



**Written submission from
Bruce Power Inc.**

**Mémoire de
Bruce Power Inc.**

In the Matter of

À l'égard de

**Bruce Power Inc.
Bruce Nuclear Generating Stations A and B**

**Bruce Power Inc.
Centrales nucléaires de Bruce-A et B**

**Application to amend the power reactor
operating licence for the Bruce Nuclear
Generating Stations (NGS) A and B**

**Demande visant à modifier son permis
d'exploitation d'un réacteur de puissance pour
les centrales nucléaires de Bruce-A et B**

Hearing in writing based on written
submissions

Audience par écrit fondée sur des mémoires

April 2023

Avril 2023

October 11, 2022

BP-CORR-00531-01842

Mr. D. Saumure
Commission Registrar
Legal and Commission Affairs Branch
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Mr. Saumure:

Application for the Amendment of the Power Reactor Operating Licence

The purpose of this letter is to request amendment of Bruce Power's Power Reactor Operating Licence, PROL 18.02/2028, pursuant to sub-section 24(2) of the *Nuclear Safety and Control Act* and Section 6 of the *General Nuclear Safety and Control Regulations* (GNSCR).

Specifically, Bruce Power requests that Licence Condition 15.3 be removed from PROL 18.02/2028 and that all fitness for service requirements applicable to pressure tubes be consolidated under Licence Condition 6.1.

Safety is Bruce Power's number one priority, and we remain committed to maintaining defense in depth with respect to the safe operation of Bruce A and Bruce B overall, and specifically as it relates to pressure tube integrity, through the continued demonstration of the fitness for service of plant components.

In its Record of Decision published in 2018, the Canadian Nuclear Safety Commission (the Commission) renewed Bruce Power's Power Reactor Operating Licence, authorizing the operation of the Bruce Nuclear Generating Stations A and B up to a maximum of 300,000 equivalent full power hours. Within the renewed licence, the Commission imposed Licence Condition 15.3, requiring approval by the Commission to operate pressure tubes with a hydrogen equivalent concentration in excess of 120 ppm.

Bruce Power is now seeking amendment of the PROL to reflect the Commission's latest Records of Decision (References 1 and 2). This request is supported by the advancements in understanding related to pressure tube behaviour and documented satisfaction that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm in the regions of interest near the pressure tube inlet and outlet rolled joints. Bruce Power has provided additional information in submissions on defense in depth (Reference 3), a finite element analysis of hydrogen diffusion in the rolled joint region of the pressure tube (Reference 4) and an additional update to the Commission (Reference 5).

Mr. D. Saumure

October 11, 2022

Bruce Power is of the opinion that all fitness for service requirements should be consolidated within Licence Condition 6.1, with supplemental compliance verification criteria added to the supporting Section 6.1 of the Licence Condition Handbook (LCH). In consideration of this request, the information required by Section 6 of this GNSCR is provided in Attachment A.

Bruce Power believes this request is consistent with the CNSC staff position reflected in Reference 6 wherein it is acknowledged that licence condition 15.3 is no longer applicable. As a result, Bruce Power respectfully requests a panel hearing by the end of February 2023.

If you require further information or have any questions regarding this submission, please contact Ms. Lisa Clarke, Director, Regulatory Affairs, at (519)361-2673 extension 16144, or lisa.clarke@brucepower.com.

Yours truly,



Digitally signed by
Maury Burton
Date: 2022.10.11
08:06:33 -04'00'

Maury Burton
Senior Director, Regulatory Affairs
Bruce Power

cc: CNSC Bruce Site Office
L. Sigouin – CNSC Ottawa
A. Viktorov – CNSC Ottawa

Attach.

References:

1. Record of Decision, DEC 21-H113, "Request for Authorization to Restart Bruce Nuclear Generating Station A Unit 4 and Bruce NGS B Units 5, 7 and 8 following future outages", February 28, 2022.
2. Record of Decision, DEC 22-H100, "Request for Authorization to Restart Bruce Nuclear Generating Station A Unit 3 following future outages", March 9, 2022.
3. Letter, M. Burton to L. Sigouin, "Bruce A and B: Defense-in-Depth Approach for Addressing Elevated Hydrogen Equivalent Concentration ([H]eq) in the Inlet Rolled Joint", March 11, 2022, BP-CORR-00531-02589.
4. Letter, M. Burton to L. Sigouin, "Bruce A and B: Finite Element Diffusion Analysis of High Hydrogen Level in Rolled Joint Region with Postulated Flaw", June 28, 2022, BP-CORR-00531-02820.
5. Letter, M. Burton to D. Saumure and A. Viktorov, "Bruce A and B: Update to the Commission regarding Elevated Hydrogen Equivalent Concentrations – Action Item 2022-07-23135", July 19, 2022, BP-CORR-00531-02909.
6. Commission Member Document, CMD: 22-M37, August 22, 2022.

Attachment A

Application for Amendment of PROL 18.01/2028

September 2022


**Attachment A:
Application to Amend PROL 18.01/2028**

LEGAL APPLICANT AUTHORITY

Mr. Dr. Mrs. Ms.

Name: Michael Rencheck
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Applicant: Bruce Power Inc.
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I, Michael Rencheck, have been designated by Bruce Power (Reference A7) as having signing authority for this application, pursuant to the General Nuclear Safety and Control Regulations Section 15(a), and certify that all information submitted herein is true and correct to the best of my knowledge. I understand that all statements and representations made in this application and on supplementary documentation are binding on the applicant.

Signature: 

Date: 2022/10/10
YYYY/ MM/ DD

Attachment A: Application to Amend PROL 18.01/2028

Introduction

This Attachment provides information to address the regulatory requirements for an application to amend the Power Reactor Operating Licence, PROL 18.02/2028, pursuant to the *General Nuclear Safety and Control Regulations* (GNSCR).

Information Required by the General Nuclear Safety and Control Regulations

GNSCR 6(a): [An application for the amendment... of a licence shall contain the following information:] a description of the amendment, revocation or replacement and of the measures that will be taken and the methods and procedures that will be used to implement it.

Bruce Power requests that PROL 18.02/2028, Licence Condition 15.3, be lifted and that Licence Condition 6.1 be updated to reflect the advancements in the licensing basis and the state of industry knowledge, precipitated by the discovery of elevated hydrogen equivalent concentrations, the subsequent Designated Officer Order, and the Commissions Records of Decision (References A1 and A2) related to these matters.

Specifically, Bruce Power requests that the scope of Licence Condition 6.1 be expanded to consolidate all requirements for fitness for service, including the fitness for service of operating pressure tubes, as a product of the Commission's acknowledgement that the fracture toughness in pressure tubes continues to be sufficient for safe operation, so long as the established criteria continue to be satisfied (References A1 and A2).

Going forward, Bruce Power requests that all aspects of pressure tube fitness for service be managed in accordance with Licence Condition 6.1 which requires that all station components be maintained fit-for-service in accordance with Bruce Power's long-established and well performing fitness-for-service program. As a product of the consolidation, Bruce Power recommends that all remaining pertinent elements of Licence Condition 15.3 be consolidated within Licence Condition 6.1, such that the redundant Licence Condition 15.3 can be eliminated.

The Compliance Verification Criteria (CVC) documented within the LCH should, in turn, be updated to reflect the expanded scope of Licence Condition 6.1. Bruce Power proposes that the current content of the LCH, Section 15.3, be updated and migrated to Section 6.1. As always, Bruce Power is open to discuss the relevant CVC with CNSC staff to ensure their ability to adequately verify and oversee Bruce Power's on-going compliance with the updated and expanded Licence Condition 6.1.

Following the discovery of elevated hydrogen concentrations in a surveillance pressure tube extracted from Unit 6, and within Unit 3, and the issuance of the Designated Officer Order (Reference A3), Bruce Power undertook an extensive inspection campaign to further understand the unanticipated behavior and its extent of condition.

In fact, Bruce Power regularly plans inspections years in advance of outages, consistent with management system processes, to ensure high levels of safety and predictability when conducting activities on a reactor. This practice is consistent and in accordance with CSA N286, *Management system requirements for nuclear facilities*, which requires top management to define, plan and control activities undertaken by Bruce Power in recognition of their potential impact on health, safety, environment, security, economics and quality. That said, presented with the unanticipated condition, Bruce Power was able to leverage long-established and active programs and procedures, to adjust and expand planned outage activities to pursue the information needed to fully satisfy the Designated Officer Order (Reference A3) while precipitating longer term Research and Development activities

which will serve to further advance industry understanding of pressure tube behavior over the remaining operating life until reaching the target Major Component Replacement (MCR) outages.

This is no surprise as undertaking inspections in a planned manner, consistent with the requirements of CSA N286, and the major component life cycle management programs recognized and established as part of the fundamental licensing basis, is both a safe and effective way to conduct these inspections and maintains any associated or consequential worker dose impacts as low as reasonably achievable.

It is for this reason that the changes to Bruce Power's implementing programs and procedures are negligible as a result of the proposed amendment.

Beyond the amendment of the PROL itself, Bruce Power recommends that the criteria documented within Section 6.1 of the associated Licence Condition Handbook be updated to include the following definitions of the Regions of Interest and fitness for service requirements for those regions:

Pressure Tube Fitness for Service Requirements for Pressure Tubes with High [H]_{eq} in Regions of Interest near the Inlet and Outlet Rolled Joints

For the Inlet Rolled Joint Region of Interest: Bruce Power shall follow the requirements of N285.4 and N285.8 to demonstrate fitness for service in the inlet region of interest. This is based on the Finite Element Diffusion Analysis of High Hydrogen Level in Rolled Joint Region with Postulated Flaw (Reference A4) results which demonstrate that the high [H]_{eq} does not impact on the inner diameter of the tube where a flaw may occur. During planned maintenance outages Bruce Power shall carry out inspection activities in the Inlet Region of Interest, as well as, surveillance on ex-service pressure tubes to confirm the Finite Element Diffusion Analysis.

For the Outlet Rolled Joint Region of Interest: During planned maintenance outages, Bruce Power shall carry out inspection activities that demonstrate with a high degree of confidence that no flaws are present in the outlet region of interest of the pressure tubes.

GNSCR 6(b): [An application for the amendment... of a licence shall contain the following information:] a statement identifying the changes in the information contained in the most recent application for the licence.

This proposed amendment does not result in the need for any changes to the material submitted in support of the most recent application for renewal (Reference A5, Attachment A) and the most recent application for amendment (Reference A6).

Note that the licensing basis is regularly and consistently maintained pursuant to Licence Conditions G.1 and G.2 of PROL 18.02/2028. As such, LCH-PR-18.02/2028-R003 documents the routine evolution of the licensing basis since the most recent application for renewal. That planned evolution has resulted in the revision and continuous improvement of Bruce Power's governing programs, procedures, environmental action levels and derived release limits from the time the renewal application was first submitted. Additionally, the current list of authorized delegates and responsible persons was last submitted in Reference A7.

GNSCR 6(c): [An application for the amendment... of a licence shall contain the following information:] a description of the nuclear substances, land, areas, buildings, structures, components, equipment and systems that will be affected by the amendment, revocation or replacement and of the manner in which they will be affected.

The proposed modification does not impact or affect any nuclear substances, land, areas, buildings, structures, components, equipment or systems from the information provided in Bruce Power's 2018 PROL renewal (Reference A5).

GNSCR 6(d): [An application for the amendment... of a licence shall contain the following information:] the proposed starting date and the expected completion date of any modification encompassed by the application.

As a result of the resolution to Commission's satisfaction of the Designated Officer Order, Bruce Power is already in a position to satisfy the proposed update to the licensing basis and the revised Compliance Verification Criteria identified within this amendment application. It is proposed that the revised and updated condition and compliance verification criteria persist at least until the next PROL renewal, scheduled for 2028.

References:

- A1. Record of Decision, DEC 21-H113, "Request for Authorization to Restart Bruce Nuclear Generating Station A Unit 4 and Bruce NGS B Units 5, 7 and 8 following future outages", February 28, 2022.
- A2. Record of Decision, DEC 22-H100, "Request for Authorization to Restart Bruce Nuclear Generating Station A Unit 3 following future outages", March 9, 2022.
- A3. ORDER BY A DESIGNATED OFFICER UNDER PARAGRAPH 37(2)(f) AND SUBSECTION 35(1) OF THE NUCLEAR SAFETY AND CONTROL ACT, e-Doc 6612402, July 26, 2021.
- A4. Letter, M. Burton to L. Sigouin, "Bruce A and B: Finite Element Diffusion Analysis of High Hydrogen Level in Rolled Joint Region with Postulated Flaw", June 28, 2022, BP-CORR-00531-02820.
- A5. Letter, F. Saunders to M. Leblanc, "Application for the Renewal of the Power Reactor Operating Licence for Bruce Nuclear Generating Stations A and B", June 30, 2017, e-Doc 5291208, NK21-CORR-00531-13493/NK29-CORR-00531-14085/NK37-CORR-00531-02768.
- A6. Letter, M. Burton to M. Leblanc, "Application for the Amendment of the Power Reactor Operating Licence", November 25, 2020, BP-CORR-00531-00982.
- A7. Letter, M. Burton to L. Sigouin, C. Purvis, M. Broeders, P. Bourassa, "Bruce Power Authorized Delegates and Responsible Persons", August 18, 2022, BP-CORR-00531-03058.