-assessments, and external benchmarking) are used to verify that program implementation remains aligned with expectations. Where deficiencies or adverse trends are identified, corrective actions are developed, tracked, and verified for effectiveness, ensuring that defence-in-depth remains properly supported by station programs.

12.6 DiD Assessment Conclusion

The Defence-in-Depth Assessment evaluated how well the plant's design and operation meet the safety principles associated with each level. The assessment incorporated:

- Evaluation of design and operational provisions for each DiD level.
- Consideration of strengths identified during the Safety Factor reviews.
- Consideration of proposed resolution statements for Global Issues.
- Assessment of the combined impact of acceptable deviations carried forward from previous PSRs and those identified during PSR3.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 42 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

- Integration of conclusions for each DiD level.
- Review of deterministic and probabilistic safety analysis results.

The overall conclusion is based on the combined evidence from these inputs, demonstrating the adequacy of the multiple and overlapping provisions that support DiD at the plant.

The detailed review of provisions for each level of defence, as well as the assessment of each level based on Safety Principles shows that Pickering NGS design and operation have effective barriers in all applicable levels of DiD and significant improvements have been implemented since the plant was put into service.

The assessment confirmed that provisions are already in place to meet the fundamental safety functions (Control, Cool and Contain) and the objectives of DiD defined in CNSC REGDOC-2.5.2 and IAEA INSAG-10. Processes are also in place to address potential challenges that are common to multiple layers of DiD.

Improvements to address BDBAs have considerably improved the robustness of the Level 4 and Level 5 DiD barriers, strengthening the capability to mitigate and respond to low frequency events.

The adequacy of these DiD provisions has also been confirmed by the recently completed REGDOC-2.4.2 compliant Probabilistic Safety Assessment for Pickering NGS. The results demonstrate that the overall plant design has a Severe Core Damage Frequency and Large Release Frequency below the Safety Goals, demonstrating the robustness of the design, and reliable equipment that is capable of responding effectively to accident scenarios. Furthermore, key performance indicators demonstrate that the DiD provisions at Pickering NGS are effective, and where adverse trends exist, the cause is identified and addressed in a timely manner. OPG sets high internal performance targets such that they provide sufficient challenge to drive continuous improvement.

Pickering NGS has a strong set of defensive barriers in place and implementation of the proposed Resolution Statements will further enhance DiD. OPG will continue to execute in-progress transition plans for new requirements in modern codes and standards or evaluate and implement practicable means of applying new requirements where this work is not yet in progress. These initiatives will improve the alignment with industry best practice and further enhance the barriers in the areas of groundwater protection, fire protection, in-service inspection, deterministic safety analysis, probabilistic safety assessment, and reliability.

The provisions and barriers identified in this DiD Assessment, including the robustness of the design, safe and conservative operational practices, a comprehensive safety case, and the supporting framework of the Nuclear Management System, provide assurance that the plant will continue to achieve a high standard of safe operation.

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 43 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary

13.0 CONCLUSION OF THE ASSESSMENT OF OVERALL ACCEPTABILITY OF OPERATION OF THE PLANT

The Global Assessment concludes that PNGS will continue to operate safely for the PSR3 period. This conclusion is supported by plant design and operating performance, the enhancements proposed through PSR3, the assessment of DiD provisions, and the overall impact of Acceptable Deviations from PSR3 and earlier PSRs.

Global Issues

The PSR3 Gaps were consolidated into 26 GIs. None were assessed as having high safety significance.

Seven GIs were assessed as having a medium safety significance, primarily related to condition and fitness for service assessments, aging management, increased irradiated fuel load during defuelling and refurbishment, singleton failures affecting core damage frequency, and potential changes to the Fire Protection System. The associated Resolution Plans include actions such as fitness for service assessments, heat load evaluations, singleton improvements, and fire response needs analysis.

Eleven GIs were assessed as having low safety significance, generally associated with requirements in modern codes and standards. Resolution Plans include actions to adopt modern standards where practical.

Eight GIs were assessed as having very low safety significance, largely related to governance, administrative matters, or modern code requirements. Many of these Gaps were assessed as Acceptable Deviations, although some actions, such as governance and document updates, are included where reasonable.

Overall, most GIs have low or very low safety significance, reflecting the maturity of PNGS and ongoing improvements since initial operation. Medium safety significance GIs are being managed through existing activities or through assessments associated with refurbishment (e.g., condition assessments).

Defence-in-Depth

The Safety Factor reviews identified seven strengths showing that PNGS exceeds modern requirements in several areas, reinforcing positive performance trends. The DiD Assessment concluded that PNGS has effective barriers at all levels of DiD and that significant improvements have been made since the plant entered service.

- At Level 1, strong barriers are maintained through conservative original design, subsequent design improvements, robust fitness for service programs, and continuous enhancement based on operating experience and evolving requirements.
- At Level 2, provisions are mature and robust, with ongoing improvements in inspections, maintenance, and safety analysis expected to further strengthen this level.

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 44 of 47
Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		

- At Level 3, the plant has effective provisions for controlling design-basis accidents, supported by strong design features, comprehensive accident management procedures, and high-quality safety analyses.
- At Level 4, additional design features and procedural measures adequately address severe accident conditions. Numerous improvements have been implemented since initial operation, and ongoing evaluation of industry experience continues to strengthen accident management capabilities.
- At Level 5, emergency preparedness is well established, supported by coordinated response plans, SAMG implementation, post-accident monitoring, and lessons learned from Fukushima.

Common challenges affecting multiple defence levels were also assessed, and appropriate programs and frameworks are in place to address them.

The DiD Assessment also considered the aggregate impacts of Acceptable Deviations identified as part of the GI Resolution Plans. The objective of GAR was to identify whether PSR3 Gaps, which were individually determined not to be significant, could potentially become more significant when grouped together. PSR3 Acceptable Deviations were considered together with Acceptable Deviations identified as part of PSR2/PSR2-B in order to ensure a comprehensive assessment was performed. The aggregate impact of Acceptable Deviations on the DiD capability of the plant was assessed for each level of DiD. In all instances, the aggregate impact of Acceptable Deviations associated with a particular level of defence was assessed to be very low.

In summary, the current plant design, operation, processes, and management system will ensure continued safe operation of PNGS. The implementation of RSs associated with the GI Resolution Plans will support and enhance the high standard of safe operation.

Report**OPG Proprietary**

Document Number:

P-REP-03680-00087

Usage Classification:

N/A

Sheet Number:

N/A

Revision Number:

R000

Page:

45 of 47

Title:

Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary**Appendix A: LIST OF ACRONYMS AND ABBREVIATIONS**

AD	Acceptable Deviation
AECL	Atomic Energy of Canada Limited
ALARA	As Low As Reasonably Achievable
ANBGMS	Automated Near Boundary Gamma Monitoring System
AOO	Anticipated Operational Occurrence
APS	Auxiliary Power System
ASTGMS	Automated Source Term Gamma Monitoring System
BDBA	Beyond Design Basis Accident
BECS	Boiler Emergency Cooling System
CANDU	CANada Deuterium Uranium
CDF	Complementary Design Features
CNEP	Consolidated Nuclear Emergency Plan
CNSC	Canadian Nuclear Safety Commission
COG	CANDU Owner Group
CSA	Canadian Standards Association
D-ISR	Darlington Integrated Safety Review
D-PSR	Darlington Periodic Safety Review
D2O	Heavy Water (Deuterium Oxide)
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DEC	Design Extension Condition
DiD	Defence-in-Depth
DRL	Derived Release Limit
DSA	Deterministic Safety Analysis
ECI	Emergency Coolant Injection
EFDR	Event Free Day Reset
EITER	Equipment Important to Emergency Response
EME	Emergency Mitigating Equipment
EO	Enhancement Opportunity
EPRI	Electric Power Research Institute
EQ	Environmental Qualification

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 46 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		
--	--	--

EWS	Emergency Water Supply
FFS	Fitness for Service
FLR	Forced Loss Rate
FSF	Fundamental Safety Function
GAR	Global Assessment Report
GI	Global Issue
GSS	Guaranteed Shutdown State
HT	Heat Transport
HTS	Heat Transport System
IAEA	International Atomic Energy Agency
IFB	Irradiated Fuel Bay
IIP	Integrated Implementation Plan
INPO	Institute of Nuclear Power Operations
ISR	Integrated Safety Review
LCH	Licence Conditions Handbook
LOCA	Loss of Coolant Accident
LRCS	Law, Regulation, Code, and Standard
LRF	Large Release Frequency
MCR	Main Control Room
NBCC	National Building Code of Canada
NFA	No Further Action
NFPA	National Fire Protection Association
NGS	Nuclear Generating Station
NPP	Nuclear Power Plant
OPEX	Operating Experience
OPG	Ontario Power Generation
PAR	Passive Autocatalytic Recombiner
PB-ISR	Pickering B Integrated Safety Review
PNGS	Pickering Nuclear Generating Station
PRD	Pressure Relief Duct
PROL	Power Reactor Operating Licence
PSA	Probabilistic Safety Analysis
PSR	Periodic Safety Review

Report

OPG Proprietary		
Document Number: P-REP-03680-00087		Usage Classification: N/A
Sheet Number: N/A	Revision Number: R000	Page: 47 of 47

Title: Pickering NGS Periodic Safety Review 3 (PSR3): Global Assessment Report Summary		
--	--	--

PSR2	Periodic Safety Review 2
PSR2-B	Periodic Safety Review 2-B
PSR3	Periodic Safety Review 3
REGDOC	Regulatory Document
RRS	Reactor Regulating System
RS	Resolution Statement
RTS	Return-to-Service
SAMG	Severe Accident Management Guidelines
SCDF	Severe Core Damage Frequency
SDC	Shutdown Cooling
SDS1	Shutdown System 1
SDS2	Shutdown System 2
SF	Safety Factor
SFR	Safety Factor Report
SIO	Safety Improvement Opportunity
SIS	Systems Important to Safety
SRV	Steam Reject Valve
SSCs	Structures, Systems and Components
WANO	World Association of Nuclear Operators
XRF	Cross Reference