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SUPPLEMENTAL/COMPLÉMENTAIRE

CMD: 20-H110.A

Date signed/Signé le : 29-03-2021

Reference CMD(s)/CMD(s) de référence : 20-H110

Issue Required Approval(s) for

Délivrer l'approbation requise pour

Request for Commission approval to modify the Pickering Nuclear Generating Station Integrated Implementation Plan: Resolution Action G25-RS1-04-20

Demande d'approbation de la Commission afin de modifier le plan intégré de mise en œuvre de la centrale nucléaire de Pickering : mesure de résolution G25-RS1-04-20

Ontario Power Generation Inc.

Ontario Power Generation Inc.

Pickering Nuclear Generating Station

Centrale nucléaire de Pickering

Hearing in writing based solely on written submissions

Audience fondée uniquement sur des mémoires

Scheduled for:
March 2021

Prévue le :
Mars 2021

Submitted by:
CNSC Staff

Soumise par :
Le personnel de la CCSN



Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Summary

This CMD pertains to a request for a decision regarding:

- a request by Ontario Power Generation (OPG) for Commission approval to amend the Pickering integrated implementation plan by removing resolution action G25-RS1-04-20
- CNSC staff assessment of the impact to safety associated with the extension of the original integrated implementation plan deadline from 2020 to 2024

The following actions are requested of the Commission:

- Consider CNSC staff's supplemental information to render a decision on OPG's request for resolution action G25-RS1-04-20

The following items are attached:

- N/A

Résumé

Le présent CMD concerne une demande de décision au sujet de :

- La demande d'Ontario Power Generation (OPG) visant à obtenir l'autorisation de la Commission pour modifier le plan intégré de mise en œuvre de Pickering en retirant la mesure de résolution G25-RS1-04-20
- L'évaluation du personnel de la CCSN de l'impact sur la sûreté associé à la prolongation du délai original du plan intégré de mise en œuvre de 2020 à 2024

La Commission pourrait considérer prendre les mesures suivantes :

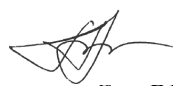
- examiner les renseignements supplémentaires fournis par le personnel de la CCSN afin de rendre une décision sur la demande d'OPG concernant la mesure de résolution G25-RS1-04-20

Les pièces suivantes sont jointes :

- Sans objet

Signed/signé le

29 March 2021



Digitally signed by Viktorov, Alexandre
DN: C=CA, O=GC, OU=CNSC-CCSN, CN="Viktorov, Alexandre"
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Director General / Directorate of Power Reactor Regulation

Directeur général / Direction de la réglementation des centrales nucléaires

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EXECUTIVE SUMMARY

Ontario Power Generation (OPG) has requested to modify the Pickering Nuclear Generating Station (NGS) Integrated Implementation Plan (IIP). The Commission's approval is required to make any changes to the IIP, as it forms part of the licensing basis for the Pickering NGS. OPG has requested the removal of IIP action G25-RS1-04-20.1, *Re-categorization of the large-break loss-of-coolant accident (LBLOCA)*, which aims to track the completion of OPG's analysis to re-categorize the Pickering NGS's CANDU safety issues (CSIs) associated with LBLOCAs from Category 3 to Category 2.

The purpose of this supplemental CMD is to provide the Commission with additional information pertaining to CNSC staff's assessment of the impact to safety due to a deadline extension (from 2020 to 2024) for the updated LBLOCA analysis and request for re-categorization of the LBLOCA CSIs to Category 2. The information provided supports the overall CNSC staff conclusions and recommendations provided in CMD 20-H110, that OPG's deadline extension does not impact the current licensing basis and does not inhibit the capability for safe operations beyond the original IIP commitment deadline of December 31, 2020.

The 4-year period is required to complete the re-categorization of the LBLOCA CSI's and does not stem from a technical issue. The additional time required for the analysis completion is a consequence of the adoption of a new analysis approach and a need for OPG to optimize allocation of the resources according to safety and operational impacts. Staff conclude that given the expected very small probability of the large pipe breaks, the overall risk significance of LBLOCA is very low. CNSC staff's assessment remains unchanged from that used to support license renewal, namely that OPG continues to meet applicable requirements for safety analysis. Overall, a four year period for updating the analysis would not change the existing, and acceptable, risk associated with the operation of PNGS.

Therefore, CNSC staff recommend the Commission approve the requested modifications to the IIP as presented in this supplemental Commission member document (CMD), along with the other requests made in CMD 20-H110.

1 OVERVIEW

1.1 Background

In support of the licence renewal for the Pickering NGS, Ontario Power Generation (OPG) conducted the second Periodic Safety Review or PSR2, results of which were recorded in the Global Assessment Report (GAR) [1] and actioned in the Integrated Implementation Plan (IIP) [2]. The IIP committed OPG to complete the remaining IIP actions by December 31, 2020, as stated under Section 15.1 of the Pickering NGS Licence Conditions Handbook (LCH) [3]. The IIP forms part of the licensing basis, and therefore any changes require the Commission's approval.

The IIP action G25-RS1-04-20.1, Re-categorization of the Large-Break Loss-of-Coolant Accident (LBLOCA), aims to track the completion of analyses allowing re-categorizing the Pickering NGS CANDU Safety Issues (CSIs) associated with Large-Break Loss-of-Coolant Accident (LBLOCA) to Category 2 (lower risk significance) from Category 3 (relatively higher risk significance).

Originally, OPG intended to use a modified Limit of Operating Envelope (LOE) safety analysis methodology to update the LBLOCA analysis and on that basis re-categorize the associated CSIs. Although OPG has continued to make progress with this action, the overall progress was slower than expected. Meanwhile, OPG continued to participate in the CANDU industry-wide initiative for addressing LBLOCA CSIs, which proposes a different methodology called the Composite Analytical Approach (CAA). Considering that CNSC staff determined Bruce Power's concept for implementation of CAA to be an acceptable approach for safety analysis of LBLOCA, OPG chose to reorient their efforts towards the application of this methodology as a more certain basis for re-categorization of LBLOCA CSIs. Bruce Power's request to re-categorize the LBLOCA CSIs from Category 3 to Category 2 has been accepted by CNSC staff. This acceptance was based on Bruce Power's assessment of the probability of large breaks for the piping system design basis loads, which has shown that the probability of breaks of large diameter pipes is very low, and lower than previously assumed. As a result of Bruce Power's progress, OPG is developing detailed analysis plans for implementation of the CAA for their own fleet of reactors, including both Darlington and Pickering NGS.

Therefore, the requested removal of a commitment from the IIP is not due to intractable technical issues preventing the fulfillment of the action, but is rather a result of OPG's adoption of an alternative analysis approach.

1.2 Purpose

The purpose of this supplemental CMD is to provide additional information to support the basis for the recommendations in CMD 20-H110 regarding the 4-year deadline extension for OPG to complete their LBLOCA analysis. To fulfill the Commission's request, CNSC staff have provided additional information

regarding their assessment of the impact on safety associated to the IIP commitment deadline extension.

2 CNSC STAFF ASSESSMENT OF THE PROPOSED DEADLINE EXTENSION

CNSC staff previously assessed the basis of the Pickering NGS request [4] and the accompanying detailed plan [5] that OPG submitted in support of their request for the removal of Resolution Action G25-RS1-04-20 from the IIP, which was detailed in Appendix B.1 of CMD 20-H110 [6]. In developing their recommendations, CNSC staff considered the completeness of the supporting information and the risk significance associated with the new timeframe and generally with the LBLOCA Category 3 CSIs.

CNSC staff note that, according to OPG's plan [5], the implementation of the CAA will be performed for Darlington NGS first. This is in accordance with CNSC staff's expectation that OPG shall provide justification for re-categorization of the LBLOCA CSIs as a condition for Unit 3 Restart after refurbishment, and due to OPG allocation of resources according to safety and operational priorities. Moreover, the plans and preparatory activities for Darlington NGS CAA analysis are at a more advanced state than for Pickering NGS. Upon submission of the CAA analysis for Darlington NGS, Pickering NGS analysis will follow thereafter. In accordance with their plan [5], OPG will submit a detailed analysis plan for Pickering NGS in Q3-2022 for CNSC staff acceptance, with analysis results in Q1-2024. Given the outcome of Bruce Power's assessment of the probability of large breaks for the piping system design basis loads, which has shown that the probability of breaks of large diameter pipes is very low, there is added confidence that a comparable assessment for OPG will show similar results.

The 4-year extension to the commitment for the completion of the analysis to facilitate re-categorization of the LBLOCA CSI's does not stem from a technical issue, but instead is a consequence of the adoption of a new analysis approach and a need to optimize allocation of the resources according to safety and operational impacts. CNSC staff conclude that the risk significance associated with the outstanding update of the LBLOCA analysis, for both Darlington and Pickering NGS, is unchanged and is low. CNSC staff also conclude that the extension of the analysis completion does not have a negative impact on the current safety envelope, and the facility operation will remain within its licensing basis, which was approved by the Commission at the time of relicensing. The requested extension does not inhibit the capability for safe operations beyond the original IIP commitment deadline of December 31, 2020.

One major source of risk information is the Probabilistic Safety Assessment, or the PSA. The Pickering NGS PSA gives the estimated frequency of any LBLOCA as approximately 2 in 100,000 years. Given the low frequency of occurrence, the contribution of LBLOCA to the Severe Core Damage Frequency is less than 0.5%

for both Pickering A and B. Also, a sensitivity case was run for Pickering A NGS by increasing the LBCOCA frequency by one order of magnitude (2 in 10,000 years) and the severe core damage frequency only increased by 5% (from 8.8E-06/year to 9.24E-06/year), which suggests that the contribution from LBLOCA to the severe core damage frequency is very low, and therefore deemed acceptable by CNSC staff. From the design in depth perspective, the design of safety systems has accounted for such accidents and is capable of stopping the progression of the event initiated by the LBLOCA.

It is also noteworthy that IIP resolution action G25-RS1-04-20 was ranked 34th out of 35 on the prioritization list in the PNGS PSR [1], in terms of its safety relevance. In other words, previously CNSC staff reviewed and agreed with OPG's determination that the LBLOCA issue is of the lowest safety significance. As OPG is continuing to work on the re-categorization of the PNGS-specific Category 3 CSI's, CNSC staff's assessment of the LBLOCA safety significance remains unchanged from that at the time of license renewal. Consequently, the impact of extending the analysis timeframe for a low safety significance event does not introduce unreasonable risk, and the facility operation will remain within its licensing basis.

3 OVERALL CONCLUSIONS AND RECOMMENDATIONS

CNSC staff recommend to accept OPG's request regarding the Resolution Action G25-RS1-04-20, based on the following:

- OPG is continuing to work on the re-categorization of the PNGS-specific LBLOCA-related Category 3 CSI's, and has reoriented their efforts to a method that has been successfully used to justify re-categorization of LBLOCA CSIs by Bruce Power.
- The request for the removal of a commitment from the IIP does not lead to an increase of the baseline risk reflected in the safety report used to support the current licensing basis and does not inhibit the capability for safe operation.
- The risk posed by the LBLOCA events is very low, as shown through the safety ranking of all the IIP actions.
- The same conclusion is drawn from the PSA results. Given the predicted very low probability of the large pipe breaks (an estimated frequency of 2 in 100,000 years), the overall risk posed by LBLOCA is low.
- Plant specific assessment of the probability of large breaks for the piping system under the design basis loads, is expected to show that the probability of breaks of large diameter pipes is even lower than previously assumed.
- The CNSC staff assessment of the LBLOCA issue remains unchanged as compared to that used to support license renewal, namely that OPG continues to meet applicable requirements for safety analysis.

- CNSC staff will retain the requirement to re-categorize LBLOCA CSIs in the Pickering NGS licensing basis by modifying the Licence Conditions Handbook, as detailed in Section 4.2.1 of CMD 20-H110 [6].

REFERENCES

1. OPG Letter, R. Lockwood to A. Viktorov, “Pickering NGS – Periodic Safety Review 2 – Submission of Global Assessment Report Revision 1”, February 12, 2018, CD# P-CORR-00531-05311, e-Doc [5470841](#).
2. OPG Letter, R. Lockwood to A. Viktorov, “Pickering NGS Periodic Safety Review 2 – Submission of Integrated Implementation Plan Revision 1”, March 1, 2018, CD# P-CORR-00531-05311, e-Doc [5470841](#).
3. CNSC Document, Licence Conditions Handbook, “Pickering Nuclear Generating Station Nuclear Power Reactor Operating Licence, Licence Conditions Handbook – LCH-PR-48.00/2028-R000”, September 1, 2018, e-Doc [5610425](#).
4. OPG Letter, J. Franke to M.A. Leblanc, “Pickering NGS: Request for Approval to Amend the Integrated Implementation Plan (IIP) to Remove Resolution Action G25-RS1-04-20”, October 6, 2020, CD# P-CORR-00531-06155, e-Doc [6394718](#).
5. OPG Letter, J. Franke to A. Viktorov and J. Burta, “Large Break Loss of Coolant Accident Safety Analysis Margins – OPG’s Adoption of Composite Analytical Approach”, September 23, 2020, CD# N-CORR-00531-22326, e-Doc [6386157](#).
6. CNSC CMD, “Request for Commission approval to modify the Pickering Nuclear Generating Station Integrated Implementation Plan”, November 27, 2020, e-Doc [6432017](#).