



**Written submission from  
Ontario Power Generation Inc.**

**Mémoire d'  
Ontario Power Generation Inc.**

In the Matter of

À l'égard de

**Request to revise the Darlington  
Nuclear Generating Station Integrated  
Implementation Plan**

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**Demande visant à réviser le plan intégré  
de mise en œuvre de la centrale nucléaire  
de Darlington**

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Hearing in writing based on written  
submissions

Audience fondée sur des mémoires

**June 2019**

**Juin 2019**

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February 28, 2019

NK38-00531 P  
NK38-CORR-00531-20239

Mr. M. Leblanc  
Commission Secretary  
Canadian Nuclear Safety Commission  
280 Slater Street  
OTTAWA, Ontario  
K1P 5S9

Dear Mr. Leblanc:

**Darlington NGS Refurbishment: Request for Commission Approval to Revise the Integrated Implementation Plan (IIP) for Unit 2**

The purpose of this letter is to request Commission approval to process a revision to the Darlington NGS Integrated Implementation Plan (IIP), NK38-REP-03680-10185-R002, referenced in the DNGS Licence Conditions Handbook LCH-PR-13.01/2025-R002 Section 15.3.

There are a number of IIP items that require wording changes due to either a new approach to resolution or a change in the completion date to what was originally defined in the IIP. OPG has proposed an alternative solution/completion date for each IIP item to achieve the same end result and support for timely and safe return to service of Unit 2 post-refurbishment. OPG and CNSC staff have extensively discussed the proposed IIP scope changes and OPG has demonstrated to staff these changes either fully satisfy or meet the intent of the original IIP commitment.

Attachment 1 provides a summary of all IIP scope change tasks, their due dates, original IIP Activity Description, proposed Activity Description and the technical basis document reference to support the change. An overview of each of the proposed changes is also provided in Attachment 2.

As shown, in some cases it was not possible to complete the work as originally committed. Consequently, as the scope was written with very specific wording that was tied to one particular solution proposed at the time of licence renewal, it is our understanding that any proposed IIP change requires approval from the Commission.

CNSC staff have advised OPG to seek approval of the Commission for a revision to the IIP.

The timeline for a majority of these changes is such that the revision to the IIP, including Commission approval, must be completed prior to CNSC release of Regulatory Hold Point

RHP 2 (prior to removal of the Guaranteed Shutdown State), nominally scheduled for November 2019.

If you have any questions regarding this submission, please contact Mr. Imtiaz Malek, Manager Refurbishment Regulatory Affairs at (905) 623-6670 ext. 7031588.

Sincerely,



Steve Gregoris  
Senior Vice President  
Darlington NGS  
Ontario Power Generation



Dietmar Reiner  
Senior Vice President  
Nuclear Projects  
Ontario Power Generation

Attach.

cc: Ms. K. Hazelton - CNSC (Darlington ES1)  
Ms. Nathalie Reindeau, Director, Darlington Regulatory Program Division CNSC  
Mr. Gerry Frappier, Director General, Power Reactor Regulation CNSC  
Mr. David Newland, Director General, Analysis Division CNSC

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

**NK38-CORR-00531-20239**

**Submission Title:**     **Darlington NGS Refurbishment: Request for Commission Approval to  
Revise the Integrated Implementation Plan (IIP) for Unit 2**

**Regulatory Commitments (REGC):**

No.	Description	Date to be Completed
	None	

**Regulatory Management Action (REGM):**

No.	Description	Date to be Completed
	None	

**Regulatory Obligation Action (REGO):**

No.	Description	Date to be Completed
	None	

**Concurrence Requested:**     OPG requests Commission approval to process a revision to the Darlington NGS Integrated Implementation Plan (IIP), NK38-REP-03680-10185-R002, referenced in the DNGS Licence Conditions Handbook LCH-PR-13.01/2025-R002 Section 15.3.



**ATTACHMENT 1**

**Darlington NGS Refurbishment: Request for Commission Approval to Revise the  
Integrated Implementation Plan (IIP) for Unit 2**

NK38-CORR-00531-20239

**Summary of Proposed Scope Changes for Integrated Implementation Plan (IIP) Tasks**

**Prepared by: P. Dunn**

**Reviewed by: Engineering**

**TABLE 1: IIP SCOPE CHANGE SUMMARY**

#	IIP Item Number	IIP Due Date	IIP R002 Activity Description	IIP R003 Proposed Description	Change Type / Technical Basis Documents
1	IIP-EA 009 (Task 12)	2019 (U2 Refurb restart)	<p><i>Provide an alternate and independent source of Emergency Water supply to the Heat Transport System by:</i></p> <ul style="list-style-type: none"> <li><i>a. Installing Emergency Mitigation Equipment (EME).</i></li> <li><i>b. Installing permanent fire water pumps and a permanent line from the Emergency Service Water (ESW) to the HTS and using an existing emergency coolant injection system line for injection to the HTS.</i></li> </ul>	<p><i>Implement a provision for alternate and independent supply of water to the Heat Transport System (HTS) by:</i></p> <ul style="list-style-type: none"> <li><i>a. Installing Emergency Mitigation Equipment (EME).</i></li> <li><i>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.</i></li> </ul>	<p><u>Alternate Strategy for Completion /</u></p> <p>See Attachment 2</p>
2	IIP-CC 023 (Tasks 1, 2, 6 and 7)	U0 and U2, U1, 3, 4 (Refurb restart)	<p><i>Test required fire dampers and replace as necessary (HVAC System for MCR and SCA).</i></p>		<p><u>De-Link Request</u></p> <p><b>Completion date is requested to be changed to allow development of fire damper testing, method assessing, ordering of replacement parts and subsequent scheduling.</b></p> <p>See Attachment 2</p>



#	IIP Item Number	IIP Due Date	IIP R002 Activity Description	IIP R003 Proposed Description	Change Type / Technical Basis Documents
3	IIP-CC 026 (Tasks 1-2)	U0 (U2 Refurb restart)	<i>Test required fire dampers and replace as necessary (Misc. Air Conditioning System).</i>		<u>De-Link Request</u>  <b>As above</b>  See Attachment 2
4	IIP-CC 034 (Tasks 1-4)	U012/U034 (U2 Refurb restart)	<i>Test required fire dampers and replace as necessary (Powerhouse Ventilation System).</i>		<u>De-Link Request</u>  <b>As above</b>  See Attachment 2
5	IIP-OI 002 (Task 1)	U2: 2022	<p><i>Additional Analysis complete and has resulted in the following two corrective actions:</i></p> <p>1) <i>Outdoor Transformer Protection</i></p> <ul style="list-style-type: none"> <li>• <i>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 filled with rock to reduce the risk of fire spread.</i></li> <li>• <i>To prevent against a potential Unit Service Transformer or System Service Transformer fire from damaging the Powerhouse wall, the associated containment dikes will be filled with rock</i></li> </ul>	<p><i>Additional Analysis complete and has resulted in the following two corrective actions:</i></p> <p>1) <i>Outdoor Transformer Protection</i></p> <ul style="list-style-type: none"> <li>• <i>To prevent a Main Output Transformer (MOT) fire from damaging the Powerhouse wall or spreading fire into Unit 0 lunchroom, the existing containment dikes <b>in each unit will be covered by sprinklers to reduce the risk of fire.</b></i></li> <li>• <i>To prevent against a potential Unit Service Transformer or System Service Transformer fire from damaging the Powerhouse wall, the</i></li> </ul>	<u>Direct Compliance</u>  See Attachment 2

Attachment 1 of OPG letter, "Darlington NGS Refurbishment: Request for Commission Approval to Revise the Integrated Implementation Plan (IIP) for Unit 2", NK38-CORR-00531-20239.

#	IIP Item Number	IIP Due Date	IIP R002 Activity Description	IIP R003 Proposed Description	Change Type / Technical Basis Documents
			<i>to reduce the risk of fire spread.</i>	<i>associated containment dikes <b>will be covered by sprinklers to reduce the risk of fire.</b></i>	
6	IIP-OI 015 (Task 2)	2019	<i>Complete a modification to provide a new supply of Fire Protection Water separate from the ESW system.</i>	<b>Complete required modifications to install automatic load shedding of selected non-safety related ESW loads, to return margin to the ESW system.</b>	<u>Alternate Strategy for Completion</u>  See Attachment 2
7	IIP-OI 023 (Task 1)	2022	<i>Protect the Fire and Smoke Detection system cabling located above the unit instrument air compressors in R-108.</i>		<u>ISR Gap raised incorrectly/</u>  <b>Deletion of this IIP Task is requested.</b>  See Attachment 2
8	IIP-OI 024 (Task 6)	U0 2019 (Refurb restart) U2 2022	<i>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.</i>  <i>Replace unlisted materials if they have been used.</i>	<i>No change to first task of; 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.</i>  <b>Replace or confirm unlisted materials meet the intent of the applicable fire protection codes and standards.</b>	<u>Alternate Compliance /</u>  See Attachment 2

## **ATTACHMENT 2**

### **Darlington NGS Refurbishment: Request for Commission Approval to Revise the Integrated Implementation Plan (IIP) for Unit 2**

NK38-CORR-00531-20239

#### **Overview of Proposed Scope Changes for IIP Line Items**

**Prepared by: P. Dunn, P. Tangestanian, G. Martin, A. Chan & H. Deol**

**Reviewed by: Engineering**

## **Introduction**

This attachment provides an overview of the 8 IIP line items that require a change in scope or completion date compared to what was originally defined in the IIP.

The proposed changes detailed in this attachment do not impact on the safety of Unit 2, as the proposed alternative scope of work either fully satisfies or meets the intent of the original IIP commitment.

The change in scope allows OPG flexibility in completing all IIP items on schedule. However, before the IIP tasks can be implemented, Commission approval is required in time to allow for completion of the revised tasks and a timely return to service of Unit 2.

This attachment identifies the proposed changes to the IIP tasks along with a high level summary of the details of the changes. The status of discussions with CNSC staff is included where applicable. No alternative will be implemented until agreement is reached on the proposed change with the Commission.

## **Unit 2 IIP Scope Changes**

The following IIP items represent Unit 2 IIP scope changes and require Commission approval.

### 1) Proposed Change to IIP-EA 009 (Task 12) – Emergency Service Water - **Alternate Strategy for Completion**

The committed solution per the IIP was to install new fire water pumps, with a back-up diesel supply, independent from station sources. In a station black-out (SBO), the firewater pumps could be started and emergency make-up water could be provided to the ESW System, and further into the HTS using the new ESW to HTS pipework. As the design progressed on this strategy, it became far too complex and challenging, details of which has been communicated to staff.

The final solution credits existing reliable, robust and well understood Group 2 equipment and components to provide make-up water as required by the Environmental Assessment (EA) and IIP-EA-009. Group 2 systems are a group of systems that can independently shutdown the reactor, contain any releases and provide long-term fuel cooling, independent of any other systems in the plant. Group 2 systems are designed to be more robust than other station systems, as they act as the last line of defence against "common mode events". They are seismically and environmentally qualified and protected from tornados and severe weather events.

In the highly unlikely situation when the Emergency Power Generators (EPGs) and/or the ESW pumps are unavailable to mitigate the BDBA, self-powered EME pumps are available to be deployed in a timely manner to provide the necessary emergency make-up water to the PHT to meet the intent of the IIP item. This solution has been shown to be a more robust and reliable solution that still meets the original intent of the EA credit and reduces overall plant risk.

Also, the newly proposed solution of crediting the EPGs, of which there are now three, to power the ESW pumps to provide emergency make-up water to the PHT for beyond design basis accidents was originally presented to CNSC staff in Reference A2-1. CNSC reviewed the proposed solution and documented outstanding issues in Reference A2-2. OPG then provided a response to all CNSC outstanding issues as well as the details of the revised strategy by which OPG would address IIP-EA 009 in Reference A2-3.

### 2) Proposed Changes to IIP-CC 023 (Tasks 1, 2, 6, 7), CC 026 (Tasks 1-2) and CC 034 (Tasks 1-4) – Testing of Required Fire Dampers and Replace as Necessary – **Change to Completion Date only**

The original IIP commitment identified that all required fire dampers were to be tested and replaced as necessary. OPG has committed to do this, however; extra time is required to order parts, assess and take into account nuclear safety aspects before commencing testing. The Unit 0 and Unit 2 related fire dampers were committed to be completed prior to Unit 2 restart.

Work to determine the required fire dampers, logistics in testing and appropriate scheduling has taken OPG longer than first anticipated. As a result, OPG requires additional time to complete the testing of the required fire dampers. An engineering report justifying the selection of fire dampers to be tested and their revised committed completion dates for testing was provided to CNSC staff in Reference A2-4. All required fire dampers are now committed to be tested (and replaced if required) by the end of 2024.

The engineering report demonstrated that the postponed testing of these fire dampers would not impose any risk to Unit 2 return to service as the dampers are in good condition and there is no

safety impact. As such, a request for an IIP extension of these items to beyond refurbishment outage restart was submitted via Reference A2-4.

3) Proposed Change to IIP-OI 002 (Task 1) – Fire Protection Water Supply – **Direct Compliance**

The committed solution per the IIP to mitigate a Main Output Transformer (MOT), Unit Service Transformer (UST) or System Service Transformer (SST) dike pool fire, was to fill the existing containment dikes with crushed rock to reduce the risk of fire spread.

Through review of the sprinkler design, it was recently shown that extension of sprinkler coverage is possible and the alternative compliance solution is no longer required. This IIP item is satisfied by direct compliance. Further details were provided to CNSC staff via Reference A2-5. An IIP wording change is requested. CNSC staff reviewed the technical details for this assessment and provided their formal concurrence with the new strategy via Reference A2-6 which results in direct compliance with N293-07.

4) Proposed Change to IIP-OI 015 (Task 2) – Fire Protection Water Supply - **Alternate Strategy for Completion**

The committed solution per the IIP was to install a new fire water supply via new fire water pumps (see IIP-EA 009 above), separate from the ESW system supply. This would eliminate any margin concerns for ESW if the fire water system were to activate. As the design progressed with this strategy, it became more complex and challenging.

The newly proposed solution of load-shedding non-safety related ESW loads in times of low ESW margins was presented to CNSC staff in Reference A2-1. CNSC reviewed the proposed solution and documented outstanding issues in Reference A2-2. OPG then provided a response to all CNSC outstanding issues as well as the details of the revised strategy by which OPG would address IIP-OI 015 in Reference A2-7.

The solution will restore ESW margins and will allow for the return of the isolated portion of the firewater system. It restores the original design basis of ESW supplying station firewater and addresses the concerns raised by IIP-OI-015. This solution differs from the originally proposed installation of dedicated firewater diesel pumps, and has been shown to be practical and suitable.

5) Proposed Change to IIP-OI 023 (Task 1) – Fire Endurance Cable – **ISR Gap Raised Incorrectly**

The committed solution per the IIP was to protect the Fire and Smoke Detection System cabling located above the unit instrument air compressors in room R-108.

Further analysis confirmed that OPG has always been in compliance with CSA N293-07, Clause 7.2.1.13.1, 7.2.1.13.2 and 7.2.1.5(b). These clauses were inaccurately raised as gaps during the Integrated Safety Review (ISR) process as, at the time, insufficient evidence could be found to show compliance. It resulted in the action plan to protect the cabling located above the unit instrument air compressors in R-108. This action plan is no longer required. Furthermore, there is a provision in the National Building Code of Canada (NBCC) 2010 which states that fire alarm system branch circuits are not required to have a 1 hour fire resistance rating.

As a result, OPG is requesting the deletion of OI-023 Task 1 from the IIP with no further field action required. Additional details were provided to CNSC staff via Reference A2-5. CNSC staff

reviewed the technical details for this assessment and provided their formal concurrence via Reference A2-6 that the revised approach of direct compliance/IIP task deletion is acceptable.

6) Proposed Change to IIP-OI 024 (Task 6) – Fire Protection Penetration Seals – **Alternate Compliance**

The committed solution per the IIP was to perform a review of penetration seals larger than a single cable, a single tube, or 13 mm wide construction joint seal, in required separations, to confirm that listed fire stopping materials (defined by inclusion in a list published by certification bodies accredited by the Standards Council of Canada) are used and replace unlisted materials if they have been used.

OPG completed the review of penetration seals and identified approximately 800 SikaFlex and 206 non-SikaFlex sealed penetrations. Laboratory tests and a third party review concluded that the fire stopping materials meet the intent of NBCC and CSA N293-07 for preventing the passage of flame and products of combustion for the duration required to meet the credited safety objectives of the fire separation where they are located. Further details were included in Reference A2-5. CNSC staff reviewed the technical details for this assessment and provided their formal concurrence via Reference A2-6. As the OPG strategy represents an alternate compliance under CSA N293-07, a request for CNSC staff acceptance was submitted via Reference A2-8, which included the OPG commitment to implement the CNSC staff recommendation regarding updating OPG's procedure that documents the newly established combustible free zones.

**ATTACHMENT 2 - REFERENCES:**

- A2-1. OPG Letter, B. Duncan to N. Riendeau, "Darlington Refurbishment: Revised Strategies to Address IIP-EA-009 and IIP-OI-015", June 18, 2018, NK38-CORR-00531-19332.
- A2-2. CNSC Letter, N. Riendeau to S. Gregoris, "Darlington Refurbishment: Revised Strategies to Address IIP-EA-009 and IIP-OI-015", December 21, 2018, NK38-CORR-00531-20413.
- A2-3. OPG Letter, S. Gregoris to N. Riendeau, "Darlington NGS Refurbishment: Revised Strategy to Address IIP-EA-009 Task 12", NK38-CORR-00531-20512, February 28, 2019.
- A2-4. OPG Letter, S. Gregoris to N. Riendeau and G. Frappier, "Darlington NGS Refurbishment: Request to De-Link IIP-CC-023, -026 and -034 from Regulatory Hold Point (RHP) 2, NK38-CORR-00531-20415, February 28, 2019.
- A2-5. OPG Letter, D. Reiner to N. Riendeau and G. Frappier, "Darlington Refurbishment: Revised Strategies to Address IIP-OI 002, IIP-OI 023 and IIP-OI 024", NK38-CORR-00531-20246, November 23, 2018.
- A2-6. CNSC Letter, N. Riendeau to D. Reiner, "CNSC Staff Review of Darlington NGS Refurbishment: Revised Strategies to Address IIP-OI 002, IIP-OI 023 and IIP-OI 024", NK38-CORR-00531-20554, February 5, 2019.
- A2-7. OPG Letter, S. Gregoris to N. Riendeau, "Darlington NGS Refurbishment: Revised Strategy to Address IIP-OI-015 Task 2", NK38-CORR-00531-20511, February 28, 2019.
- A2-8. OPG Letter, D. Reiner to N. Riendeau, "Darlington Refurbishment: Request for CNSC Concurrence for Alternative Compliance with CSA N293 and NBCC for IIP-OI 024, Fire Protection Penetration Seals", NK38-CORR-00531-20504, February 19, 2019.