CMD 26-H107 - CNSC Staff Submission

Ontario Power Generation request for changes to the Darlington NGS Integrated Implementation Plan

Classification	UNCLASSIFIED
Type of CMD	Original
CMD Number	26-H107
Reference CMD(s)	N/A
Type of audience	Hearing in writing based solely on written submissions
Public hearing date	Fall 2026
Word e-DOC #	3779UC3NXORX-1883431929-1035 – EN
PDF e-DOC #	3779UC3NXORX-1883431929-1149 – EN
Attachments	• Current Darlington Nuclear Generating Station power reactor operating licence • Current Darlington integrated implementation plan (R004) • Relevant excerpt from the current Darlington licence conditions handbook
Summary	Ontario Power Generation (OPG) is requesting Commission approval to revise the timelines and expand the scope of two Darlington Integrated Implementation Plan (IIP) items related to aquatic thermal effects, and impingement and entrainment monitoring. The revisions are required because the remaining work can only be completed after full completion of the Darlington Refurbishment Project in March 2026.
Actions required	CNSC staff request the Commission render a decision regarding the requested approval of changes to the Darlington IIP, as described in OPG's submission.

CMD 26-H107 - Soumission du personnel de la CCSN

Demande d'Ontario Power Génération visant à modifier le plan intégré de mise en œuvre de la centrale nucléaire de Darlington

Classification	NON CLASSIFIÉ
Titre du CMD	Original
Numéro du CMD	26-H107
CMD(s) de référence	N/A
Type d'audience	Audience par écrit fondée uniquement sur des mémoires
Date de l'audience	Automne 2026
Word e-DOC #	3779UC3NXORX-1883431929-1035 – EN
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Pièces jointes	• Le permis actuel d'exploitation d'un réacteur de puissance pour la centrale de Darlington • Le plan intégré de mise en œuvre actuel pour Darlington (R004) • l'extrait pertinent du manuel des conditions de permis en vigueur de Darlington
Sommaire	Ontario Power Generation (OPG) demande l'approbation de la Commission pour réviser les échéanciers et élargir la portée de deux éléments du Plan intégré de mise en œuvre (IIP) de Darlington liés aux effets thermiques aquatiques, ainsi qu'à la surveillance de l'impact et de l'entraînement. Ces révisions sont nécessaires parce que les travaux restants ne pourront être complétés qu'après l'achèvement complet du projet de rénovation de Darlington en mars 2026.
Actions requises	Le personnel du CNSC demande à la Commission de rendre une décision concernant l'approbation demandée des modifications au PII de Darlington, comme décrit dans la soumission de l'OPG.

CMD 26-H107

Signed by:

Viktorov, Alexandre

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Ontario Power Generation request for changes to the Darlington NGS Integrated Implementation Plan

Canadian Nuclear Safety Commission

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Land acknowledgement

The Darlington site is located on the north shore of Lake Ontario in Clarington, Ontario, 5 kilometers outside the town of Bowmanville and 10 kilometers southeast of Oshawa. The Darlington site resides on lands in which many Indigenous Nations and communities have a vested interest and rights, lying within the lands and waters of the Michi Saagiig Anishinaabeg, the Gunshot Treaty (1877-88), the Williams Treaties (1923), and the Williams Treaties Settlement Agreement (2018).

Plain language summary

Ontario Power Generation (OPG) has requested Commission approval to revise the Darlington integrated implementation plan (IIP).

The requested changes pertain to the following 2 IIP items:

- IIP-EA 012: Aquatic Thermal Study
- IIP-EA 013: Aquatic Impingement and Entrainment Study

OPG is requesting a total of 4 changes and 1 new task addition across IIP-EA 012 and IIP-EA 013:

- IIP-EA 012 Task #6: Approval to revise the timeline to 2030 and expand the scope to include reporting and assessment of thermal monitoring data related to round whitefish embryos. This change also involves amalgamating this task with the reporting and assessment components of Task 7.
- IIP-EA 012 Task #7: Approval to revise the timeline to 2031 and narrow scope to include only the review of mitigation options if performance thresholds are exceeded. The reporting and assessment components have been transferred to Task 6, resulting in a task separation.
- IIP-EA 013 Task #8: Approval to revise the timeline to 2030 and expand the scope to include 2 consecutive years of impingement and entrainment monitoring prior to documentation and reporting. This change includes amalgamation with the monitoring components of Task 9.
- IIP-EA 013 Task #9: Approval to revise the timeline to 2031 and narrow scope to include only the review of mitigation options if performance thresholds are exceeded. The documentation and reporting components have been transferred to Task 8, resulting in a task separation.
- IIP-EA 013 Task #10: Approval to add a new task requiring the completion of a Best Available Technology Economically Achievable (BATEA) study by December 31, 2026, during DNGS refurbishment.

OPG is requesting new timelines because the last phase of the Darlington Refurbishment Project (Unit 4) was completed in March 2026. The remaining work for IIP-EA 012 and 013 can only begin after the entire refurbishment project is complete. The previous commitment dates were based on early estimates and no longer provide the sufficient time to collect data,

complete the required analyses, and prepare the associated reports following completion of the Darlington Refurbishment Project.

In parallel, the Fisheries Act Authorization (FAA) issued by Fisheries and Oceans Canada has been amended to align with the updated refurbishment schedule. The FAA established the authorization period to coincide with the completion of refurbishment activities and includes requirements for two consecutive years of post-refurbishment impingement and entrainment monitoring. As such, the proposed IIP schedule revisions therefore align with the amended FAA timelines and associated regulatory requirements.

Commission approval is required to revise the IIP, as it forms part of the licensing basis for the Darlington NGS. The IIP is captured in Section 15.3 of the Darlington Power Reactor Operating Licence (PROL) 13.00/2045.

Canadian Nuclear Safety Commission (CNSC) staff evaluated OPG's submission, as well as the supporting technical documentation, and conclude that:

- The proposed changes are primarily administrative in nature, including timeline extensions, task reorganization, and the addition of a BATEA study, and do not result in new adverse environmental effects; and
- The changes do not affect the conclusions of the environmental assessment presented to the Commission in 2012 (CMD 12-H13); and
- The changes remain consistent with regulatory requirements, including the amended Fisheries Act Authorization; and
- OPG continues to support the objectives of the environmental protection and refurbishment programs.

CNSC staff further conclude that the proposed revisions will not result in a reduction in safety or pose any unreasonable risk to the workers, the public or the environment.

CNSC staff recommend that the Commission approve OPG's request to revise the Darlington IIP as described in this CMD.

Referenced documents in this CMD are available to the public upon request, subject to confidentiality considerations.

1 Overview

1.1 Background

In preparation for the Darlington Refurbishment Project, Ontario Power Generation (OPG) conducted a systematic review of plant design, condition and operation in accordance with the requirements of RD-360, *Life Extension of Nuclear Power Plants*. This review comprised both an environmental assessment (EA) [1] and an integrated safety review (ISR) [2].

The ISR [2] consisted of an assessment of the plant design, systems, structures, and component (SSCs) condition and plant performance to determine the extent to which the Darlington Nuclear Generating Station (DNGS) conforms to modern standards and practices. From the ISR, OPG identified reasonable and practical modifications to SSCs and to the management of the station, in order to enhance the safety of the plant to a level approaching that of modern nuclear power plants and to allow for long term operation. The results of the EA and ISR assessments were incorporated into the Darlington integrated implementation plan (IIP), which encompasses all 4 unit refurbishments and extends to 2028. Implementation of the IIP is a considerable undertaking, consisting of 622 detailed IIP commitments.

In 2015, OPG submitted Revision 2 of the Darlington IIP to CNSC staff [3]. Following its review and acceptance by CNSC staff, OPG requested approval of the IIP by the Commission in CMD 15-H8.1, as part of the licence renewal for the Darlington NGS [4].

On December 23, 2015, the Commission renewed OPG's Power Reactor Operating Licence (PROL) for the Darlington NGS. In accordance with the Record of Proceeding, including Reasons for Decisions issued by the Commission [5], Revision 2 of the Darlington IIP became part of the licensing basis, and its implementation formed the basis of licence condition 15.3 of the Darlington PROL. Specific reference to Revision 2 of the IIP was placed in the Darlington Licence Conditions Handbook (LCH). At the time of approval of the IIP by the Commission, some commitments were based on conceptual designs and early forecasted schedules. For these reasons, the potential need to revise the IIP over time was recognized.

In February 2019, OPG requested Commission approval to revise the Darlington IIP [6] for 8 IIP items listed in Revision 2 of the Darlington IIP. OPG's request was approved by the Commission in December 2020 [7]. The proposed IIP revisions, including CNSC staff's recommendations to the Commission, were captured in CMD 19-H104 [8]. In accordance with the Record of Decision [9], OPG submitted Revision 3, in 2021, of the Darlington IIP to CNSC staff [10]. Following its review and acceptance by CNSC staff [11],

specific reference to Revision 3 of the IIP was placed in Section 15.3 of Revision 5 of the Darlington NGS LCH-PR-13.03/2025.

Similarly, in June 2022, OPG requested Commission approval to revise the Darlington IIP [12] for 3 IIP items listed in Revision 3 of the Darlington IIP. OPG's request was approved by the Commission in April 2023 [13]. The IIP Revisions including CNSC staff's recommendations to the Commission were captured in CMD 23-H102 [14]. In accordance with the Record of Decision [13], in July 2023, OPG submitted Revision 4, of the Darlington IIP to CNSC staff [15]. Following its review and acceptance by CNSC staff [16], specific reference to Revision 4 of the IIP was placed in Section 15.3 of Revision 6 of the Darlington NGS LCH-PR-13.04/2025.

In November 2025, following Darlington's Power Reactor Operating Licence (PROL) renewal, PROL 13.00/2045 was issued with an effective date of December 1, 2025 [17]. This newly issued PROL maintains all of the requirements and commitments established for the Darlington IIP, including all pertinent Licence Conditions and their Compliance Verification Criteria. Table 1 summarizes the key milestones and regulatory approvals associated with the Darlington IIP, including its incorporation into the licensing basis and its implementation progress over time.

As of March 2026, OPG had completed 597 of the 622 IIP commitments [18].

Table 1. Darlington Integrated Implementation Plan (IIP) Timeline Summary

Date / Period	Event	Key Details
Pre-2015	Life extension review conducted (EA + ISR)	Environmental Assessment and Integrated Safety Review completed under RD-360; results formed the Darlington IIP.
April 2015	OPG submitted IIP to CNSC	Covers 4-unit refurbishment; extends to 2028; includes 622 IIP commitments.
December 2015	Commission renewed the PROL for DNGS	PROL 13.00/2025 was issued. The IIP became part of licensing basis; tied to licence condition 15.3 and referenced in LCH-PR-13.00/2025.
February 2019	OPG requested changes to the IIP	Request covered changes to 8 IIP items.

December 2020	Commission approved IIP revisions	Approval of revisions to 8 IIP items (CMD 19-H104).
October 2021	Updated IIP submitted by OPG	OPG updated the Darlington IIP to reflect approved 2019 changes and submitted it to the CNSC. CNSC staff accepted the revised IIP in December 2021.
June 2022	OPG requested further changes to the IIP	Request covered changes to 3 IIP items.
April 2023	Commission approved IIP revisions	Approval of revisions to 3 IIP items (CMD 23-H102).
July 2023	Updated IIP submitted	OPG updated the Darlington IIP to reflect approved 2023 changes and submitted it to the CNSC. CNSC staff accepted the revised IIP in October 2023.
November 2025	Commission renewed the PROL for DNGS	PROL 13.00/2045 was issued. The licensing basis maintains all IIP requirements and commitments and remains tied to licence condition 15.3.

1.2 Highlights

In October 2024, OPG requested Commission approval to revise the Darlington IIP for 2 IIP items listed in Revision 4 of the Darlington IIP [19]. Table 2 provides the specific item number and description of the current and proposed IIP activity, which are the subject of OPG's request. Appendix A.2 provides more detail on CNSC staff review and assessment.

Table 2: Listing and description of IIP items with requested changes (IIP R004)

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description
1	IIP-EA 012 Task 6	2026	Conduct thermal monitoring after restart of all reactors (i.e. Continued Operation phase).	2030	Conduct thermal monitoring after restart of all reactors (i.e., Continued Operation phase) and report monitoring data collected during this phase and assess likely effects on the survival of round whitefish embryos.
	IP-EA 012 Task 7	2027	Report monitoring data collected during Continued Operation phase and assess likely effects on the survival of round white fish embryos. If the performance threshold is exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.	2031	If the performance threshold is exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.
2	IP-EA 013 Task 8	2027	Conduct impingement and entrainment monitoring according to the sampling plan.	2030	Conduct 2 consecutive years of impingement monitoring and entrainment monitoring according to Fisheries and Oceans Canada (DFO) approved sampling plan, then document and report findings of impingement and entrainment monitoring field studies.

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description
	IIP-EA 013 Task 9	2027	Document and report findings. If the performance threshold(s) are exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.	2031	If the performance threshold(s) are exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.
	IIP-EA 013 Task 10*	N/A*	N/A*	2026	Complete the best available technically and economically feasible opportunity to mitigate the impingement and entrainment losses or further reduce the potential for effects.
***OPG is requesting this additional task be added to IIP-EA 013.**					

In accordance with the Periodic Safety Review Process [20], intent changes to the IIP scope are not permitted unless approved by the Commission, as it constitutes a change to the licensing basis. Alternate means to meet the safety improvement goals and objectives of the IIP may be considered by CNSC staff; however, any such changes to the IIP must be formally approved by the Commission.

With respect to IIP-EA 012 Tasks 6 and 7 and IIP-EA 013 Tasks 8 and 9, CNSC staff note that the requested new commitment dates extend beyond the current IIP timeline (i.e., after the year 2028). Additionally, Section 379 of the Record of Proceedings for the 2015 Darlington licence renewal [5] states that "*the Commission expects CNSC staff to report to the Commission if the predictions of the EA are not being confirmed*." While CNSC staff do not anticipate changes to the EA conclusions, the extension of IIP commitments beyond the original timeline warrants Commission awareness and consideration.

1.3 Staff Assessment and Conclusions Regarding the Proposed Changes to the IIP

CNSC staff evaluated OPG's supporting documentation and justification [19] for the requested revisions. For each revision, CNSC staff have assessed:

1. that the proposed approach conforms with the EA results
2. the completeness of OPG's justifications; and
3. the adequacy of the proposed implementation schedule.

OPG is proposing to revise the timelines and scopes for the IIP items to ensure sufficient time to collect data, complete the required analyses, and prepare the associated reports following completion of the Darlington Refurbishment Project. The previously committed dates, based on early schedule estimates, would not allow adequate time to complete this work following the return to service of Unit 4, which was completed in March 2026. Since completion of the overall refurbishment project is a prerequisite for IIP-EA-012 and IIP-EA-013, these items require extensions beyond the current IIP end date (i.e., beyond 2028) to align with the updated refurbishment schedule and the conditions of the amended Darlington Fisheries Act Authorization [19].

A detailed summary of CNSC staff's review of OPG's submissions, including CNSC staff's assessment and recommendations, is provided in Appendix A.2 to this CMD.

Based on the review of OPG's submission [19], CNSC staff conclude that OPG's proposed revisions:

- have no negative impact on safety;
- remain aligned with the EA [1] conducted in support of the Darlington NGS refurbishment and continued operation; and
- meet the safety improvement objectives of the IIP.

Therefore, CNSC staff recommend the Commission to approve the requested changes and instruct OPG to revise the IIP.

2 Matters for Consideration

2.1 Environmental Protection Review

CNSC staff have reviewed OPG's request under the *Nuclear Safety and Control Act* (NSCA) and conclude that the proposed changes to the Darlington IIP will not cause any adverse impacts to the environment. CNSC staff note that the amendments are

primarily administrative, including timeline extensions, task reorganization, and the addition of a BATEA study. As such, no new adverse environmental effects are expected, a provincial environmental assessment (EA) is not required, and the conclusions of the most recent Environmental Protection Review (EPR) Report remain unchanged [21]. The proposed changes are consistent with the original EA conclusions and are aligned with the amended FAA [19].

3 Consultation and Engagement

3.1 Indigenous Consultation and Engagement

The common-law duty to consult with Indigenous Nations and communities applies when the Crown contemplates actions that may adversely affect potential or established Indigenous and/or treaty rights. The CNSC ensures that all of its licence decisions under the NSCA uphold the honour of the Crown and uphold Indigenous peoples' potential or established Indigenous and/or treaty rights pursuant to section 35 of the Constitution Act, 1982.

Based on the information provided in the application, CNSC staff have determined that the requested revision to the Darlington IIP will not cause an adverse impact on potential or established Indigenous or treaty rights. Therefore, the duty to consult has not been raised for this application. However, CNSC staff have proactively reached out to identified Indigenous Nations via notification letters to inform them of the OPG's application and the related regulatory process [22]. The identified Indigenous Nations include: Alderville First Nation; Curve Lake First Nation; Hiawatha First Nation; Mississauga of Scugog Island First Nation; Chippewas of Beausoleil First Nation; Georgina Island First Nation; Chippewa of Rama First Nation; Mohawks of the Bay of Quinte; Métis Nation of Ontario Regions 6, 7 and 8; Six Nations of the Grand River; and Mississaugas of the Credit First Nation. To date, none of the identified Indigenous Nations have expressed concerns related to the application following receipt of the notification letter. CNSC staff will continue to reach out to the identified Indigenous Nations and communities to share updates pertaining to OPG's Darlington IIP.

4 Overall Conclusions and Recommendations

4.1 Overall Conclusions

CNSC staff reviewed the requested revisions to the Darlington IIP and conclude that:

- The proposed changes are primarily administrative in nature, including timeline extensions, task reorganization, and the addition of a BATEA study, and do not result in new adverse environmental effects; and
- The changes do not affect the conclusions of the environmental assessment presented to the Commission in 2012 (CMD 12-H13); and
- The changes remain consistent with regulatory requirements, including the amended Fisheries Act Authorization; and
- OPG continues to support the objectives of the environmental protection and refurbishment programs.

CNSC staff further conclude that the proposed revisions will not result in a reduction in safety and any unreasonable risk to the worker, the public or the environment.

4.2 Overall Recommendations

CNSC staff recommend that the Commission:

- Approve the requested revision to IIP-EA 012 Tasks 6 and 7;
- Approve the requested revision to IIP-EA 013 Tasks 8 and 9;
- Approve the inclusion of IIP-EA 013 Task 10; and
- Instruct OPG to update the IIP, to reflect these changes, for inclusion in the Darlington NGS Licence Conditions Handbook.

References

The following documents are references in this CMD.

[1] Canadian Nuclear Safety Commission and Fisheries and Oceans Canada, "Final Environmental Assessment Screening Report: “The Refurbishment and Continued Operation of the Darlington Nuclear Generating Station, Municipality of Clarington, Ontario”, CEAR# 11-01-62516," March 2013. e-Doc (3917932).

[2] OPG letter, D. Reiner to F. Rinfret, "Darlington NGS Integrated Safety Review (ISR) Submission - Final ISR Report Addendum 002 - NK38-REP-03680-10104-ADD-002-R000," December 2, 2013. e-Doc (4244897).

[3] OPG letter, B. Duncan to F. Rinfret, "Darlington NGS - Request for CNSC Acceptance of Integrated Implementation Plan (IIP) Revision 002, NK38-CORR-00531-17327, (Report Number NK38-REP-03680-10185-R002)," April 27, 2015. e-Doc (4743237).

[4] Commission Member Document, “Application to renew the Power Reactor Operating Licence for the Darlington Nuclear Generating Station”, CMD 15-H8.1, August 19, 2015. e-Doc (4778224).

[5] Record of Proceedings, Including Reasons for Decision, “Application to Renew the Nuclear Power Reactor Operating Licence for the Darlington Nuclear Generating Station,” March 2, 2016. e-Doc (4920689).

[6] OPG letter, S. Gregoris and D. Reiner to M. Leblanc, "Darlington NGS Refurbishment: Request for Commission Approval to Revise the Integrated Implementation Plan (IIP) for Unit 2, NK38-CORR-00531-20239," February 28, 2019. e-Doc (5826417).

[7] CNSC Memorandum, M. Leblanc to R. Velshi, "Darlington / Record of decision 19-H104," December 2, 2020. e-Doc (6435689).

[8] Commission Member Document 19-H104, "Ontario Power Generation request to revise the Darlington Nuclear Generating Station Integrated Implementation Plan," June 2019. e-Doc (5840170).

[9] Record of Decision, Request to revise the Integrated Implementation Plan for the Darlington Nuclear Generating Station. July 18, 2019. e-Doc (5948260).

[10] OPG Letter, S. Sinnathamby and S. Gregoris to J. Burta, “Darlington NGS Refurbishment – Request for CNSC Acceptance of Integrated Implementation Plan (IIP) Revision 003,” NK38-CORR-00531-22811, October 28, 2021. e-Doc (6671221).

[11] CNSC Letter, J. Burta to S. Gregoris and S. Sinnathamby, "Darlington NGS - Request for CNSC Acceptance of Integrated Implementation Plan (IIP) Revision 003," December 10, 2021. e-Doc (6698445).

[12] OPG letter, R. Geofroy and S Sinnathamby to D. Saumure, "Darlington NGS Refurbishment: Request for Commission Approval to Revise the Integrated Implementation Plan (IIP), NK38-CORR-00531-23402," June 28, 2022. e-Doc (6837565).

[13] Record of Proceedings - OPG - Approval of revisions to the Darlington Nuclear Generating Station Integrated Implementation Plan, Application for approval of revisions to the Darlington Nuclear Generating Station Integrated Implementation Plan, April 27, 2023. e-Doc (7027803).

[14] Commission Member Document 23-H102, "Ontario Power Generation request to revise the Darlington Nuclear Generating Station Integrated Implementation Plan," March 2023. e-Doc 6870486

[15] OPG letter, R. Geofroy and B. Vulanovic to A. Mathai, "Darlington NGS Refurbishment – Request for CNSC Acceptance of the Integrated Implementation Plan (IIP) Revision 004," NK38-CORR-00531-24670, October 3, 2023. e-Doc (7139515)

[16] CNSC letter, A. Mathai to R. Geofroy and B. Vulanovic, "Darlington NGS Refurbishment – Request for CNSC Acceptance of Integrated Implementation Plan (IIP) Revision 004," October 27, 2023. e-Doc (7153151)

[17] CNSC letter, K. Lun to A. Grace, "Licence Conditions Handbook – LCH-PR-13.00/2045-R000," December 2, 2025. e-Doc (7445271)

[18] OPG Letter, A. Grace and V. Smyth to K. Hazelton, "Darlington NGS Refurbishment - Submission of 2025 Annual Integrated Implementation Plan (IIP) Progress Report and Request for Concurrence for the Associated Completion Declaration Forms," NK38-CORR-00531-26658, March 3, 2026. e-Doc (7641693)

[19] OPG letter, A. Grace and B. Vulanovic to C. Salmon, "Darlington NGS Refurbishment – Request for Commission Approval to Revise the Darlington NGS Integrated Implementation Plan (IIP)," NK38-CORR-00531-25116, October 17, 2024. e-Doc (7385378)

[20] OPG Process, "Periodic Safety Review (PSR)", N-PROC-MA-0109-001, e-Doc (6933230)

[21] CNSC Form, N. Friggault to A. El-Merhi, "Environmental Review Identification – Request Form", March 3, 2025, e-Doc (7467816)

[22] CNSC Letter, K. Lun to the identified Indigenous Nations and communities, "OPG – Darlington Nuclear Generating Station: Request for Commission Approval to Revise the Darlington NGS Integrated Implementation Plan (IIP)", December 5, 2025, e-Doc (7609077)

5 Glossary

For definitions of terms used in this document, see REGDOC-3.6, *Glossary of CNSC Terminology*, which includes terms and definitions used in the *Nuclear Safety and Control Act* and the Regulations made under it, and in CNSC regulatory documents and other publications.

Appendix A: Basis for Recommendation(s)

A1: Regulatory Basis

The regulatory basis for the recommendations presented in this CMD is as follows:

- *Nuclear Safety and Control Act*, subsection 24 (2).
- Nuclear Power Reactor Operating Licence, Darlington Nuclear Generating Station, PROL 13.00/2045.
- RD-360, Life Extension of Nuclear Power Plants
- Darlington Licence Conditions Handbook, LCH-PR-13.00/2045 R000, in particular the regulatory documents and standards identified as compliance verification criteria.
- REGDOC-2.3.3, Periodic Safety Reviews

A2: Technical Basis

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description	Summary of CNSC Staff's Review	CNSC Staff's Recommendation
1	IIP-EA 012 Task 6	2026	Conduct thermal monitoring after restart of all reactors (i.e. Continued Operation phase).	2030	Conduct thermal monitoring after restart of all reactors (i.e., Continued Operation phase) and report monitoring data collected during this phase and assess likely effects on the survival of round whitefish embryos.	IIP-EA 012 Task 6 involves confirming the accuracy of Environmental Assessment (EA) predictions regarding lake water temperature changes near the Condenser Cooling Water (CCW) discharge and potential effects on round whitefish embryo survival. Completion of the refurbishment of all 4 Darlington Nuclear Generating Station (DNGS) units is expected by Q4 2026. Conducting thermal monitoring after full restart ensures that field data reflects the station's complete operational footprint. The extension will also allow OPG to prioritize resources toward the impingement and entrainment monitoring study under IIP-EA 013 (2027–2030) before conducting the thermal monitoring. The monitoring will take place during the round whitefish spawning period (December 2029 to March 2030). In addition, the scope of Task 6 has been expanded to include documentation and	Revise the requested revision to IIP-EA 012 Task 6

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description	Summary of CNSC Staff's Review	CNSC Staff's Recommendation
						reporting of the monitoring results—previously part of IP-EA 012 Task 7. Based on these considerations, CNSC staff agree with OPG's request, as the proposed changes will ensure relevant post-refurbishment data is collected, analyzed, and reported.	
	IIP-EA 012 Task 7	2027	Report monitoring data collected during Continued Operation phase and assess likely effects on the survival of round white fish embryos. If the performance threshold is exceeded, review	2031	If the performance threshold is exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.	This task was originally intended to review mitigation options and report findings based on performance thresholds. The reporting component is now conducted under IIP-EA 012 Task 6, with Task 7 focusing solely on review of mitigation measures if thermal performance thresholds are exceeded. The extended timeline to 2031 accounts for the revised structure of data collection and evaluation. CNSC staff consider this technically justified given the dependency on results from IIP-EA 012 Task 6.	Revise the requested revision to IIP-EA 012 Task 7

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description	Summary of CNSC Staff's Review	CNSC Staff's Recommendation
			available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.				
2	IIP-EA 013 Task 8	2027	Conduct impingement and entrainment monitoring according to the sampling plan.	2030	Conduct 2 consecutive years of impingement monitoring and entrainment monitoring according to the DFO approved sampling plan, then document	The revised scope of Task 8 now includes the documentation and reporting of monitoring findings, previously assigned to IIP-EA 013 Task 9, consolidating the work into a single final report by March 2030. CNSC staff consider this consolidation appropriate and support the revised timeline.	Revise the requested revision to IIP-EA 013 Task 8

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description	Summary of CNSC Staff's Review	CNSC Staff's Recommendation
					and report findings of impingement and entrainment monitoring field studies.		
	IIP-EA 013 Task 9	2027	Document and report findings. If the performance threshold(s) are exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available	2031	If the performance threshold(s) are exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.	For Task 9, OPG is requesting an extension from 2027 to 2031. With the reporting function now moved to IIP-EA 013 Task 8, Task 9 will focus solely on evaluating whether additional technically and economically feasible mitigation options are warranted if performance thresholds are exceeded. CNSC staff support this revision, as this task must follow completion of the monitoring report in 2030 (IIP-EA 013 Task 8), making the proposed 2031 deadline for Task 9 appropriate.	Revise the requested revision to IIP-EA 013 Task 9

Item #	IIP Item Number	IIP R004 Due Date	IIP R004 Activity Description	IIP R005 Proposed Due Date	IIP R005 Proposed Activity Description	Summary of CNSC Staff's Review	CNSC Staff's Recommendation
			to further reduce the potential for effects.				
	IIP-EA 013 Task 10*	N/A*	N/A*	2026	Complete the best available technically and economically feasible opportunity to mitigate the impingement and entrainment losses or further reduce the potential for effects.	Task 10 is a new addition proposed by OPG to fulfill a regulatory commitment under the amended Fisheries Act Authorization. The task involves conducting a Best Available Technology Economically Achievable (BATEA) study and submitting a report by the end of 2026. CNSC staff reviewed the proposed approach and confirm it complements IIP-EA 013 Tasks 7–9 by providing an evaluation of practicable technology options that may reduce aquatic impacts from station operations.	Approve the inclusion of IIP-EA 013 Task 10.
***OPG is requesting this additional task be added to IIP-EA 013.**							

Appendix B: Attachments

Attachment 1 – The current Darlington NGS PROL
Attachment 2 – The current Darlington Integrated Implementation Plan (R004)
Attachment 3 – Relevant excerpt from the current Darlington Licence Conditions Handbook, Revision 000

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

Word Ref.: e-Doc 7604188
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File / Dossier: 2.01

NUCLEAR POWER REACTOR OPERATING LICENCE

DARLINGTON NUCLEAR GENERATING STATION

I) LICENCE NUMBER: **PROL 13.01/2045**

II) LICENSEE: Pursuant to section 24 of the *Nuclear Safety and Control Act* this licence is issued to:

Ontario Power Generation Inc
1908 Colonel Sam Drive,
Oshawa, Ontario
L1H 8P7, Canada

[Amended 2026-03]

III) LICENCE PERIOD: This licence is valid from December 1, 2025 to November 30, 2045, unless suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

(i) operate the Darlington Nuclear Generating Station, including equipment for the production of radionuclides identified in (vi) and the Darlington Tritium Removal Facility housed within the Heavy Water Management Building (hereinafter "the nuclear facility"), at a site located in the Municipality of Clarington, in the Regional Municipality of Durham, in the Province of Ontario;

(ii) possess, transfer, use, package, manage and store the nuclear substances that are required for, associated with, or arise from the activities described in (i);

(iii) import and export nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i);

(iv) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i);

(v) possess, transfer, process, package, manage and store the nuclear substances associated with the operation of the Darlington Tritium Removal Facility;

(vi) produce, possess, transfer, use, package, manage and store nuclear substances that are required for, associated with, or arise from the activities associated with operations of the Darlington Nuclear Generating station and activities described in (i) associated with production of:

(1) Co-60; and
(2) Y-90, Mo-99 and Lu-177

including the associated decay radionuclides.

V) EXPLANATORY NOTES:

(i) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.

(ii) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and associated Regulations.

(iii) The Darlington NGS Licence Conditions Handbook (LCH) provides compliance verification criteria including the Canadian standards and regulatory documents used to verify compliance with the conditions in the licence. The LCH also provides information regarding delegation of authority, applicable versions of documents and non-mandatory recommendations and guidance on how to achieve compliance.

VI) CONDITIONS:

G. General

G.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

(i) the regulatory requirements set out in the applicable laws and regulations
(ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence
(iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC, hereinafter "the Commission").

G.2 The licensee shall give notification of changes to the facility's safety and control measures that impact the licensing basis.

G.3 The licensee shall control the use and occupation of any land within the exclusion zone.

G.4 The licensee shall provide, at the nuclear facility and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of that nuclear facility (onsite Commission staff).

G.5 The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.6 The licensee shall implement and maintain a public information and disclosure program.

G.7 The licensee shall implement and maintain an Indigenous engagement program.

1. Management System

1.1 The licensee shall implement and maintain a management system.

2. Human Performance Management

2.1 The licensee shall implement and maintain a human performance program.

2.2 The licensee shall implement and maintain the minimum shift complement and control room staffing.

2.3 The licensee shall implement and maintain training programs for workers.

2.4 The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2.

Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030.

Persons appointed to the following positions require certification:

(i) Responsible Health Physicist;
(ii) Shift Manager;
(iii) Control Room Shift Supervisor;
(iv) Authorized Nuclear Operator; and
(v) Unit 0 Control Room Operator.

3. Operating Performance

3.1 The licensee shall implement and maintain an operations program, which includes a set of operating limits.

3.2 The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or prior written consent of a person authorized by the Commission.

3.3 The licensee shall notify and report in accordance with CNSC regulatory document REGDOC-3.1.1 Reporting Requirements: Nuclear Power Plants.

3.4 The licensee shall conduct and submit, results of a periodic safety review at least every 10 years.

4. Safety Analysis

4.1 The licensee shall implement and maintain a safety analysis program.

5. Physical Design

5.1 The licensee shall implement and maintain a design program.

5.2 The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

5.3 The licensee shall implement and maintain an equipment and structure qualification program.

6. Fitness for Service

6.1 The licensee shall implement and maintain a fitness for service program.

7. Radiation Protection

7.1 The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

8. Conventional Health and Safety

8.1 The licensee shall implement and maintain a conventional health and safety program.

9. Environmental Protection

9.1 The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

10. Emergency Management and Fire Protection

10.1 The licensee shall implement and maintain an emergency preparedness program.

10.2 The licensee shall implement and maintain a fire protection program.

11. Waste Management

11.1 The licensee shall implement and maintain a waste management program.

11.2 The licensee shall implement and maintain a decommissioning plan.

12. Security

12.1 The licensee shall implement and maintain a security program.

13. Safeguards and Non-Proliferation

13.1 The licensee shall implement and maintain a safeguards program.

14. Packaging and Transport

14.1 The licensee shall implement and maintain a packaging and transport of nuclear substances program.

15. Nuclear Facility-Specific

15.1 The licensee shall implement and maintain an operations program for the Tritium Removal Facility, which includes a set of operating limits.

15.2 The licensee shall implement a return to service plan for refurbishment.

15.3 The licensee shall implement the Integrated Implementation Plan.

15.4 The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.

15.5 The licensee shall limit the activities of import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment.

15.6 The licensee shall implement and maintain an operations program for the use of the Target Delivery System to produce the radionuclides described in section IV (vi) (2).

15.7 The licensee shall implement and maintain a Co-60 operations program for the activities described in part IV of the licence.

SIGNED at OTTAWA, this 6th day of March, 2026.

_____

Pierre F. Tremblay, President
on behalf of the Canadian Nuclear Safety Commission

ONTARIO POWER GENERATION

Report

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Title:
DARLINGTON NGS INTEGRATED IMPLEMENTATION PLAN

Darlington NGS Integrated Implementation Plan

NK38-REP-03680-10185-R004

2023-06-28

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Tables

Revision Summary

Revision Number	Date	Comments
R000	2013-11-14	Initial Issue
R001	2014-10-31	General - Revised IIP to reflect feedback received following CNSC staff initial review [R-6] Section 1.0 - Added Section 1.1 CNSC Review and Assessment of the GAR and IIP Section 2.0 - Added the IIP Criteria used for the CCA and Code Gap IIP Commitments. Section 3.0 - High-level expectation of schedule has been provided. - Life Extension Model has been removed. Major Activities - Major Activities have been removed as they are identified in the respective IIP Commitment tables located in the Appendices. IIP Change Control Process - The IIP Change Control Process has been limited to a high-level description. Specific details will be described in the IIP Change Control Process document. Tables - Removed Roadmap of Items Considered in the Development of the IIP. Appendices - Appendix A identifies the Open IIP Commitments for EA, CCAs and Code Gaps. - Appendix C identifies the IIP Item Number mapping between IIP R000 and IIP R001. - Appendix D describes the Integrated Aging Management Program.
R002	2015-04-30	General Revised IIP to reflect feedback received from CNSC staff of IIP R001 [R-7]. Section 3.0 Clarified TRF work to be managed by TRF lifecycle planning Section 5.0 Removed as managed systems instruction for Change Control and Close-out of actions has been issued Appendix A Removed items completed since R001 issuance Appendix B Updated table for completed items
R003	2021-09-24	IIP was revised as per Commission Record of Decision July 18 2019 [R-8] based on CMD 19-H104.1 [R-9], 19-H104 [R-10], the OPG Clarification On The Revision To The Integrated Implementation Plan [R-11], and the Commission clarification [R-12]. The following changes were made; • The activity description for alternative means of resolution for IIP items IIP-EA 009, IIP-OI 015, IIP-OI 002, and IIP-OI 024 were revised in Appendix A. • IIP-OI 023 was deleted from Appendix A, as per Commission Record of Decision July 18, 2019 [R-8]. • The IIP completion due dates for IIP-CC 023, CC 026, and CC 034 were revised Along with the changes listed above, the following were also revised; • A new appendix: Appendix B (IIP Change Requests) was added to document the IIP Change Requests which have been accepted by the CNSC.

		• All IIP Change Requests which are documented in the new Appendix (C) were revised into Appendix A and B. • IIP Items which have been completed since the issuance of IIP R002 have been removed from Appendix A. Updated Appendix C (IIP Mapping) to reflect changes made in Appendix A.
R004	2023-06-28	IIP was revised as per Commission Record of Decision April 27 2023 [R-245] based on DEC 23-H102. The following changes were made; 1. Revised the activity description for alternative means of resolution for IIP items IIP-CC 073, CC 074 and OI 060 in Appendix A, Tables 3 & 4. 2. Added Section 1.2 to refer to a new PSR governance: "It should be noted that a new Periodic Safety Review (PSR) governance [R-246] is now in place to provide the administrative process for planning, conducting and documenting the PSR process to support the License Renewal Application (LRA) as part of the Canadian Nuclear Safety Commission (CNSC) requirement outlined in REGDOC-2.3.3 [R-247], which will result in the new set of IIPs. Additionally, the PSR governance superseded N-INS-03680-10001, *Darlington NGS Integrated Implementation Plan (IIP) Change Control and Closeout Process*, which is a compliance verification criteria document referred in the LCH [R-248] (reference NK38-CORR-00531-23887 [R-249])." 3. Updated Appendix E (Glossary) to include PSR definition: "Periodic Safety Review (PSR) is a comprehensive assessment of an existing nuclear generating station." 4. Removed Appendix B (Completed Activities) from R003, as all completed activities/tasks are being reported regularly in the IIP annual reports; As such all changes have been reflected in this new revised R004 report accordingly. 5. Updated IIP Scope Changes table in Appendix B (IIP Change Requests) to include approved scope changes IIPs-CC 073, CC 074 & OI 060. 6. Updated IIP Timely Change Request table in Appendix B (IIP Change Requests) to include approved schedule change IIP-CC 077. In addition, the date for IIP-CC 077 was revised in Appendix A, Table 3. 7. Updated Appendix F (References) to include new documents referenced in IIP report R004.

1.0 INTRODUCTION

The Darlington Nuclear Generating Station, also referred to here as Darlington, is a four-unit generating station that includes a separately housed Tritium Removal Facility (TRF). The site is located in the Municipality of Clarington, Regional Municipality of Durham, in the Province of Ontario. Darlington has operated successfully since the early 1990s and a program has been implemented to extend the life of the plant for 30 additional years.

The justification for the continued operation of Darlington following Life Extension is documented in a Global Assessment [R-1] carried out in accordance with the Canadian Nuclear Safety Commission (CNSC) Regulatory Document RD-360, “Life Extension of Nuclear Power Plants” [R-2]. The regulatory document, hereafter referred to as RD-360, requires the licensee to demonstrate that continued station operation poses no unreasonable risk to health, safety, security of the public or the environment, and will continue to conform to international obligations.

The results from the Global Assessment [R-1] demonstrated that Darlington is a safe and reliable nuclear power plant today. Implementation of the improvements, as documented here, will result in Darlington being an even safer and more reliable source of clean electrical power to the Province of Ontario for another 30 years.

Three principal activities were undertaken by OPG to systematically identify the environmental and safety enhancements that will assure ongoing safe operation for 30 additional years:

1. Environmental Assessment (EA)

   The EA is a comprehensive assessment of the potential impacts of refurbishment and continued operation on the natural environment including public safety and socio-economic considerations. The EA is focused on the impacts beyond the plant boundary. The EA determined that refurbishment and continued operation of Darlington, given the mitigations described, will not have significant adverse environmental impacts. The results of the EA are contained in the Environmental Impact Statement [R-3], the technical support documents, and the CNSC decision as documented in the CNSC’s Record of Proceedings [R-4].

2. Integrated Safety Review (ISR)

   The ISR is a systematic and comprehensive assessment of the plant design and actual condition, and of the management system used to operate and maintain the nuclear plant. The ISR enabled the determination of the reasonable and practical modifications that should be made to the plant design or the management system to further enhance future safe operation. The results of the ISR are documented in a series of reports based on established Safety Factor review topics listed in N-PROC-LE-0005 “Nuclear Refurbishment Integrated Safety Review – Darlington” [R-5].

3. Global Assessment (GA)

   The Global Assessment used the results of the EA and ISR and examined them in an integrated manner. It assessed the strengths, opportunities for improvement, and actions to address the opportunities for improvement, in order to provide an overall judgment on the acceptability of the risk arising from continued operation. The GA further assessed the adequacy, and implementation timing of the actions arising from the EA and ISR that are identified to extend the life of the plant.

The Integrated Implementation Plan (IIP) presents the scope and schedule for the implementation of actions identified through the ISR and the EA.

1.1 CNSC Review and Assessment of the GAR and IIP

Canadian Nuclear Safety Commission (CNSC) staff completed their review and assessment of OPG's submission of the Global Assessment Report (GAR) and Integrated Implementation Plan (IIP). As documented in the CNSC correspondence letter [R-6], OPG's GAR as submitted was acceptable to CNSC staff as it meets all applicable requirements of RD-360. CNSC staff accepted OPG's IIP Revision 001 with implementation of several required specific changes [R-7].

1.2 Periodic Safety Review (PSR) Governance

It should be noted that a new Periodic Safety Review (PSR) governance [R-246] is now in place to provide the administrative process for planning, conducting and documenting the PSR process to support the License Renewal Application (LRA) as part of the Canadian Nuclear Safety Commission (CNSC) requirement outlined in REGDOC-2.3.3 [R-247], which will result in the new set of IIPs.

Additionally, the PSR governance superseded N-INS-03680-10001, *Darlington NGS Integrated Implementation Plan (IIP) Change Control and Closeout Process*, which is a compliance verification criteria document referred in the LCH [R-248] (reference NK38-CORR-00531-23887 [R-249]).

2.0 INTEGRATED IMPLEMENTATION PLAN (IIP) SCOPE

The scope of OPG's Integrated Implementation Plan (IIP) includes:

- Mitigating measures and follow-up program activities from the Environmental Assessment (EA)
- Actions from the Integrated Safety Review:
  - Recommendations from Component Condition Assessments (CCA);
  - Actions to close gaps identified through the balance of the Integrated Safety Review (ISR) and CNSC questions; and
  - Actions resulting from the review of updates to modern ISR Codes and Standards and significant operating experience since the submission of the ISR to the end of 2013.

1. The Environmental Assessment (EA)

The scope of the IIP resulting from the EA includes the mitigation measures, the Safety Improvement Opportunities (SIO's) committed in the EA and the follow-up program elements. The mitigation measures and SIOs address potential environmental effects. The follow-up program elements are actions to confirm that the predictions of environmental effects are accurate post refurbishment, and that the mitigation measures are effective.

2. Components Condition Assessments (CCAs)

CCAs were performed on critical components to determine the condition, reliability of material and to ensure that required activities are in place to monitor the condition of the components going forward; or that components are repaired or replaced as necessary to ensure good system performance as the plant ages. The Aging and Actual Condition of SSCs Safety Factor Report presented a preliminary list of recommended actions required to allow each unit within the station to reach the end of its current life, as well as actions to be undertaken during and following the refurbishment.

Actions to address issues identified in the CCAs are included in the IIP based on the following criteria:

- Components that are part of the 58 Safety Related Systems identified in the ISR; and
- Components have high nuclear Safety Significance (Reactor Safety 1 or 2); and
- Components with a condition of less than "Good", and the activities to bring them to "Good" condition are not already part of normal station

maintenance; or

- Components rated with a condition of “Good” based solely on past performance history and no physical inspections have been done. Inspection activity is required to confirm actual physical condition of component;

Actions resulting from the CCA Recovery Project are included in the IIP if they met the criteria outlined above.

Any future CCA actions that meet the above criteria will be processed in accordance with the Aging Management Process [R-13].

3. Code Gaps

As part of the ISR, safety improvements were proposed to address gaps with respect to safety requirements identified during the review of modern codes and standards identified in N-PROC-LE-0005 [R-5]. Related gaps were consolidated into ISR Issues for prioritization and resolution. The safety significance of these ISR Issues was assessed in accordance with the Issue Prioritization Process N-INS-00770-10005 [R-14].

The code gaps have been consolidated into ISR Issues; ISR Issues with similar resolutions have been consolidated with a single action plan and completion date. TRF actions have been removed from the IIP as they will be managed by the TRF life cycle plan.

IIP scope will be monitored to completion and closed out through its own approved processes. Normal component ageing for the remaining station life will be managed in accordance with the Integrated Aging Management (IAM) Program N-PROG-MP-0008 [R-15] and executed as part of normal station practices. The IAM Program ensures that the condition of critical equipment is understood and that activities are in place to ensure the health of these components and systems while the plant ages. Elements of the IAM Program are detailed in Appendix D.

3.0 IIP SCHEDULE

The Darlington Life Extension Plan is to have:

- EA activities implemented in accordance with the EA Screening Report and EA Follow Up Program Report;
- The majority of unit specific physical work completed prior to restart of the first complete maintenance outage following the Refurbishment Outage for each respective unit;
- The majority of inspections required to confirm condition completed prior to unit restart from each respective Refurbishment Outage.
- The timing to execute contingency actions (repairs or replacements resulting from inspections) will be determined by using a graded approach:
    - Inspection results that are favourable will require no further action;
    - Inspections revealing minor degradation will require either enhanced monitoring or will be addressed by normal station practices;
    - Inspections revealing safety significant defects that would prevent unit start-up will be prioritized in alignment with the Technical Operability Evaluation Process N-PROC-MP-0045 [R-16] and corrected as required prior to unit restart of each respective Refurbishment Outage.
- The majority of safety improvements applicable to the entire station will be implemented prior to the restart from the Unit 2 Refurbishment Outage;

Specific year end completion dates have been identified for all actions in the IIP for unitized and non-unitized work, unless otherwise noted. There are cases where the activity will be completed by the restart of a unit outage rather than the year end date. These details have been provided in the ‘Date’ column of the subsequent tables.

4.0 DESCRIPTION OF APPENDICES

Appendix A – IIP Commitments

Activities identified in Appendix A are open actions which are required for Life Extension. These include:

- EA Mitigation Program Elements including SIO's (Table 1);
- EA Follow-Up Monitoring Program Elements (Table 2);
- Component Condition Assessments (Table 3);
- Code Gaps (Table 4).

Appendix B – IIP Change Requests

IIP Non-Intent Change Requests, including timely change requests and annual change requests have been referenced in Appendix B. All change requests which have been accepted by the CNSC have been incorporated into Appendix A and B.

Along with the Non-Intent changes submitted and accepted by the CNSC, the scope changes approved by the CNSC have been incorporated into IIP R004 and identified within Appendix B.

Appendix C – IIP Mapping

Appendix C identifies the mapping between the IIP Item Number in IIP R000 and IIP R001. The numbering established in R001 of the IIP remains the same in R004 of the IIP.

Appendix D – Integrated Aging Management Program

Appendix D describes the elements of the OPG equipment aging management process.

Appendix A: Open Activities

Table 1 is a summary of the activities to address the EA Mitigation Measures. Table 2 is a summary of the activities to address EA Follow-up Program Elements. The following is a brief description of the columns for both tables:

1. The ‘IIP Item Number’ column lists a unique identifier. This number remains the same as was produced in R001 of the IIP. Appendix C identifies the mapping between the IIP Item Number in IIP R000 and IIP R001.
2. The ‘Environmental Component’ column identifies the source reference(s) for the line item.
3. The ‘Mitigation Objective’ or ‘Monitoring and Follow-up Objective’ column lists the high level mitigation measure or follow-up program elements.
4. The ‘Action Plan’ column lists the proposed strategy to meet the objectives of the mitigation measures and follow-up program elements.
5. The ‘Tracking Number’ column lists the Action Request (AR) number or Darlington Scope Request (DSR) number that internally tracks each item to completion.
6. The ‘Completion Date’ column identifies the year end date in which the identified actions will be completed. ‘Refurbishment Outage’ completion dates are linked to the Refurbishment Outage restart dates and not the year end date.

Table 1: EA Mitigation Measures (Open Activities)

IIP Item Number	Environmental Component (Reference)	Mitigation Objective (In design and Additional Mitigation Measures)	Action Plan	Tracking Number	Completion Date
IIP- EA 003	Socio-Economics CNSC Screening Report – page 108, 109 and 111 (also in EIS Table 5.15) Traffic and Transportation CNSC Screening Report – page 107 (also in EIS Table 5.15)	Reduce traffic disruption during peak periods and maintain safe traffic conditions both on-site and off-site during the Refurbishment Phase.	1) Develop a Traffic Management Working Group (TMWG) Terms of Reference between the interested parties (OPG, Ministry of Transportation, Durham region and Clarington) to plan a coordinated program of road improvements to maintain safe and efficient transportation operations in the Local Study Area. Darlington Nuclear Traffic Management "Working Group" (TMWG), NK38-CORR-13110-0456325, provides the Terms of Reference (purpose, mandate, scope of activities, membership, schedule and agenda/minutes) 2) Develop and implement a Travel Demand Management (TDM) program to reduce and control DN site traffic during peak periods and to reduce disruption to the use or enjoyment of community and recreational facilities on or off the DN site. Issue a report documenting the TDM initiatives that were implemented. TDM initiatives will consider shift changes at times other than traditional peak travel periods; shuttle/transit service to DN site, and carpool incentives. 3) Perform an assessment to confirm effectiveness of traffic management and travel demand management initiatives by periodically assessing levels of service at key intersections and road links during Refurbishment phase (until Horizon 2021 which represents peak Project-related traffic conditions).	Complete [R-18] Complete [R-19] AR# 28159540-01	2014 2017 2022
IIP- EA 005	Socio-Economics CNSC Screening Report – page 110 and 111 (also in EIS Table 5.15)	Inform neighbours and the public of the refurbishment project and on-going activities of the DNGS operations.	1) Ensure activities to periodically inform the public about the progress of the Project; share information with key stakeholders regarding the timing and magnitude of the on-site labour force; and work in partnership with government and educational institutions through existing liaison mechanisms and programs, are identified in communication plans in accordance with NK38-PLAN-09701-10067 Refurbishment Program Communications Plan. Issue annual communication reports documenting the above. 2) Communicate information to the public based on level of public interest of station operations, activities, and anticipated effects on environment and the health and safety of persons. "Nuclear Public Information and Disclosure," N-STD-AS-0013 defines the on-going public and stakeholder communication program.	AR# 28159540-38 to -46 2014- 2020 report completed [R-20] AR# 28159540-38 to -46 2020 report completed [R-20]	Annually from 2014 to 2025 Annually from 2014 to 2025
IIP-EA 006	Socio-Economics CNSC Screening Report – page 110 (also in EIS Table 5.15)	Minimize disruption of recreation facilities and amenities on the DN site which includes maintaining public access to the Waterfront Trail.	1) Establish and maintain agreements with the Municipality of Clarington to ensure safe public access of the Waterfront trail that traverses the DN site. Site Plan Agreement (G14375) item #8 specifies the OPG lands set aside for the Waterfront trail and the Licensing agreement (Licence P502128) for the Waterfront trail. 2) Undertake a Recreational User Survey of DN site recreation facilities for two seasons in one year after the restart of all reactors. 3) Results of the Recreation User Survey will be reviewed as part of the DN Public Affairs program and with the Community Advisory Committee.	Complete [R-21] [R-22] AR# 28159540-03 AR# 28159540-04	2012 2026 2026

IIP Item Number	Environmental Component (Reference)	Mitigation Objective (In design and Additional Mitigation Measures)	Action Plan	Tracking Number	Completion Date
IIP-EA 009	Accidents & Malfunctions CNSC Screening Report Section 7.5.2	Implement the following design modifications as identified in Section 7.5.2 in the CNSC Screening Report through the Safety Improvements for the DNGS Refurbishment Project. Credit for these improvements were taken in the EA resulting in RC7 as the representative accident scenario: Containment Filtered Venting System (CFVS) Powerhouse Steam Venting System (PSVS) Third Emergency Power Generator (EPG) Provision of Alternate and Independent Supply of Water to Heat Transport System (Emergency Heat Sink).	Implement the following modifications: 1) A Containment Filtered Venting System (CFVS). The purpose of the CFVS is to provide controlled and filtered emergency venting of containment to prevent over-pressurization and assure containment integrity in the unlikely event of a multi-unit Severe Accident. A Severe Accident is a Beyond Design Basis Accident[1] (BDBA) that involves significant core degradation. To enhance the CFVS modification, a Shield Tank Overpressure Protection modification will be implemented. The purpose of this modification is to enhance the relief capacity of the shield tank surrounding each unit's calandria vessel to prevent shield tank catastrophic failure and to limit the containment over pressurization in the unlikely event of a multi unit Severe Accident. 2) Powerhouse Steam Venting System (PSVS) enhancements. These enhancements are related to duplication of the programmable controller logic of the current PSVS to improve the reliability of the PSVS which is an important system to protect plant systems following a steam line break. 3) A third Emergency Power Generator (EPG3). The third EPG is planned to be able to withstand a seismic event which is more demanding than the Design Basis Earthquake for which the existing two EPGs are designed, and to increase emergency power reliability when one EPG is not available. A Design Basis Earthquake is a representation of the combined effects, at the site, of a set of possible earthquakes having a very small probability of being exceeded during the life of the plant. 4) Implement a provision for alternate and independent supply of water to the Heat Transport System (HTS) by: a. Installing Emergency Mitigation Equipment (EME). b. Installing a permanent line from the Emergency Service Water (ESW) to the HTS and using recovered existing station equipment to provide for injection to the HTS[2].	Complete [R-23] Complete [R-24] Complete [R-25] Complete [R-26] Complete [R-27] Complete [R-28] Complete [R-29] Complete [R-30] DSR# SI0050-1 [R-31]	U0: 2017[3] U3: 2017 U4: 2016[3] U1: 2017[4] U2: 2019 (Refurbishment Outage Restart) U1: 2016[3] U2: 2016[3] U3: 2016[3] U4: 2016[3] U0: 2017[3] 2012 U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)

[1] A BDBA is an event with a frequency of occurrence less than 1 in 100,000 reactor years.
[2] IIP Task revised per Commission Record of Decision on July 18th, 2019 [R-8].
[3] Activity will be completed prior to U2 Refurbishment breaker-open.
[4] Activity will be completed prior to U2 Refurbishment Outage Restart (breaker-closed) and prior to bulkhead installation.

Table 2: Follow-up Program Elements (Open Activities)

IIP R001 Item Number	Environmental Component (Reference)	Monitoring and Follow-up Objective	Action Plan	Tracking Number	Completion Date
IIP-EA 012	Aquatic CNSC Draft Report – page 97, 160 and 168 (Also in EIS Table 11.6.2)	Confirm the accuracy of the predictions made in the EA concerning changes in lakewater temperatures in the vicinity of the CCW discharge, and their associated possible effects on survival rates for round whitefish embryos.	1) Obtain and review the results of an in-progress CANDU Owners Group (COG) study examining thermal effects to round whitefish eggs over the two winter seasons (2011/2012 and 2012/2013). 2) Develop a sampling plan. A Thermal Monitoring Protocol Agreement established through consultations with regulatory agencies and other stakeholders will be included in the sampling plan. The Protocol should consider the results of the COG study in establishing: • Thermal benchmark(s) for comparison of measured values. • Determination of location(s) for ambient water temperature monitoring; and • Temperature thresholds that would trigger adaptive management response (e.g., increased thermal monitoring). 3) Implement annual ambient water temperature monitoring. 4) Conduct thermal monitoring during Refurbishment outage. 5) Report monitoring data collected during Refurbishment outage and assess likely effects on the survival of round white fish embryos. If the performance threshold is exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects. 6) Conduct thermal monitoring after restart of all reactors (i.e. Continued Operation phase). 7) Report monitoring data collected during Continued Operation phase and assess likely effects on the survival of round white fish embryos. If the performance threshold is exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects.	Complete [R-32] Complete [R-33] Complete [R-34] Complete [R-35] Complete [R-35] AR# 28159540-26 AR# 28159540-27	2015 2015 2016 2020 2021 2026 2027
IIP-EA 013	Aquatic CNSC Screening Report – pages 168 to 171 (Also in EIS Table 11.6.2 and “Adaptive	<u>Benthic Invertebrate Community Study</u> Determine baseline abundance and species diversity of benthic invertebrates in the vicinity of the DNGS intake. Species presence will be classified to order (or genus if possible) and will be compared to future entrainment study results. These benthic results will also be compared to near shore benthic studies conducted in	<u>Benthic Invertebrate Community Study</u> 1) Develop a sampling plan for Benthic Invertebrate Community Study in the vicinity of DNGS intake. 2) Conduct Benthic Invertebrates Community study.	Complete [R-36] Complete [R-37]	2015 2016[3]

[3] Activity will be completed prior to U2 Refurbishment breaker-open.

IIP R001 Item Number	Environmental Component (Reference)	Monitoring and Follow-up Objective	Action Plan	Tracking Number	Completion Date
	Management for Impingement and Entrainment Effects During Continued Operations of DNGS" (Discussion Draft))	2008 in the vicinity of the proposed New Nuclear at Darlington (NND) infill area. <u>Entrainment Monitoring</u> • Characterize early life stages of fish and macro invertebrates being entrained by station operation. The sampling should be conducted in a manner sufficient to reflect the diel and seasonal cycles in organism abundance within the capture zone of the intake; • Monitor at a level capable of detecting fish Species at Risk and aquatic species of conservation concern that have been identified by provincial or federal agencies. Sampling should target species based on life history characteristics and potential for interaction with station operation; and, • Determine the total fish and macro invertebrate losses and associated impact. <u>Impingement and Entrainment</u> • Characterize early life stages of fish and macro invertebrates being entrained and fish impinged by station operation. The sampling should be conducted in a manner sufficient to reflect the deil and seasonal cycles in organism abundance within the capture zone of the intake; • Monitor at a level capable of detecting fish Species at Risk and aquatic species of conservation concern that have been identified by provincial or federal agencies. Sampling should target species based on life history characteristics and potential for interaction with station operation; and, • Determine the total fish and macro invertebrate losses and associated impact.	3) Document and report findings including a comparison to the 2008 study in the vicinity of NND. <u>Entrainment Monitoring</u> 1) Develop a sampling plan which includes entrainment sampling methodology. The selected methodology will consider methodologies from other jurisdictions. Sampling plan should include development of performance threshold(s) for impingement and entrainment (i.e. unacceptable levels of impingement and entrainment losses especially in reference to Species at Risk and aquatic species of conservation concern) through consultations with regulatory agencies and other stakeholders. 2) Using the methodology developed from activity 1), conduct entrainment study prior to start of the refurbishment outage. 3) Document and report findings. <u>Impingement and Entrainment</u> 1) Prepare sampling plan for impingement and entrainment. 2) Conduct impingement and entrainment monitoring according to the sampling plan. 3) Document and report findings. If the performance threshold(s) are exceeded, review available mitigation options to determine if additional technically and economically feasible opportunities are available to further reduce the potential for effects (see Section 3.3).	Complete [R-38] Complete [R-36] Complete [R-37] Complete [R-39] AR# 28159540-34 AR# 28159540-35 AR# 28159540-36	2016 2015 2016[3] 2016 2025 2027 2027

[3] Activity will be completed prior to U2 Refurbishment breaker-open.

IIP R001 Item Number	Environmental Component (Reference)	Monitoring and Follow-up Objective	Action Plan	Tracking Number	Completion Date
IIP-EA 014	Malfunction and Accidents CNSC Screening Report – page 169	Update the station PRA to confirm that the assignment of probabilities appropriately represent the SIO changes. This will take place after the station design has been finalized, all the design changes with supporting Safety Analysis and procedural documents (e.g., Emergency Operating Procedures, Abnormal Incident Manual) and the plant modifications are declared Available for Service (AFS) are complete prior to bringing the refurbished units back on-line. The PRA will be updated and reported to the CNSC as per S-294 requirements.	1) Provide the SIO implementation status update prior to the restart of each the refurbished units. 2) Once all of the refurbished units are back on-line, update the PRA to reflect the plant changes in all units. A review of the PRA results will be completed to confirm that the event frequencies predicted in the EA based on conceptual design features are consistent with the installed equipment.	Complete [R-40] AR# 28159540-10,-11,-12 AR# 28159540-13	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart) 2026

Table 3 provides a summary of the activities to address CCAs in support of the ISR. The activities are categorized based on whether they were identified based on input from the Major Components Program [R-41] or from the ISR System Reviews which is documented in the Aging and Actual Condition of SSCs Safety Factor Report [R-42]. The following is a brief description of the columns in the table:

1. The 'IIP Item Number' column lists a unique identifier. This number remains the same as was produced in R001 of the IIP. Appendix C identifies the mapping between the IIP Item Number in IIP R000 and IIP R001.
2. The "CCA" column lists a sequential CCA number, if applicable, for the Commodity Group included in a particular system.
3. The "System" column lists the applicable system.
4. The "Description" column lists the name of the Commodity Group (e.g. Vault Coolers). This is the generic name for components in a Commodity Group.
5. The "Condition" column lists the overall condition of components in each Commodity Group, if applicable. The condition is ranked "Very Good", "Good", "Satisfactory", "Poor" or "Very Poor" in accordance with Section 1.10.6.2 of N-PROC-MP-0060 [R-13].

Condition Classification	Criteria
Very Good	a) The component meets all functional design requirements, with no reduction in operating margin and exhibits no apparent degradation, i.e., is in "like new" condition, **and** b) The ageing management practices have been optimized to ensure the component remains in a "like new" condition.
Good	a) The component meets all its functional design requirements, with only a slight reduction in operating margins. Some slight ageing degradation is evident, **or** b) The ageing management practices are adequate but have not been optimized to ensure that the component remains in "like new" condition.
Satisfactory	a) The component still meets all its functional design requirements, but operating margins are significantly eroded. This can be attributed to evidence of significant ageing degradation, **or** b) The ageing management practices are ineffective in only one area and should be reviewed and/or changed.
Poor	a) The component can only marginally meet its functional design requirements and has lost all its operating margin. Severe aging degradation is evident, **or** b) The ageing management practices are ineffective in a number of areas and need to be revised.
Very Poor	a) The component cannot meet one or more of its functional design requirements The component needs immediate or near term maintenance, repair and/or replacement to restore its condition, **or** b) The current ageing management practices are completely ineffective and need revision.

6. The "Activity Description" column identifies the required activities to resolve the issues or recommendations. A detailed assessment of adequacy of these activities to address the identified degradation by the CCAs was performed as part of the Global Assessment.
7. The "DSR#" column identifies the tracking number originating from the Darlington Scope Request (DSR) Database in accordance with NK38-INS-09701-10001 [R-43].
8. The "Date" column either identifies the end year or the unit restart date in which the IIP item will be completed. A date for each affected unit is provided, if applicable.

Table 3: CCAs (Open Activities)

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 001	N/A	N/A	Shutdown Cooling Pumps	N/A	Install two Shutdown Cooling (SDC) "Auxiliary" pumps which are physically separate and of diverse design than the existing SDC pumps.	Complete [R-44] TS0500-1	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 002	N/A	Major Components Program	Feeders	N/A	Replace Feeders	Complete [R-45] TS0010-4	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 003	N/A	Major Components Program	Fuel Channels	N/A	Replace Fuel Channels	Complete [R-46] TS0010-4	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 004	N/A	Major Components Program	Calandria Tubes	N/A	Replace Calandria Tubes	Complete [R-47] TS0010-4	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 005	N/A	Major Components Program	End Fittings	N/A	Replace End Fittings	Complete [R-48] TS0010-4	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 006	N/A	Major Components Program	Calandria	N/A	Conduct an internal inspection of the calandria	Complete [R-49] TS0010-4	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 007	N/A	Major Components Program	Lattice Tubes	N/A	Perform visual inspection of all Lattice Tubes for leaks	Complete [R-50] TS0010-4	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 009	49	Class II Power System, USI# 50320, System #: 0011	Distribution Bus	Satisfactory	Clean and test MCC (three 120/208Vac buses per unit) per NK38-CMP-53307-03.	Complete [R-51] TS0540-1	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 010	3244	Class IV Power System, USI# 50340, System #: 0013	Transformers, 4 kV (10MVA) (silicone)	Poor	Complete the tapchanger bypass modification on 0-53240-T59 and 0-53240-T60.	Complete [R-52] TS0560-6	U0: 2019 U0: 2022
IIP-CC 018	339	Emergency Filtered Air Discharge System , USI# 73750, System #: 0019	Moisture element	Satisfactory	Replace 4 moisture probes and transmitters for EFADS.	TS0160-6	U0: 2023
IIP-CC 019	2071	Emergency Filtered Air Discharge System , USI# 73750, System #: 0019	Rad Monitor computer and peripherals.	Satisfactory	Replace EFADS computer and associated components.	TS0160-8	U0: 2023
IIP-CC 020	3524	Emergency Power Generators System, USI# 49200, System #: 0020	Gas Producer / Power Turbine Unit	Poor	Replace EPG 1 and EPG2 degraded Gas Generator.	TS0480-1	U0: 2021 (EPG2) U0: 2023 (EPG1)
IIP-CC 021	2090	Emergency Service Water System, USI# 72800, System #: 0022	Butterfly and Ball MOV (EQ)	Satisfactory	Replace valve body on 0-72800-MV29, MV30, MV34, & MV35. Overhaul actuator on 0-72800-MV29, MV30, MV34, & MV35 and overhaul PAWCS HX1 ESW Supply Valve 0-72800-MV168, based on inspection results.	Complete [R-53] TS0180-7	Replace U0: 2015 Overhaul U0: 2024 (U2 Planned Outage Restart)
IIP-CC 025	2253	Miscellaneous Air Conditioning System, USI# 73940, System #: 0040	Air Conditioning Unit (RS)	Satisfactory	Replace the entire ACU.	TS0710-7	U012/U034/U1-U4: 2024 (U2 Planned Outage Restart)
IIP-CC 028	13	Moderator and Auxiliary Systems, USI# 32000, System #: 0042	Velan Swing Check Valves	Satisfactory	Overhaul X-32110-NV3/4/9/10/23/24/28 with new seat and disk material. Replace X-32210-NV112 in all units.	Complete [R-54] TS1450-1 TS1450-2	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 029	23	Moderator and Auxiliary Systems, USI# 32000, System #: 0042	Manual Valves	Satisfactory	Replace the following isolating valves: 1/2/3/4-63253-V52 V53 and 1/2/3/4-32110-V5, V6, V21, V22, V25, V26, and 1/2/3/4-32110-MV1, MV2, MV7, MV8, MV11, MV12, MV31, MV32	Complete [R-55] TS1070-3	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 031	449	Negative Pressure Containment System, USI# 34200, System #: 0044	Radiation Detector and Monitor	Satisfactory	Replace activity monitors.	TS0210-9	U012/U034/U1-U4: 2024 (U2 Planned Outage Restart)

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 033	2526	Powerhouse Ventilation System, USI# 73220, System #: 0050	Air Cooling Units - R/S	Satisfactory	Replace 0-73260-ACU5 to 16, 1,2,3,4-73220-ACU2 to 10, ACU17 to 22.	TS0700-2 Complete [R-56][R-57] Complete [R-58] TS0700-2	U0: 2024 (U2 Planned Outage Restart) U3: 2018 U4: 2019 U1: 2021 U2: 2024 (Each Unit Planned Outage Restart)
IIP-CC 034	2527	Powerhouse Ventilation System, USI# 73220, System #: 0050	Fire Damper (FDP)-R/S	Satisfactory	Test required fire dampers and replace as necessary.	TS0700-3 TS0700-10	U012/U034: December 15, 2023[2,5]
IIP-CC 035	2459	Powerhouse Ventilation System, USI# 73220, System #: 0051	Pneumatic Operator (PO)-R/S	Poor	Refurbish Power Operators[6]	TS1240-1	U2: 2024 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart)
IIP-CC 037	1198	PHT and Auxiliaries System, USI# 33100, System #: 0053	Main HT Pump Trip Pressure Switches	Satisfactory	Replace the cable associated with PHT trip pressure switches and perform any corrective maintenance for switch modules and pressure switches in all units.	Complete [R-59] TS0090-7	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 039	1148	PHT and Auxiliaries System, USI# 33100, System #: 0053	Main HT Pumps	Good	Inspect 2-33120-P3 and fix the gasket leaks. Repair gasket leaks on 1-33120-P2. Inspect one Unit 3 pump and repair/replace if required.	Complete [R-60] TS0090-1 TS0090-12	U2: 2019 U3: 2023 U1: 2025 (Each Unit Refurbishment Outage Restart)
IIP-CC 040	1149	PHT and Auxiliaries System, USI# 33100, System #: 0053	Main HT Pump Motors & Heaters	Satisfactory	Replace all PHT pump motors.	TS0320-1	U2: 2022 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart)
IIP-CC 043	490	Radiation Monitors and Samplers System, USI# 67989, System #: 0057	Noble Gas Monitor, Iodine Monitor, Particulate Monitor	Satisfactory	Replace computers and modicons for the stack monitor system.	TS0740-4	U012/U034/U0-U4: 2023
IIP-CC 044	3490	Radiation Monitors and Samplers System, USI# 67989, System #: 0057	Tritium Oxide Collectors	Satisfactory	Replace Labserco Tritium collectors on all affected stacks.	TS0740-1	U012/U034/U0-U4: 2023

[2] IIP Task revised per Commission Record of Decision on July 18th, 2019 [R-8].
[5] If safety significant defects are found as a result of inspections, they will be corrected by the date specified.
[6] The majority (more than 70%) of the Power Operators (POs) will be refurbished prior to 2022 as online work. However, some areas may require an outage so a full unit outage cycle is required to ensure 100% completion of the work. The IIP committed completion date should be viewed as the latest possible completion date. Continuous monitoring of PO failures is done through safety related system tests (functional and stroke tests twice per year), as well as walk downs by the system responsible engineer. It should be noted that there have not been a significant number of PO failures so far that have caused system unavailability.

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 045	3493	Radiation Monitors and Samplers System, USI# 67978, System #: 0057	Rate meter	Poor	Replace Liquid Effluent Monitoring System[7].	TS0740-2	U0: 2023
IIP-CC 046	2192	Reactor Vault and Fuelling Duct Atmosphere Cooling System, USI# 73720, System #: 0060	Vault Coolers (RS)	Satisfactory	Replace coils (like-for-like).	Complete [R-61] TS0280-1	U2: 2019 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 047	2193	Reactor Vault and Fuelling Duct Atmosphere Cooling System, USI# 73720, System #: 0060	Temperature Controllers, Vault Coolers (RS)	Satisfactory	Replace all 16 Temperature Controllers. (4 per unit).	TS0880-21 U3 Complete [R-62]	U1-U4: 2023
IIP-CC 050	1467	Shutdown Cooling System, USI# 33410, System #: 0067	Motor Operated Valves	Satisfactory	-Inspect 5 representative MOVs on U2. Inspect 4 representative valves each in U1, U3 and U4. -Inspect MOV intergate drain lines. -Replace bellows sealed valves, 33410-MV28 MV97 in U2. -Disassemble and inspect removed valves to determine path forward for remaining Units. -Provide an inspection and rehab strategy prior to and after inspections are complete in Unit 2.	Complete [R-63][R-64] [R-65] TS0110-2 TS0110-13	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 051	1471	Shutdown Cooling System, USI# 33410, System #: 0067	Manual Valves	Poor	Complete an engineering assessment of manual valves to determine if repacking is required. Repack the SDC manual valves as required[8].	Complete [R-66][R-67] TS0110-8	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 052	3439 3440 3441 3442 3444	Shutdown System Computer Hardware System, USI# 68240, System #: 0068	SDS1 GA Computers	Satisfactory	Design and Replace SDS1 Trip Computer and the Display / Test Computer.	Complete [R-68] TS0350-5 TS0350-7	U2: 2022 (Planned Outage Restart) U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)

[7] Poor condition is based on past frequent battery failures along with other maintenance issues including decay of source, electronic component degradation and obsolescence issues. Risk Mitigation Strategy: A bridging strategy to find a suitable replacement for the computer backup battery has been completed. The batteries have been sourced and installed. Maintenance practices to ensure condition of the rate meter does not degrade prior to monitoring system replacement include periodic calibration and prompt repair/replacement if required.

[8] The valves are scheduled for replacement during the refurbishment outage because that is the only time that the shutdown cooling system can be taken out of service safely. Risk Mitigation Strategy: Because the valves are only required for maintenance they are operated infrequently and as a result the risk of failure is minimized. There are also alternatives available for isolating portions of the SDC system if one of the manual valves fails.

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 053	779	Shutdown System Process System, USI# 68200, System #: 0069	Element, Flow	Satisfactory	Conduct design review to select/modify the flow element prior to refurbishment. Replace SDS1 Flow Elements.	Complete [R-69][R-70] TS0010-4	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 054	2789	Shutdown System Process System, USI# 68200, System #: 0069	S/A Clutch Power Supply	Satisfactory	Replace Shutoff Rod Clutch Power Supplies on all Units	Complete [R-71] Complete [R-72] TS0240-2 Complete [R-73]	U2: 2022 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart)
IIP-CC 055	3446 3447 3449 3450 3451 3455 3456	Shutdown System Computer Hardware System, USI# 68340, System #: 0070	SDS2 GA Computers	Satisfactory	Design and replace the SDS2 Trip Computer and the Display / Test Computer.	Complete [R-74] TS0350-6 TS0350-8	U2: 2022 (Planned Outage Restart) U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 056	853	Shutdown System Process System, USI# 68300, System #: 0071	Poison Tank Ball Position Level Alarm	Satisfactory	Replace LISS poison tank ball position level alarm system.	Complete [R-75] TS0260-3	U4: 2019 U1: 2021 U2: 2024 U3: 2025 (Each Unit Planned Outage Restart)
IIP-CC 057	861	Shutdown System Process System, USI# 68300, System #: 0071	Element, Flow	Satisfactory	Conduct design review to select/modify the flow element prior to refurbishment. Replace SDS2 Flow Elements.	Complete [R-69][R-76] TS0010-4	U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart)
IIP-CC 059	3525	Standby Generators System, USI# 49100, System #: 0073	Standby Generator Building	Satisfactory	Perform an inspection for Standby Generator complex. Perform required repairs.	Complete [R-77] TS1590-2	U0: 2018 U0: 2024 (U2 Planned Outage Restart)
IIP-CC 060	76	Structures - Reactor Building and Fueling Facilities, USI# 21000, System #: 0080	Reactor Building Structure	Satisfactory	Perform required inspections for Reactor Building Structure. Perform required repairs.	Complete [R-78] TS0510-16	U014: 2018 U014: 2024 (U2 Planned Outage Restart)

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 061	77	Structures - Reactor Building and Fueling Facilities, USI# 21000, System #: 0080	Reactor Building Internal Structure	Satisfactory	Perform inspections for the Reactor Building Internal Structures. Perform required repairs.	Complete [R-79] TS0510-17	U014: 2018 U014: 2024 (U2 Planned Outage Restart)
IIP-CC 062	78	Structures - Reactor Building and Fueling Facilities, USI# 21000, System #: 0080	Reactor Auxiliary Bay including structural and architectural elements	Good	Perform inspections for the civil structures located in the Reactor Auxiliary Bay (RAB). Perform required repairs.	Complete [R-80] TS0510-18	U014: 2018 U014: 2024 (U2 Planned Outage Restart)
IIP-CC 063	79	Structures - Reactor Building and Fueling Facilities, USI# 21000, System #: 0080	FFAA - West & East	Good	Perform required inspections for the civil structures located in Fuelling Facilities Auxiliary Areas (FFAA). Perform required repairs.	Complete [R-81] TS0510-25	U012/U034: 2018 U012/U034: 2024 (U2 Planned Outage Restart)
IIP-CC 064	80	Structures - Reactor Building and Fueling Facilities, USI# 21000, System #: 0080	Irradiated Fuel Area	Satisfactory	Perform required inspections for irradiated fuel area. Perform required repairs.	Complete [R-82] TS0510-28	U014: 2018 U014: 2024 (U2 Planned Outage Restart)
IIP-CC 065	81	Structures - Reactor Building and Fueling Facilities, USI# 21000, System #: 0080	Fuel Handling & Service Area	Good	Perform required inspections for fuel handling and service area. Perform required repairs.	Complete [R-83] TS0510-29	U012/U034: 2018 U012/U034: 2024 (U2 Planned Outage Restart)
IIP-CC 067	84	Structures - Powerhouse System, USI# 22000, System #: 0081	Turbine Hall & Turbine Auxiliary Bay civil/ structural elements	Good	Perform required inspections for turbine hall and turbine auxiliary bay. Perform required repairs.	Complete [R-84] TS0510-26	U014: 2018 U014: 2024 (U2 Planned Outage Restart)
IIP-CC 069	86	Structures - Powerhouse System, USI# 22000, System #: 0081	Central Control Area	Good	Perform inspection of civil structures located in the central control area. Perform required repairs.	Complete [R-85] TS0510-30	U0: 2018 U0: 2024 (U2 Planned Outage Restart)
IIP-CC 071	90	Circulating Water Systems System, USI# 27100, System #: 0083	Pumphouse	Good	Perform required inspections on Pumphouse Structures. Perform required repairs.	Complete [R-85] TS0510-22	U0: 2018 U0: 2024 (U2 Planned Outage Restart)
IIP-CC 072	94	Emergency Power System & Emergency Service Water Complex System, USI# 28300, System #: 0084	EPS Buildings Including EPS, EPG, ESW and EPS Fuel Management	Good	Perform required inspections on EPS Buildings, including EPS, EPG, ESW and EPS Fuel Management Structures. Perform required repairs.	Complete [R-86] TS0510-24	U0: 2018 U0: 2024 (U2 Planned Outage Restart)

IIP R001 Item Number	CCA	System	Description	Condition	Activity Description	DSR#	Date
IIP-CC 073	2712	Fuel Handling Trolley System, USI# 35700, System #: 0206	Cable-Power-Harsh-Trolley-I&C	Satisfactory	Perform a visual inspection and megger testing on cables and connections and send power cable sample for analysis. Change the power cables as required based on results of inspection. Replace catenary power cables as required based on inspection, sample testing and analysis.	Complete [R-88] TS0430-6 TS0430-18	U0: 2019[5] (U2 Refurbishment Outage Restart) U0: 2025 U0: 2025
IIP-CC 074	2713	Fuel Handling Trolley System, USI# 35700, System #: 0206	Cable-Signal-Harsh-Trolley-I&C	Satisfactory	Perform a visual inspection and megger testing on the signal cables and connections and send sample for analysis. Change the signal cables as required based on results of inspection. Replace catenary signal cables as required based on inspection, sample testing and analysis.	Complete [R-88] TS0430-7 TS0430-19	U0: 2019[5] (U2 Refurbishment Outage Restart) U0: 2025 U0: 2025
IIP-CC 077	2685	Fuel Machine Head System, USI# 35210, System #: 0208	Homing & Locking (Snout) Assembly	Satisfactory	Replace manifolds for fine homing and gap sensing on all fuel machine heads.	TS0450-9	U0/U012/U034: 2028

[5] If safety significant defects are found as a result of inspections, they will be corrected by the date specified.

Table 4 provides a summary of the activities to address the Code Gaps resulting from the ISR and CNSC comments. The following is a brief description of the columns in the table:

1. The 'IIP Item Number' column lists a unique identifier. This number remains the same as was produced in R001 of the IIP. Appendix C identifies the mapping between the IIP Item Number in IIP R000 and IIP R001.
2. The "Issue Number and Title" column lists the following:
    a. Issue Number assigned by the ISR Gap Resolution Process N-INS-00770-10004 [R-89].
    b. Title of the ISR Issue including the PROL (Power Regulator Operating License) and non-PROL Code(s) and Standard (s) in which the ISR Issue was discovered.
3. The "Issue Description" column lists a high level description of the ISR Issue.
4. The "Action Plan" column includes a description of the required activities to address the ISR Issue. A detailed assessment of adequacy of these activities to address the identified issues at a gap level was performed as part of the Global Assessment.
5. The "Tracking #" column identifies the DSR tracking number originating from the Darlington Scope Request (DSR) Database in accordance with NK38-INS-09701-10001 [R-43] or the OPG internal Action Request (AR) number, or CNSC Action Item (AI) Number.
6. The "Date" column either identifies the end year or the unit restart date in which the IIP item will be completed. A date for each affected unit is provided, if applicable.

Table 4: Code Gaps (Open Activities)

IIP Item Number	Issue Number & Title	Issue Description	Action Plan	Tracking #	Date
IIP-OI 002	D045 – Fire Suppression (CSA N293-07 “Fire Protection for CANDU Nuclear Power Plants”)	The design criteria used for the existing fire suppression and extinguishing systems do not meet some of the modern design standards referenced in CSA-N293-07. Design requirements in modern codes are typically grandfathered for existing facilities however they are being re-evaluated as part of the Darlington Refurbishment. Upon completion of analysis it has been determined that there are 2 areas where corrective actions are required for refurbishment. Outdoor transformer protection and the fire loading in Central Services Area (CSA) storage area.	Additional Analysis complete and has resulted in the following two corrective actions: 1) Outdoor Transformer Protection • To prevent a Main Output Transformer (MOT) fire from damaging the Powerhouse wall or spreading fire into the Unit 0 lunchroom, the existing containment dikes in each unit will be covered by sprinklers to reduce the risk of fire spread[2]. • To prevent against a potential Unit Service Transformer or System Service Transformer fire from damaging the Powerhouse wall, the associated containment dikes will be covered by sprinklers to reduce the risk of fire spread[2].[12] 2) CSA Stores Sprinkler System Commodity Storage To avoid over taxing the existing CSA Stores Sprinkler systems in S-119 and S-219 the plastic storage bins will be removed and replaced with metal wire baskets or steel drawers.	Complete [R-91] IP1220-2 IP1470-1 Complete [R-92]	Additional Analysis 2016 U2: 2024 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart) U2: 2019 (U2 Refurbishment Outage Restart)
IIP-OI 018	D428 – Detection of Significant Fire Hazards (CSA N293-07 “Fire Protection for CANDU Nuclear Power Plants”)	Significant Fires need to be quickly detected.	1) Develop a justification for all screen 2 and 3 rooms which do not have automatic detection installed. 2) Install automatic Fire detection in rooms with Major Fire hazard rooms as identified in the FHA table 4-1.1 In NK38-REP-78000-10002 R001. 3) Install detection in high Fire hazard rooms Rx-109 and Rx-121.	Complete [R-93] IP1280-1 IP1280-1	Justification: 2016 Modifications: U0-U4: 2024 (U2 Planned Outage Restart)

[2] IIP Task revised per Commission Record of Decision on July 18th, 2019 [R-8].

IIP Item Number	Issue Number & Title	Issue Description	Action Plan	Tracking #	Date
IIP-OI 024	D444 – Fire Stopping (CSA N293-07 “Fire Protection for CANDU Nuclear Power Plants”)	A material used for fire-stopping (Sikaflex) at the Darlington Nuclear Generating Station does not meet acceptance criteria outlined in Clause 3.1.5.2 of the NBCC for use in a building of non-combustible construction.	Perform a review of penetration seals larger than a single cable, a single tube, or 13 mm wide construction joint seal, in required fire separations, to confirm that listed fire stopping materials are used. Replace or confirm unlisted materials meet the intent of the applicable fire protection codes and standards[2]	Complete [R-94] Complete [R-95] IP1220-3	Review and replacement: U0: 2019 (U2 Refurbishment Outage Restart) U2: 2024 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart)
IIP-OI 030	D475 – Valves Controlling Water Supplies (NFPA-24-2007 “Standard for the Installation of Private Service Mains and Their Appurtenances”, NFPA-20-2007 “Standard for the Installation of Stationary Pumps for Fire Protection”)	This issue is related to the requirements for valves controlling Fire Protection Water supplies.	Complete the following actions related to Valves Controlling Water Supplies: -Test all private fire service main control valves to confirm operability. -Replace the unlisted hose valves downstream of the fire pumps with listed devices that will have an appropriate pressure rating or implement an alternate compliance. -Disconnect the cross connection between ASW and Fire Protection Water on Elevation 107.5.	Complete[R-96] Complete [R-97][R-98] IP1220-14	Tests: 2016 Modifications/Repairs: U0: 2019 (U2 Refurbishment Outage Restart) U2: 2024 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart)
IIP-OI 034	D260 – Human Factors - Annunciation Improvements (NUREG 0700 “Human-System Interface Design Review Guidelines & IAEA NS-R-1 “Safety of Nuclear Power Plants: Design”)	An assessment was performed on the human-machine interface for the Emergency Coolant Injection system and the Annunciation system. Two areas for improvement were identified: 1. Improve annunciation conditioning capability to reduce the number of nuisance alarms in the annunciation system to minimize operator distraction. 2. Improve the control scheme for the annunciation acknowledge function.	OPG has already completed the work committed in D260 to reduce nuisance alarms. Nuisance alarms associated with shutdown, start-up, and turbine trip have been reduced by 85% and current levels are acceptable to operations and human factors engineering. This meets the intent of the first area for improvement identified in D260. The second area for improvement in D260 is in the control scheme for acknowledging annunciations in the control room. The current state is acceptable however some improvements will be made to further reduce the potential for error in acknowledging annunciations.	IP0430-2	U1: 2021 U2: 2024 U3: 2025 U4: 2028 (Each Unit Planned Outage Restart)

[2] IIP Task revised per Commission Record of Decision on July 18th, 2019 [R-8].

IIP Item Number	Issue Number & Title	Issue Description	Action Plan	Tracking #	Date
IIP-OI 035	D027 - Severe Accident and Beyond Design Basis Accident (BDBA) Analysis/ SAMG (IAEA NS-G-1.2 “Safety Assessment and Verification For Nuclear Power Plants”)	A systematic analysis of BDBA and Severe Accidents is required and Severe Accident Management Guidelines must be fully implemented.	-Implement the Safety Improvement Opportunities (SIOs) resulting from the Environmental Assessment. -Complete the Reg Doc 2.4.1 Compliance Activities. -Complete the remaining SAMG activities which involve enhancements to the suite of guidelines.	SIO’s: Refer to IIP-EA 009 AI 2014-OPG-5461 Complete [R-99]	SIO’s: Refer to IIP-EA 009 Reg Doc 2.4.1: 2024 SAMG: 2015
IIP-OI 036	D068 - Severe Accident and Beyond Design Basis Accident (BDBA) Design/ SAMG (IAEA NS-R-1 “Safety of Nuclear Power Plants: Design” & CNSC RD-337 “Design of New Nuclear Power Plants”)	The scope of this ISR issue covers the design requirements of the plant with respect to its capability to safely respond to Beyond Design Basis Accidents (BDBA) and Severe Accidents, and that will reduce any impact to the plant, during and after the accident. Although the clauses specify aspects of the design of a nuclear power plant, all of these Integrated Safety Review (ISR) gaps were declared because a Severe Accident Management Guidelines (SAMG) program has not been fully implemented at Darlington.	-Implement the Safety Improvement Opportunities (SIOs) resulting from the Environmental Assessment. -Complete the remaining SAMG activities which involve enhancements to the suite of guidelines. -Address equipment and instrument survivability under Severe Accident conditions. -Install Passive Autocatalytic Re-combiners (PARS) in all 4 Units at Darlington.	SIO’s: Refer to IIP-EA 009 Complete [R-99] Complete [R-100] Complete [R-101]	SIO’s: Refer to IIP-EA 009 SAMG: 2015 Instrument Survivability PARS: 2015
IIP-OI 037	D143 - Severe Accident and Beyond Design Basis Accident (BDBA) Program/ SAMG (CNSC G-306 “Severe Accident Management Programs for Nuclear Reactors”)	The scope of this Integrated Safety Review (ISR) Issue includes the requirements for Severe Accident Management Guidelines (SAMG) and their implementation at Darlington.	-Implement the Safety Improvement Opportunities (SIOs) resulting from the Environmental Assessment -Complete the remaining SAMG activities which involve enhancements to the suite of guidelines. -Address equipment and instrument survivability under Severe Accident conditions.	SIO’s: Refer to IIP-EA 009 Complete [R-99] Complete [R-100]	SIO’s: Refer to IIP-EA 009 SAMG: 2015 Instrument Survivability: 2015
IIP-OI 042	N/A – Heat Transport Liquid Relief Valve water hammer	The Global Assessment performed a review of the licensing issues addressed in the Integrated Safety Review (NK38-REP-03680-10104 Appendix H). The path forward on the Heat Transport Liquid Relief Valve (HT LRV) water hammer issue resulted in a design change.	Replace the Primary Heat Transport Liquid Relief Valves (LRVs) to limit the risk of water hammer loading. Retain sections of removed piping for a metallurgical assessment following replacement of the Liquid Relief Valves (LRVs) in the first refurbished unit. Complete the metallurgical assessment and report results to CNSC.	Complete [R-102] IP0010-1 A/R 28116373-03 Complete [R-103]	Replacement: U2: 2020 U3: 2023 U1: 2025 U4: 2026 (Each Unit Refurbishment Outage Restart) Assessment: 2019

IIP Item Number	Issue Number & Title	Issue Description	Action Plan	Tracking #	Date
IIP-OI 043	D028 - Systematic Analysis of Anticipated Operational Occurrences (AOO's) D030 - Identification and Classification of Events per CNSC RD-310 D332 - Reactor Control System Requirements for Anticipated Operation Occurrences (AOOs) D346 - Environmental Qualification of Equipment for Beyond Design Basis Accident (BDBA) Analysis D399 - Acceptance Criteria for Anticipated Operational Occurrences (AOO's) D400 - Deterministic Safety Analysis Uncertainties D424 - Anticipated Operational Occurrences (AOOs)	Comply with the new requirements of CNSC Reg Doc 2.4.1	Complete the Reg Doc 2.4.1 compliance activities which includes: 1) Carrying out a comprehensive review of Event Identification and Classification 2) Performing AOO analysis 3) Performing DBA analysis 4) Associated documentation updates 5) Developing analysis rules, coordinating with other COG members, and interactions on technical matters with the CNSC	AI 2014-OPG-5461	2024
IIP-OI 056	D498 - Airflow from Zone 3 to Zone 2 Does not Meet Design Requirements(NS-G-1.13 "Radiation Protection Aspects of Design for Nuclear Power Plants")	The as-built condition of the Powerhouse Ventilation System does not meet the following requirement: "The airflow in the ventilation system should be such that the pressure in a region of lower airborne contamination is higher than the pressure in a region of potentially higher contamination. Thus the airflow in the ventilation system should be directed from regions of lower airborne contamination to regions of higher contamination and air should be extracted from the latter. The airflow should be such as to minimize the re-suspension of contamination."	Repair and return to service Units 1 and 3 supply fans and non-contaminated exhaust fans. Once returned to service in all units, conduct smoke tests to confirm inter-zonal airflow direction at the Zone 2/3 boundaries in all units.	Complete [R-104] IP1290-1	2021

IIP Item Number	Issue Number & Title	Issue Description	Action Plan	Tracking #	Date
IIP-OI 058	D502 - Foundation Steel Piling Condition Assessment for Life Extension (National Building Code of Canada (2005))	CNSC staff requested OPG to provide comprehensive site-specific assessment that can provide thorough information on the potential for pile corrosion at the Darlington site. Based on the available evidence, there is no immediate risk to the buried steel piles on the Darlington site. In addition, periodic civil structural inspections will identify the early warnings signs should there be any significant pile corrosion. As a result the safety risks associated with this IIP item are very low and no additional mitigating actions are necessary.	Evaluate options available to better characterise the corrosion of buried steel foundation piles, using conservative assumptions, to ensure that they can continue to fulfill their function for extended life. Options may include further analysis, testing, or inspections.	A/R 28175343-01	2028
IIP-OI 059	D504 – Electrical Equipment and Wiring (CSA N293-12 “Fire Protection for CANDU Nuclear Power Plants”)	Changes to the 2009 edition of the CSA C22.1 may impact protection from fire.	1) Perform a code refresh between the Canadian Electrical Code (CEC) Part 1 2006 Edition [R-105] and the 2009 edition [R-106]. 2) The code refresh concluded that there are no significant code changes that impact protection from fire. One minor modification is required: Replace the water tight conduit seals with explosion proof seals on the Heat Transport Hydrogen Addition system, units 1 to 4 -63352-FT6.	Complete [R-107] IP1460-1	Code Refresh: 2015 Modifications: U2: 2024 U3: 2025 U1: 2026 U4: 2028 (Each Unit Planned Outage Restart)
IIP-OI 060	D517 – Electrical Protections and Requirements for Fire Pump Systems (NFPA-20-2013 “Standard for the Installation of Stationary Pumps for Fire Protection”)	This issue is related to the requirements for electrical protection of Fire Pump systems. As per the code requirement, ground fault interruption should not be installed in any fire pump control or power circuit. The existing installation includes a ground fault interruption on the Fire Protection Water booster pump. Also it could not be confirmed based on the documentation if the fire pump motor terminal boxes are a listed means of connection. This issue is low risk, mitigating actions are not required since the pumps are tested monthly, have redundant power supplies and in the unlikely event that the fire booster pump in one unit is unavailable, a fire booster pump in an adjacent unit can be used.	Ensure the electrical connections at the fire pump motor terminal boxes are a listed means of connection.	IP1310-1	U0-U4: 2023

IIP Item Number	Issue Number & Title	Issue Description	Action Plan	Tracking #	Date
IIP-OI 066	D607 - Severe Accident and Beyond Design Basis Accident (BDBA) Design Severe Accident Management Guidelines (SAMG) (CSA N290.3 “Requirements for the Containment System of Nuclear Power Plants”)	CSA N290.3 requirements for new build are a Containment Filtered Venting System to protect containment integrity, Shield Tank Overpressure Protection to promote In-Vessel Retention of corium to prevent Core Concrete Interaction, and Severe Accident Management Guides to monitor hydrogen.	-Implement the Safety Improvement Opportunities (SIOs) resulting from the Environmental Assessment. -Complete the remaining SAMG activities which involve enhancements to the suite of guidelines. -Install Post Autocatalytic Re-combiners (PARS) in all 4 Units at Darlington.	SIO’s: Refer to IIP-EA 009 Complete [R-99] Complete [R-101]	SIO’s: Refer to IIP IIP-EA 009 SAMG: 2015 2015

Appendix B: IIP Change Requests

IIP Timely Change Requests

IIP Item Number	IIP Task Number	Change Request Reference	CNSC Acceptance Reference
IIP-CC 001	1	[R-191]	[R-192]
IIP-CC 002	1	[R-193]	[R-192]
IIP-CC 003	1	[R-194]	[R-192]
IIP-CC 005	1	[R-195]	[R-192]
IIP-CC 010	2	[R-196][R-197]	[R-198]
IIP-CC 020	1	[R-199]	[R-200]
IIP-CC 033	4	[R-201]	[R-202]
IIP-CC 033	6	[R-203]	[R-204]
IIP-CC 049	2	[R-205]	[R-192]
IIP-CC 050	10	[R-206]	[R-192]
IIP-CC 051	2	[R-207]	[R-192]
IIP-CC 053	2	[R-208]	[R-192]
IIP-CC 056	2	[R-209]	[R-202]
IIP-CC 057	2	[R-210]	[R-192]
IIP-EA 009	1	[R-211] [R-213]	[R-212] [R-214]
IIP-EA 009	13	[R-215]	[R-192]
IIP-EA 009	4	[R-216]	[R-217]
IIP-EA 009	10	[R-218] [R-220]	[R-219] [R-221]
IIP-EA 014	1	[R-222]	[R-192]
IIP-OI 028	1	[R-223] [R-225]	[R-224] [R-226]
IIP-OI 030	1	[R-227] [R-225]	[R-224] [R-226]
IIP-OI 034	1	[R-228]	[R-202]
IIP-OI 042	2	[R-229]	[R-192]
IIP-OI 056	2	[R-230] [R-232]	[R-231] [R-233]
IIP-CC 021	2	[R-234]	[R-235]
IIP-CC 025	1, 2, 3, 4, 5, 6	[R-234]	[R-235]
IIP-CC 031	1, 2, 3, 4, 5, 6	[R-234]	[R-235]
IIP-CC 033	1, 5	[R-234]	[R-235]
IIP-CC 035	1	[R-234]	[R-235]
IIP-CC 056	3	[R-234]	[R-235]
IIP-CC 059	2	[R-234]	[R-235]
IIP-CC 060	2	[R-234]	[R-235]
IIP-CC 061	2	[R-234]	[R-235]

IIP-CC 062	2	[R-234]	[R-235]
IIP-CC 063	3, 4	[R-234]	[R-235]
IIP-CC 064	2	[R-234]	[R-235]
IIP-CC 065	3, 4	[R-234]	[R-235]
IIP-CC 067	2	[R-234]	[R-235]
IIP-CC 069	2	[R-234]	[R-235]
IIP-CC 071	2	[R-234]	[R-235]
IIP-CC 072	2	[R-234]	[R-235]
IIP-OI 002	3	[R-234]	[R-235]
IIP-OI 018	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	[R-234]	[R-235]
IIP-OI 024	2, 7	[R-234]	[R-235]
IIP-OI 030	4	[R-234]	[R-235]
IIP-OI 034	2	[R-234]	[R-235]
IIP-OI 059	3	[R-234]	[R-235]
IIP-CC 001	2	[R-236]	[R-235]
IIP-CC 002	2	[R-236]	[R-235]
IIP-CC 003	2	[R-236]	[R-235]
IIP-CC 004	2	[R-236]	[R-235]
IIP-CC 005	2	[R-236]	[R-235]
IIP-CC 006	2	[R-236]	[R-235]
IIP-CC 007	2	[R-236]	[R-235]
IIP-CC 009	2	[R-236]	[R-235]
IIP-CC 028	3, 4	[R-236]	[R-235]
IIP-CC 029	2	[R-236]	[R-235]
IIP-CC 037	2, 6	[R-236]	[R-235]
IIP-CC 039	4, 5	[R-236]	[R-235]
IIP-CC 046	2	[R-236]	[R-235]
IIP-CC 050	3, 7	[R-236]	[R-235]
IIP-CC 051	4	[R-236]	[R-235]
IIP-CC 052	2	[R-236]	[R-235]
IIP-CC 053	3	[R-236]	[R-235]
IIP-CC 055	2	[R-236]	[R-235]
IIP-CC 057	3	[R-236]	[R-235]
IIP-EA 009	14	[R-236]	[R-235]
IIP-EA 014	2	[R-236]	[R-235]
IIP-OI 042	4	[R-236]	[R-235]
IIP-CC 001	3	[R-237]	[R-235]
IIP-CC 002	3	[R-237]	[R-235]
IIP-CC 003	3	[R-237]	[R-235]
IIP-CC 004	3	[R-237]	[R-235]
IIP-CC 005	3	[R-237]	[R-235]
IIP-CC 006	3	[R-237]	[R-235]
IIP-CC 007	3	[R-237]	[R-235]
IIP-CC 009	3	[R-237]	[R-235]
IIP-CC 028	5, 6	[R-237]	[R-235]

IIP-CC 029	3	[R-237]	[R-235]
IIP-CC 037	3, 7	[R-237]	[R-235]
IIP-CC 039	3	[R-237]	[R-235]
IIP-CC 046	3	[R-237]	[R-235]
IIP-CC 050	2, 8	[R-237]	[R-235]
IIP-CC 051	6	[R-237]	[R-235]
IIP-CC 052	3	[R-237]	[R-235]
IIP-CC 053	4	[R-237]	[R-235]
IIP-CC 055	3	[R-237]	[R-235]
IIP-CC 057	4	[R-237]	[R-235]
IIP-EA 009	15	[R-237]	[R-235]
IIP-EA 014	3	[R-237]	[R-235]
IIP-OI 042	5	[R-237]	[R-235]
IIP-CC 001	4	[R-238]	[R-235]
IIP-CC 002	4	[R-238]	[R-235]
IIP-CC 003	4	[R-238]	[R-235]
IIP-CC 004	4	[R-238]	[R-235]
IIP-CC 005	4	[R-238]	[R-235]
IIP-CC 006	4	[R-238]	[R-235]
IIP-CC 007	4	[R-238]	[R-235]
IIP-CC 009	4	[R-238]	[R-235]
IIP-CC 028	7, 8	[R-238]	[R-235]
IIP-CC 029	4	[R-238]	[R-235]
IIP-CC 037	4, 8	[R-238]	[R-235]
IIP-CC 046	4	[R-238]	[R-235]
IIP-CC 050	4, 9	[R-238]	[R-235]
IIP-CC 051	8	[R-238]	[R-235]
IIP-CC 052	4	[R-238]	[R-235]
IIP-CC 053	5	[R-238]	[R-235]
IIP-CC 055	4	[R-238]	[R-235]
IIP-CC 057	5	[R-238]	[R-235]
IIP-EA 009	16	[R-238]	[R-235]
IIP-EA 014	4	[R-238]	[R-235]
IIP-OI 042	6	[R-238]	[R-235]
IIP-CC 077	1, 2, 3	[R-251]	[R-252]

IIP Annual Change Requests

IIP Item Number	IIP Task Number	Change Request Reference	CNSC Acceptance Reference
IIP-EA 009	2	[R-239]	[R-240]
IIP-CC 020	2	[R-241][R-242]	[R-243]

IIP Scope Changes

IIP Item Number	IIP Task Number	Scope Change Reference	CNSC Acceptance Reference
IIP-EA 009	12, 13, 14, 15, 16	[R-9]	[R-8][R-12]
IIP-CC 023	1, 2, 6, 7	[R-9]	[R-8]
IIP-CC 026	1, 2	[R-9]	[R-8]
IIP-CC 034	1, 2, 3, 4	[R-9][R-244]	[R-8]
IIP-OI 002	3, 4, 5, 6	[R-9]	[R-8][R-12]
IIP-OI 015	2	[R-9]	[R-8]
IIP-OI 023	1, 2, 3, 4	[R-9]	[R-8][R-12]
IIP-OI 024	6, 7, 8, 9, 10	[R-9]	[R-8][R-12]
IIP-CC 073	3	[R-250]	[R-245]
IIP-CC 074	3	[R-250]	[R-245]
IIP-OI 060	1, 2, 3, 4, 5	[R-250]	[R-245]

Appendix C: IIP Mapping

EA IIP Items

IIP R000 Item Number	IIP R001 Item Number	Status	IIP Appendix or Reference
0003	IIP-EA 003	Open	Appendix A
0005	IIP-EA 005	Open	Appendix A
0006	IIP-EA 006	Open	Appendix A
0009	IIP-EA 009	Open	Appendix A
0012	IIP-EA 012	Open	Appendix A
0013	IIP-EA 013	Open	Appendix A
0014	IIP-EA 014	Open	Appendix A

CCA IIP Items

IIP R000 Item Number	IIP R001 Item Number	Status	IIP Appendix or Reference
0016	IIP-CC 001	Open	Appendix A
0017	IIP-CC 002	Open	Appendix A
0018	IIP-CC 003	Open	Appendix A
0019	IIP-CC 004	Open	Appendix A
0020	IIP-CC 005	Open	Appendix A
0021	IIP-CC 006	Open	Appendix A
0022	IIP-CC 007	Open	Appendix A
0023	N/A	Asset Preservation	NK38-CORR-00531-16866
0024	N/A	Asset Preservation	NK38-CORR-00531-16866
0025	N/A	Asset Preservation	NK38-CORR-00531-16866
0026	N/A	Asset Preservation	NK38-CORR-00531-16866
0027	N/A	Asset Preservation	NK38-CORR-00531-16866
0028	IIP-CC 010	Open	Appendix A
0033	N/A	Asset Preservation	NK38-CORR-00531-16866
0034	N/A	Asset Preservation	NK38-CORR-00531-16866
0036	N/A	Asset Preservation	NK38-CORR-00531-16866
0037	IIP-CC 018	Open	Appendix A
0038	N/A	Asset Preservation	NK38-CORR-00531-16866
0039	N/A	Asset Preservation	NK38-CORR-00531-16866
0040	N/A	Asset Preservation	NK38-CORR-00531-16866
0041	N/A	Asset Preservation	NK38-CORR-00531-16866
0042	IIP-CC 019	Open	Appendix A
0043	IIP-CC 020	Open	Appendix A
0044	N/A	Asset Preservation	NK38-CORR-00531-16866
0045	IIP-CC 021	Open	Appendix A
0047	N/A	Asset Preservation	NK38-CORR-00531-16866
0048	N/A	Asset Preservation	NK38-CORR-00531-16866
0049	N/A	Asset Preservation	NK38-CORR-00531-16866
0051	N/A	Asset Preservation	NK38-CORR-00531-16866
0052	IIP-CC 025	Open	Appendix A
0055	N/A	Asset Preservation	NK38-CORR-00531-16866
0056	IIP-CC 028	Open	Appendix A
0057	IIP-CC 029	Open	Appendix A
0059	IIP-CC 031	Open	Appendix A
0061	IIP-CC 033	Open	Appendix A
0062	IIP-CC 034	Open	Appendix A
0064	IIP-CC 035	Open	Appendix A
0066	IIP-CC 037	Open	Appendix A
0069	N/A	Asset Preservation	NK38-CORR-00531-16866
0070	IIP-CC 043	Open	Appendix A
0071	IIP-CC 044	Open	Appendix A
0072	IIP-CC 045	Open	Appendix A

IIP R000 Item Number	IIP R001 Item Number	Status	IIP Appendix or Reference
0073	N/A	Asset Preservation	NK38-CORR-00531-16866
0074	IIP-CC 046	Open	Appendix A
0075	IIP-CC 047	Open	Appendix A
0077	N/A	Asset Preservation	NK38-CORR-00531-16866
0078	N/A	Asset Preservation	NK38-CORR-00531-16866
0079	N/A	Asset Preservation	NK38-CORR-00531-16866
0081	IIP-CC 050	Open	Appendix A
0082	N/A	Asset Preservation	NK38-CORR-00531-16866
0083	IIP-CC 052	Open	Appendix A
0084	IIP-CC 052	Open	Appendix A
0085	IIP-CC 052	Open	Appendix A
0086	IIP-CC 052	Open	Appendix A
0087	IIP-CC 052	Open	Appendix A
0088	IIP-CC 053	Open	Appendix A
0089	N/A	Asset Preservation	NK38-CORR-00531-16866
0090	N/A	Asset Preservation	NK38-CORR-00531-16866
0091	IIP-CC 054	Open	Appendix A
0092	IIP-CC 055	Open	Appendix A
0093	IIP-CC 055	Open	Appendix A
0094	IIP-CC 055	Open	Appendix A
0095	IIP-CC 055	Open	Appendix A
0096	IIP-CC 055	Open	Appendix A
0097	IIP-CC 055	Open	Appendix A
0098	N/A	Asset Preservation	NK38-CORR-00531-16866
0099	IIP-CC 056	Open	Appendix A
0100	IIP-CC 057	Open	Appendix A
0101	N/A	Asset Preservation	NK38-CORR-00531-16866
0103	N/A	Asset Preservation	NK38-CORR-00531-16866
0104	IIP-CC 059	Open	Appendix A
0105	N/A	Asset Preservation	NK38-CORR-00531-16866
0106	IIP-CC 060	Open	Appendix A
0107	IIP-CC 061	Open	Appendix A
0108	IIP-CC 062	Open	Appendix A
0109	IIP-CC 063	Open	Appendix A
0110	IIP-CC 064	Open	Appendix A
0111	IIP-CC 065	Open	Appendix A
0113	IIP-CC 067	Open	Appendix A
0115	IIP-CC 069	Open	Appendix A
0117	IIP-CC 071	Open	Appendix A
0118	IIP-CC 072	Open	Appendix A
0119	IIP-CC 073	Open	Appendix A
0120	IIP-CC 074	Open	Appendix A
0121	N/A	Asset Preservation	NK38-CORR-00531-16866
0122	N/A	Asset Preservation	NK38-CORR-00531-16866

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New Item	IIP-CC 009	Open	Appendix A
New Item	IIP-CC 039	Open	Appendix A
New Item	IIP-CC 040	Open	Appendix A
New Item	IIP-CC 051	Open	Appendix A
New Item	IIP-CC 077	Open	Appendix A

Code Gaps IIP Items

IIP R000 Item Number	IIP R001 Item Number	Status	IIP Appendix or Reference
0132	IIP-OI 002	Open	Appendix A
0133	IIP-OI 002	Open	Appendix A
0134	IIP-OI 002	Open	Appendix A
0135	IIP-OI 002	Open	Appendix A
0136	IIP-OI 002	Open	Appendix A
0137	IIP-OI 002	Open	Appendix A
0138	IIP-OI 002	Open	Appendix A
0139	IIP-OI 002	Open	Appendix A
0140	IIP-OI 002	Open	Appendix A
0143	N/A	Asset Preservation	NK38-CORR-00531-16866
0153	IIP-OI 008	Open	Appendix A
0154	IIP-OI 008	Open	Appendix A
0165	N/A	Asset Preservation	NK38-CORR-00531-16866
0166	N/A	Asset Preservation	NK38-CORR-00531-16866
0167	N/A	Asset Preservation	NK38-CORR-00531-16866
0168	N/A	Asset Preservation	NK38-CORR-00531-16866
0173	N/A	Asset Preservation	NK38-CORR-00531-16866
0174	N/A	Asset Preservation	NK38-CORR-00531-16866
0177	N/A	Asset Preservation	NK38-CORR-00531-16866
0186	IIP-OI 018	Open	Appendix A
0187	IIP-OI 018	Open	Appendix A
0274	IIP-OI 023	Deleted	[R-8] [R-12]
0275	IIP-OI 023	Deleted	[R-8] [R-12]
0276	IIP-OI 023	Deleted	[R-8] [R-12]
0277	IIP-OI 024	Open	Appendix A
0284	N/A	Asset Preservation	NK38-CORR-00531-16866
0289	IIP-OI 020	Open	Appendix A
0290	IIP-OI 020	Open	Appendix A
0302	IIP-OI 030	Open	Appendix A
0303	IIP-OI 030	Open	Appendix A
0304	IIP-OI 030	Open	Appendix A
0305	IIP-OI 030	Open	Appendix A
0321	IIP-OI 034	Open	Appendix A
0322	IIP-OI 034	Open	Appendix A
0323	IIP-OI 034	Open	Appendix A
0324	IIP-OI 034	Open	Appendix A
0325	IIP-OI 034	Open	Appendix A
0326	IIP-OI 034	Open	Appendix A
0327	IIP-OI 034	Open	Appendix A
0328	IIP-OI 034	Open	Appendix A
0329	IIP-OI 034	Open	Appendix A
0330	IIP-OI 034	Open	Appendix A

IIP R000 Item Number	IIP R001 Item Number	Status	IIP Appendix or Reference
0331	IIP-OI 034	Open	Appendix A
0332	IIP-OI 034	Open	Appendix A
0333	IIP-OI 034	Open	Appendix A
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0350	IIP-OI 037	Open	Appendix A
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0397	IIP-OI 043	Open	Appendix A

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0407	IIP-OI 043	Open	Appendix A
0408	IIP-OI 043	Open	Appendix A
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0412	IIP-OI 043	Open	Appendix A
0413	IIP-OI 043	Open	Appendix A
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0415	IIP-OI 043	Open	Appendix A
0416	IIP-OI 043	Open	Appendix A
0417	IIP-OI 043	Open	Appendix A
0418	IIP-OI 043	Open	Appendix A
0419	IIP-OI 043	Open	Appendix A
0420	IIP-OI 043	Open	Appendix A
0464	IIP-OI 036	Open	Appendix A
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0466	IIP-OI 036	Open	Appendix A
0467	IIP-OI 036	Open	Appendix A
0468	IIP-OI 036	Open	Appendix A
0469	IIP-OI 036	Open	Appendix A
0470	IIP-OI 036	Open	Appendix A
0471	IIP-OI 036	Open	Appendix A
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0473	IIP-OI 037	Open	Appendix A
0474	IIP-OI 037	Open	Appendix A
0475	IIP-OI 037	Open	Appendix A
0476	IIP-OI 046	Open	Appendix A
0492	IIP-OI 009	Open	Appendix A
0493	IIP-OI 009	Open	Appendix A
0514	IIP-OI 056	Open	Appendix A
New Item	IIP-OI 058	Open	Appendix A
New Item	IIP-OI 059	Open	Appendix A
New Item	IIP-OI 060	Open	Appendix A
New Item	IIP-OI 066	Open	Appendix A

Appendix D: Integrated Aging Management Program

Aging management practices at Darlington Nuclear Generating Station (NGS) are managed through the implementation of an integrated set of managed systems and programs. These programs ensure that aging of critical equipment is managed such that the operation of Darlington NGS remains within the licensing basis and allows for station operational goals to be met. The Integrated Aging Management (IAM) Program ensures that the condition of critical equipment is understood and that activities are in place to ensure the health of these components and systems while the plant ages. The IAM program was developed on the basis of IAEA NS-G-2.12 which is in alignment with CNSC Reg Doc 2.6.3 and there are 4 elements which ensure success of the IAM program.

Element 1: Program Direction

OPG has developed an IAM Program on the basis of IAEA NS-G-2.12 which is in alignment with CNSC Reg Doc 2.6.3. The program integrates aging management functions that reside in a number of implementing work groups such as equipment reliability, safety analysis, maintenance, supply chain and work management.

Element 2: Equipment Reliability

OPG has implemented an extensive Equipment Reliability program in place for several years based on nuclear industry best practices. The Equipment Reliability Program applies a programmatic approach to the following elements: Scoping & Identification of Components, Performance Monitoring, Corrective Action, Continuing Equipment Reliability Improvement, Long-Term Planning & Life Cycle Management and Preventive Maintenance (PM) Implementation.

For components applicable to the IIP safety goals, *Scoping & Identification of Components* is based on the 58 Safety Related Systems identified in the ISR. Components whose failure results in a full or partial impairment of a System Important to Safety (SIS) are considered critical components and they receive high priority in maintenance, inspection, monitoring and replacement activities. All other components are prioritized based on other parameters which support the nuclear power plant's generation goals.

Performance Monitoring is evaluated through the monitoring of system and component performance and a comparison to the overall performance goals. The objective is to look for trends in overall performance and put action plans in place to address any issues to maintain or improve performance. These action plans are documented and prioritized in system health reports which are communicated to station stakeholders to support the improvement of the systems' performance. Should a failure or degradation be discovered through Performance Monitoring activities, appropriate *Corrective Actions* are taken to ensure the system or component performs to its intended safety function.

Continuing Equipment Reliability Improvements occur through continuous reviews of PM activities, industry OPEX, inspection and maintenance activities of components where frequencies and scope of activities are optimized to ensure high component reliability.

Long Term Planning & Life Cycle Management is an ongoing process to create a long-term strategy which integrates long-term plans with the overall station business plan. These strategies prioritize improvement activities based on station need. These strategies are incorporated into the business plan and the appropriate system or component health reports. Most recently, Component Condition Assessments were completed which identified and evaluated degradation mechanisms to determine the extent of degradation, and identify long range asset preservation activities such as replacements of components that are required to address aging and reliability.

The objective of the *Preventive Maintenance program* is to prevent or minimize equipment breakdown and to maintain equipment in a satisfactory condition for normal or emergency use. The output results in the identification of the optimal level of PM tasks necessary to achieve a balance between equipment performance and effective resources used. This involves the specification, scheduling and execution of time-based maintenance on systems and components to ensure continued reliable operation. Condition-based and predictive based activities are also included in the integrated approach used at OPG.

Element 3: Parts Availability

Supply chain personnel work with station organizations to maintain inventories of equipment and components that support plant reliability and nuclear safety. A spare parts process is in place which defines the criteria for identifying a component as a critical spare and to develop a strategy to mitigate obsolescence issues and lengthy lead times.

Element 4: Work Management

OPG's Work Management processes are based on Nuclear Industry best practices. Specific Work Management processes are in place for the work completed during a unit outage, a Refurbishment outage, or on-power. The work management processes specify how work is prioritized based on nuclear safety implications, regulatory requirements, preservation of special safety systems or systems important to safety, and threats to electrical generation.

Appendix E: Glossary

Asset Preservation activities are activities required to ensure long term preservation of equipment to achieve the greatest financial return and service life.

Component Condition Assessment (CCA) provides:

1. An assessment of the current condition of the safety system components
2. An assessment of component life, given the status of the current programs for inspection and maintenance
3. Recommendation of actions required for the components to reach the target extended plant life.

Component Condition Assessment (CCA) Recommendations are recommendations that fall into one of the following four broad implementation activity categories:

1. Improving the condition of components through replacement, refurbishment or repair.
2. Determining the condition of components through inspection or testing, followed by remedial actions if the components are found to be aged.
3. Improving the aging management practices to mitigate the effects of future aging through an adjustment to the Preventative Maintenance Program.
4. Addressing obsolescence.

Contingency Actions are repair or replace activities resulting from inspections.

Environmental Assessment (EA) is an assessment carried out under the Canadian Environmental Assessment Act to identify whether a specific project is likely to cause significant environmental effects.

Final ISR Report is the document that summarizes the results and major findings of all the Safety Factors, the ISR Aggregate Review and the disposition of all gaps that were identified.

Global Assessment provides an overall risk judgement on the acceptability of continued plant operation based on the significant ISR results and the EA mitigation measures and follow-up program elements, including plant strengths. The Global Assessment takes into account the safety improvements to address the issues identified in the EA and the ISR and the safety improvements resulting from identified opportunities to reduce the overall plant risk. The Global Assessment also incorporates the results of the Defense-in-Depth assessment.

Global Assessment Report (GAR) summarizes the results of the Global Assessment by providing a high level summary of the ISR and EA and an overall judgement on Nuclear Safety.

Integrated Implementation Plan (IIP) is the integrated result of the EA and ISR, identifying all necessary safety improvements, proposed plant modifications, safety

upgrades, compensatory measures and improvements to operation and management programs that will apply to the project and to long term operation.

Integrated Safety Review (ISR) is a comprehensive assessment of an existing nuclear generating station in order to determine:

1. Extent to which the plant conforms to modern high-level safety goals and requirements.
2. Extent to which Licensing Basis remains valid.
3. Adequacy and effectiveness of arrangements that are in place to maintain plant safety for long-term operation.
4. Safety improvements to address gaps with respect to modern safety requirements identified during the assessment.

ISR Gap is a clause for which a safety requirement in a code or standard is not met or for which the intent of the clause is not met depending on the type of code or standard. ISR Gaps exist for:

1. PROL Codes and Standards - the review finds that the safety requirement of a clause has not been met.
2. Non-PROL Codes and Standards – the review finds that it does not meet either the safety requirement or the intent of a clause (or set of clauses).
3. Review Task - the assessment of the Review Task finds that it does not meet either the safety requirement or the intent of the Review Task.

ISR Issue is a compilation of ISR Gaps with similar scope. The categorization, prioritization and resolution of an ISR Issue shall encompass all the included ISR Gaps.

Life Extension is a set of activities for extending the safe operating life of a nuclear power plant beyond its design life. It involves the replacement or refurbishment of major components (e.g. pressure tubes) or substantial modifications to the plant, or both.

Periodic Safety Review (PSR) is a comprehensive assessment of an existing nuclear generating station.

Reactor Safety 1 (RS1) is an Operational Safety Requirement (OSR) system that is also a System Important to Safety (SIS) whose failure results in a Total Loss of Redundancy (TLR) or System Unavailability impairment condition.

Reactor Safety 2 (RS2) is an OSR system that is also a SIS whose failure results in a Partial Loss of Redundancy (PLR) impairment condition, or is an OSR system that is also a non-SIS system whose failure results in a Total Loss of Redundancy or System Unavailability impairment condition.

Safety Improvements are changes to processes or plant to address the issues identified in the EA, the ISR, and the safety improvements resulting from identified opportunities to reduce the overall plant risk.

Safety Related Systems are those systems, components and structures which, by virtue of their failure to perform in accordance with the design intent, would have the potential to impact on the radiological safety of the public or plant personnel from operation of the NPP.

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[R-228] NK38-REP-03680-11849, “Extension IIP Request Oi 034 Task 1”, June 2020.

[R-229] NK38-REP-03680-11813, “IIP-OI 042 Change Request - Dnru2 Delay”, October 2019.

[R-230] NK38-REP-03680-11785, “IIP-OI 056 - Task #2 Conduct Smoke Tests To Confirm Inter-zonal Airflow Direction At Zone 2 And 3 Boundaries - Schedule Change Request Form”, November 2019.

[R-231] NK38-CORR-00531-21312, “Darlington NGS Refurbishment - Integrated Implementation Plan (IIP) Extension Request For IIP-OI 056 Task 2 (confirm Inter-zonal Airflows)”, December 2019.

[R-232] NK38-REP-03680-11785 R001, “IIP-OI 056 - Task #2 Conduct Smoke Tests To Confirm Inter-zonal Airflow Direction At Zone 2 And 3 Boundaries - Schedule Change Request Form”,

[R-233] NK38-CORR-00531-22005, “Integrated Implementation Plan (IIP) Extension Request For IIP-OI 056 Task 2 (confirm Inter-zonal Airflows)”, November 2020.

[R-234] NK38-REP-03680-11896 R001, “Change Request Form for IIP Task Items Associated With D2321” September 2021.

[R-235] NK38-CORR-00531-22803, “Darlington NGS Refurbishment - Integrated Implementation Plan (IIP) Extension Request for Multiple Tasks Rescheduled Due to Outage Deferral”, September 2021.

[R-236] NK38-REP-03680-11897, “Change Request Form for IIP Task Items Associated With DNRU3” June 2021.

[R-237] NK38-REP-03680-11898, “Change Request Form for IIP Task Items Associated With DNRU1” June 2021.

[R-238] NK38-REP-03680-11899, “Change Request Form for IIP Task Items Associated With DNRU4” June 2021.

[R-239] NK38-REP-03680-10316, “IIP-EA 009 - Task Item #1b Change Request - Shieldtank Overpressure Protection”, December 2015.

[R-240] NK38-CORR-00531-17857, “Darlington NGS Refurbishment - Unit 3 Shield Tank Overpressure (stop) Update And Integrated Implementation Plan (lip) Item Number IIP-EA 009 Change Request”, April 2016.

[R-241] NK38-REP-03680-10433 R000, “IIP-CC 020 Task 2 - Replace Epg1 Degraded Gas Generator”, December 2017.

[R-242] NK38-REP-03680-10433 R001, “IIP-CC 020 Task 2 - Replace Epg1 Degraded Gas Generator”, March 2019

[R-243] NK38-CORR-00531-21751, “Darlington NGS Refurbishment Integrated Implementation Plan (IIP) Extension Request For IIP-CC 020 (replace Epg2 And Epg1)”, July 2020.

[R-244] NK38-CORR-00531-22293, “OPG Response: CNSC Review Of OPG Letter On Fire Dampers System Risk Assessment For IIP Items IIP-CC 023, 026 and 034

[R-245] NK38-CORR-00531-24289, “Record Of Decision - Re: Hearing In Writing - 23-H102 - OPG Darlington NGS Integrated Implementation Plan”, April 2023

[R-246] N-PROC-MA-0109, “Periodic Safety Review (PSR)”, November 2022

[R-247] REGDOC-2.3.3, “Operating Performance: Periodic Safety Reviews”, April 2015

[R-248] LCH-PR-13.03 2025-R005, “Licence Conditions Handbook - Darlington Nuclear Generating Station Nuclear Power Reactor Operating Licence”, 2022

[R-249] NK38-CORR-00531-23887, “CNSC Staffs Written Notification Of Document Change: N-Ins-03680-10001 R001, Darlington NGS Integrated Implementation Plan (IIP) Change Control”, November 2022

[R-250] NK38-CORR-00531-23402, ”Darlington NGS Refurbishment: Request For Commission Approval To Revise The Integrated Implementation Plan (IIP)”, June 2022

[R-251] NK38-REP-03680-11920, “IIP-CC 077 Extension Request”, May 2022

[R-252] NK38-CORR-00531-23678, “Darlington NGS Refurbishment - Integrated Implementation Plan (IIP) Extension Request For IIP-CC-077 Tasks 1 To 3”, September 2022

15.3 *Integrated Implementation Plan*

Licence Condition:

The licensee shall implement the Integrated Implementation Plan.

Preamble

The Integrated Implementation Plan (IIP) contains commitments, including the timeframes for implementation, resulting from the Environmental Assessment (EA) for Darlington Refurbishment and Continued Operations as well as the Darlington Integrated Safety Review (ISR). These commitments include, but are not limited to:

- Replacement of fuel channels, feeders, calandria tubes, and end fittings;
- Installation of two auxiliary shutdown cooling pumps per unit;
- Installation of a containment filtered venting system;
- Provision of shield tank overpressure protection;
- Enhancements to the powerhouse steam venting system;
- Installation of a 3rd emergency power generator;
- Provision of an alternate, independent supply of water as an emergency heat sink;
- Implementation of safety related recommendations from component condition assessments; and
- Implementation of mitigation and follow up activities stemming from the Environmental Assessment conducted under the *Canadian Environmental Assessment Act, 1992*.

Compliance Verification Criteria

In implementing the commitments identified in the Darlington ISR IIP, NK38-REP-03680-10185 R004 , *Darlington NGS Integrated Implementation Plan* (e-Doc 7139515), OPG shall provide formal progress reports on the status of all Darlington ISR IIP commitments on an annual basis to CNSC staff by March 31st of each year during the licence period.

In parallel to the Darlington ISR IIP, OPG has also provided an IIP based on the Darlington PSR completed in 2024. OPG is currently implementing NK38-REP-03680-11940-R000, *Darlington NGS Periodic Safety Review (D-PSR): Integrated Implementation Plan* (e-Doc 7125642) in compliance with REGDOC-2.3.3, Periodic Safety Reviews. As with the ISR IIP, OPG shall provide formal progress reports on the status of all Darlington PSR IIP commitments on an annual basis to CNSC staff by March 31st of each year during the licence period.

Any proposed non-intent changes to the Darlington IIPs shall be subject to the licensee's IIP Change Control Process Principles (CD# NK38-CORR-00531-16991, e-Doc 4575922); further developed in N-PROC-MA-0109, *Periodic Safety Review (PSR)*.

The following documents require written notification of change:

Document Title	Document #	Notification Status
Periodic Safety Review (PSR)	N-PROC-MA-0109	TI

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CNSC	Periodic Safety Reviews	REGDOC-2.3.3	2015