



**ORDER BY A DESIGNATED OFFICER UNDER PARAGRAPH 37(2)(f) AND
SUBSECTION 35(1) OF THE *NUCLEAR SAFETY AND CONTROL ACT***

UNCLASSIFIED

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Date of Order: July 26, 2021

TO:

Ontario Power Generation Inc.
700 University Avenue
Toronto, Ontario
M5G 1X6

IN RELATION TO:

Canadian Nuclear Safety Commission (CNSC) licence number PROL 48.01/2028 issued pursuant to the *Nuclear Safety and Control Act*, which authorizes Ontario Power Generation (OPG) to operate the Pickering Nuclear Generating Station (NGS). Licence condition 15.3 for PROL 48.01/2028 requires that “Before Hydrogen equivalent concentration exceeds 120 ppm, the licensee shall demonstrate that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm”. The compliance verification criteria for this licence condition, as outlined in Section 15.3 of LCH-48.00/2028-R004, establish that “OPG shall provide prior written notification and seek CNSC staff concurrence before operating any pressure tube with a predicted Heq concentration greater than 120 ppm between the inlet and outlet burnish marks”.

RATIONALE:

The CNSC became aware that pressure tubes in two reactors operated by Bruce Power were found to exceed the 120 ppm hydrogen equivalent concentration ([Heq]) limit established by the Commission for that licensee. The [Heq] prediction models used in assessment of fuel channel fitness for service under-predicted the elevated [Heq] in specific locations of the pressure tubes. This discovery reveals that the [Heq] models used in fracture toughness assessment of fuel channel fitness for service in Pickering NGS Units 1, 4, 5, 6, 7 and 8 may also underestimate [Heq] in specific locations of pressure tubes. OPG received a request per Subsection 12(2) of the *General Nuclear Safety and Control Regulations* [1] to evaluate this information as it may pertain to Pickering NGS and to confirm that all units in operation are currently operating within their approved licensing basis.

ORDER:

Prior to the restart of any of Units 1, 4, 5, 6, 7 or 8, following any outage that results in the cooldown of the heat transport system, OPG shall obtain authorization from the Commission to restart.

Prior to seeking such authorization, OPG shall either:

- a. carry out inspection and maintenance activities that demonstrate with a high degree of confidence that pressure tube [Heq] is within OPG's licensing basis, *per* licence condition G.1, and submit results of such activities to CNSC staff;

or

- b. carry out inspection and maintenance activities that demonstrate with a high degree of confidence that no flaws are present in the region of pressure tubes where the models failed to conservatively predict the elevated [Heq], and submit results of such activities to CNSC staff.

Ramzi Jammal
Designated Officer
Canadian Nuclear Safety Commission

Dated at Ottawa, Ontario, Canada this 26th day of July 2021.

References:

1. CNSC Letter, "Darlington and Pickering NGS: Request pursuant to Subsection 12(2) of the *General Nuclear Safety and Control Regulations: Issues Relating to Measurement of Hydrogen Concentration in Pressure Tubes*", July 13, 2021. e-Doc [6603931](#)