



**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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File 4.01.03

Date of Order: July 26, 2021

TO:

Bruce Power Inc.
P.O. Box 1540, R.R. #2
Building B10, 177 Tie Road
Municipality of Kincardine
Tiverton, Ontario N0G 2T0

IN RELATION TO:

Canadian Nuclear Safety Commission (CNSC) licence number PROL 18.01/2028 issued pursuant to the *Nuclear Safety and Control Act*, which authorizes the operation of the Bruce Nuclear Generation Stations A and B. Licence condition 15.3 for PROL 18.01/2028 requires that “Before hydrogen equivalent concentrations exceed 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-18.01/2028-R002, establish that “Bruce Power shall obtain approval from the Commission before operating any pressure tube with a measured [Heq] greater than 120 ppm, or beyond the time any pressure tube is predicted to have a [Heq] greater than 120 ppm...”

RATIONALE:

Bruce Power Unit 3 and 6 pressure tubes exceeded the 120 ppm hydrogen equivalent concentration limit established by the Commission [1, 2]. The [Heq] prediction models used in assessment of fuel channel fitness for service failed to conservatively predict the elevated [Heq] in specific locations of pressure tubes. The [Heq] models used in fracture toughness assessment of fuel channel fitness for service of Units 4, 5, 7 and 8 may also underestimate [Heq] in specific locations of pressure tubes. Bruce A Units 1 and 2 pressure tubes were refurbished in 2012 and have not operated long enough to generate pressure tubes with elevated [Heq].

ORDER:

Prior to the restart of any of Units 3, 4, 5, 7 or 8, following any outage that results in the cooldown of the heat transport system, Bruce Power shall obtain authorization from the Commission to restart.

Prior to seeking such authorization, Bruce Power shall either:

- a. carry out inspection and maintenance activities that demonstrate with a high degree of confidence that pressure tube [Heq] is within Bruce Power'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. Bruce Power Email, J. Thompson to L. Sigouin, "REGDOC-3.1.1 B-2021-98077 DR", July 5, 2021, e-Doc [6600317](#).
2. Bruce Power Email, J. Thompson to L. Sigouin, "REGDOC-3.1.1 B-2021-93819", July 8, 2021, e-Doc [6603256](#)