



Record of Decision

DEC 23-H103

In the Matter of

Applicant Bruce Power Inc.

Subject Application to Amend the Power Reactor
Operating Licence for the Bruce Nuclear
Generating Stations A and B with Respect to
Fitness for Service Requirements

Public Hearing
in Writing April 2023

Record of
Decision Date October 13, 2023

RECORD OF DECISION – DEC 23-H103

Applicant: Bruce Power Inc.

Address/Location: P.O. Box 1540, Building B10, 177 Tie Road, Municipality of Kincardine, Tiverton, Ontario, N0G 2T0

Purpose: Application to amend the Power Reactor Operating Licence for the Bruce Nuclear Generating Stations A and B with respect to fitness for service requirements

Application received: [October 11, 2022](#)

Hearing: Public Hearing in Writing – Notice of Hearing in Writing published on [February 1, 2023](#); revised [March 7, 2023](#)

Date of decision: October 13, 2023

Panel of Commission: Ms. R. Velshi, President
Dr. M. Lacroix

Licence: Amended

Table of Contents

1.0	INTRODUCTION	1
2.0	DECISION	3
3.0	APPLICATION OF THE <i>IMPACT ASSESSMENT ACT</i>	4
4.0	ISSUES AND COMMISSION FINDINGS	5
4.1	Assessment of the Licence Application	5
4.2	Regulatory and Technical Basis for the Proposed Amendment	7
4.2.1	<i>Background</i>	7
4.2.2	<i>Assessment of Proposed Amendment and Associated Compliance Verification</i> <i>Criteria</i>	10
4.2.3	<i>Conclusion on Regulatory and Technical Basis for the Proposed Amendment</i>	17
4.3	Indigenous Engagement and Consultation	19
4.3.1	<i>Indigenous Consultation</i>	19
4.3.2	<i>Indigenous Engagement</i>	19
4.3.3	<i>Conclusion on Indigenous Consultation and Engagement</i>	21
4.4	Licence Amendments	22
5.0	CONCLUSION	22
Appendix A – Intervenors		A

1.0 INTRODUCTION

1. Bruce Power Inc. (Bruce Power) has applied to the Canadian Nuclear Safety Commission¹ to amend the power reactor operating licence (PROL) for the Bruce Nuclear Generating Stations (NGS) A and B, located in the Municipality of Kincardine, Ontario, and on the Traditional and Treaty Territory of the Saugeen Ojibway Nation (SON), and the traditional harvesting territories of the Métis Nation of Ontario (MNO) Region 7 and the Historic Saugeen Métis (HSM) peoples.
2. The current licence, PROL 18.02/2028,² authorizes Bruce Power to operate the Bruce site, which includes 8 nuclear power reactor units and their associated equipment. In its application, Bruce Power is seeking to remove licence condition 15.3, which states that:

Before hydrogen equivalent concentrations^[3] ([Heq]) exceed 120 ppm, the licensee shall demonstrate that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm.

Bruce Power is proposing that all fitness for service requirements related to pressure tubes be incorporated into the existing licence condition 6.1, which states that:

The licensee shall implement and maintain a fitness for service program.

As described in the licence conditions handbook for PROL 18.02/2028, Bruce Power's fitness for service program deals with many elements of fitness for service, including that of pressure tubes.

3. The licence amendment is being sought to reflect a number of recent developments and Commission decisions related to [pressure tubes](#) at the Bruce NGS. In 2021, [Bruce Power discovered elevated \[Heq\]](#) at Bruce NGS A Unit 3 and Bruce NGS B Unit 6, in excess of the 120 ppm limit. Following an order that was issued by a Designated Officer (DO) related to the discovery and several Commission proceedings, the Commission authorized Bruce Power to restart Bruce NGS A Units 3 and 4, and to restart Bruce NGS B Units 5, 7, and 8 from any outage that results in the cooldown of the heat transport system. This authorization was subject to satisfying all other pressure-tube-related fitness for service requirements in the licensing basis.⁴

¹ The *Canadian Nuclear Safety Commission* is referred to as the “CNSC” when referring to the organization and its staff in general, and as the “Commission” when referring to the tribunal component.

² Nuclear Power Reactor Operating Licence, *Bruce Nuclear Generating Stations A and B*, PROL 18.02/2028.

³ Hydrogen equivalent (Heq) concentration ([Heq]) is the concentration of hydrogen by weight that would be present in a pressure tube if the deuterium atoms were replaced by hydrogen atoms. [Heq] is expressed in parts per million (ppm) by weight.

⁴ The licensing basis is the set of requirements and documents for a regulated facility or activity comprising the regulatory requirements set out in the applicable laws and regulations; the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence; and the safety and control measures described in the licence application and the documents needed to support that licence application.

Issues

4. In considering Bruce Power's application for the amendment of the existing power reactor operating licence, the Commission considered whether and what requirements the [Impact Assessment Act](#)⁵ (IAA) imposes in relation to the activities sought to be authorized.
5. Pursuant to paragraphs 24(4)(a) and (b) of the [Nuclear Safety and Control Act](#)⁶ (NSCA), in considering whether to amend the licence, the Commission must be satisfied that:
 - a) Bruce Power is qualified to carry on the activity that the amended licence would authorize; and
 - b) in carrying on that activity, Bruce Power will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
6. As an agent of the Crown, the Commission recognizes its role in fulfilling the Crown's constitutional obligations, along with advancing reconciliation with Canada's Indigenous peoples. The Commission's responsibilities include the duty to consult and, where appropriate, accommodate Indigenous interests where the Crown contemplates conduct which may adversely impact potential or established Aboriginal⁷ or treaty rights.⁸ As such, the Commission must determine what engagement and consultation steps and accommodation measures are called for, respecting Indigenous interests.

Hearing in writing

7. On February 1, 2023, the Commission published a [Notice of Hearing in Writing](#) for this matter, which invited requests to intervene by April 11, 2023. On March 7, 2023, the Commission published a [revised notice](#) to announce an extension to the dates for filing submissions.
8. Pursuant to section 22 of the NSCA, the President of the Commission established a Panel of the Commission over which she would preside, including Commission member Dr. M. Lacroix, to decide on the application. The public hearing was conducted as a hearing based on written materials, in accordance with the [Canadian Nuclear Safety Commission Rules of Procedure](#) (the Rules). The Commission

⁵ Statutes of Canada (S.C.) 2019, chapter (c.) 28, s. 1.

⁶ S.C. 1997, c. 9.

⁷ "Aboriginal" is the term used in this document when referring to the Crown's duty to consult as that is the term used in s. 35 of the Constitution Act, 1982. In all other cases, "Indigenous" is the preferred terminology and used accordingly.

⁸ *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73; *Taku River Tlingit First Nation v. British Columbia (Project Assessment Director)*, 2004 SCC 74.

considered written submissions from Bruce Power ([CMD 23-H103.1](#), [CMD 23-H103.1A](#) and [CMD 23-H103.1B](#)), CNSC staff ([CMD 23-H103](#), [CMD 23-H103.A](#) and [CMD 23-H103.B](#)), and submissions from 8 intervenors.⁹ The Commission also considered submissions from the Commission’s [External Advisory Committee \(EAC\) on Pressure Tubes](#)¹⁰ ([CMD 23-H103.10](#) and [CMD 23-H103.10A](#)), as well as the EAC’s final report to the Commission ([CMD 23-H103.10B](#))^{11,12}.

9. Pursuant to section 12 of the *Rules*, Bruce Power requested that the Commission take measures to protect information in correspondence and reports related to measurements of [Heq] in pressure tubes at Bruce NGS A and B, referenced in CMD 23-H103.1.¹³ Bruce Power submitted that there was information contained in these documents that was of a confidential commercial, scientific, technical and personal nature. Bruce Power provided non-confidential summary information related to these documents to the Commission Registry for the EAC to review. The Commission considered Bruce Power’s request for confidentiality and decided that the information would not be made public for the Commission hearing, pursuant to subrule 12(3) of the *Rules*. The Commission is satisfied that there is adequate publicly available information to serve the public in this matter.
10. In making its decision, the Commission sent questions to CNSC staff and Bruce Power through [CMD 23-H103Q](#) and [CMD 23-103Q.A](#). The Commission also sought responses to questions raised by the EAC in its submissions. The Commission is satisfied with the completeness of the responses provided by CNSC staff ([CMD 23-H103.A](#) and [CMD 23-H103.B](#)) and Bruce Power ([CMD 23-H103.1A](#) and [CMD 23-H103.1B](#)).

2.0 DECISION

11. Based on its consideration of this matter, as described in more detail in the following sections of this *Record of Decision*, the Commission concludes the following:
 - the Commission is satisfied that an impact assessment under the [Impact Assessment Act](#) (IAA) is not required;
 - the contemplated licence amendment does not present any novel adverse impact on any potential or established Aboriginal claim or right;

⁹ See Appendix A for a list of interventions.

¹⁰ The External Advisory Committee (EAC) was established on July 30, 2021, pursuant to subsection 17(1) and paragraph 21(1)(c) of the *Nuclear Safety and Control Act*, to provide technical and scientific expertise to the Commission in its regulatory decision-making regarding pressure tube fitness for service.

¹¹ As directed by clause 8 b. of the EAC’s [Terms of Reference](#).

¹² As a matter of procedural fairness, Bruce Power, as the applicant, was given the opportunity to make submissions in response to the EAC Report. Bruce Power elected not to do so.

¹³ The documents included in Bruce Power’s confidentiality request were: 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-COR-00531-02820 (Reference 4 in CMD 23-H103.1) and 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 (Reference 5 in CMD 23-H103.1)

- the Commission’s responsibility to uphold the honour of the Crown and its constitutional obligations with regard to engagement and consultation respecting Indigenous interests has been satisfied;
- Bruce Power is qualified to carry on the activities that the amended licence will authorize; and
- Bruce Power, in carrying on these activities, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

Therefore,

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, amends the power reactor operating licence issued to Bruce Power Inc. for the Bruce Nuclear Generating Stations A and B. The amended licence, PROL 18.03/2028, remains valid until September 30, 2028.

12. The Commission includes in the licence the conditions as recommended by CNSC staff in CMD 23-H103. Specifically, the Commission:
 - Removes licence condition 15.3
 - Includes the new licence condition 6.2
“The licensee shall implement and maintain an enhanced fitness for service program for fuel channels in extended operation.”

With this decision, the Commission directs CNSC staff to update the Licence Conditions Handbook for PROL 18.03/2028 to reflect the removal of licence condition 15.3 and the inclusion of licence condition 6.2, as described in CMD 23-H103.

13. The Commission also directs CNSC staff to provide updates on Bruce Power’s progress in its research and development (R&D) activities through the regular *Status Report on Power Reactors*, which is presented at each public Commission Meeting. CNSC staff shall develop a consolidated table to track and communicate the ongoing work to the Commission through the aforementioned *Status Report on Power Reactors*.

3.0 APPLICATION OF THE *IMPACT ASSESSMENT ACT*

14. In coming to its decision, the Commission was first required to determine whether any requirement under the IAA applied to the amendment being sought, and whether an impact assessment of the Proposal was required.

15. Pursuant to the IAA and the [Physical Activities Regulations](#)¹⁴ made under it, impact assessments are to be conducted in respect of projects identified as having the greatest potential for adverse environmental effects in areas of federal jurisdiction. Bruce Power's application pertains solely to the administration of a licence condition; no new licenced activities are being proposed by Bruce Power. The proposed licence amendment is not a project designated in the *Physical Activities Regulations* under the IAA.
16. The Commission concludes that there is no requirement under the IAA for an impact assessment to be completed. The Commission is also satisfied that there are no other applicable requirements of the IAA to be addressed in this matter.¹⁵

4.0 ISSUES AND COMMISSION FINDINGS

17. In making its licensing decision, the Commission considered a number of issues and submissions relating to Bruce Power's qualification to carry out the proposed licensed activities. The Commission also considered the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.
18. The matter before the Commission is an application to amend an existing power reactor operating licence to reflect recent developments and Commission decisions related to pressure tubes. The Commission will focus its reasons on the issues that it considers the most relevant to the requested amendment, specifically:
 - Assessment of the licence application
 - The technical basis for the proposed amendment in relevant [safety and control areas](#)¹⁶ (SCAs)
 - Indigenous engagement and consultation
 - The proposed licence amendment and changes to the Licence Conditions Handbook

4.1 Assessment of the Licence Application

19. The Commission examined the sufficiency of Bruce Power's [application](#) and the adequacy of the information submitted, as required by the NSCA, the [General Nuclear](#)

¹⁴ SOR/2019-285.

¹⁵ The IAA can impose other requirements on federal authorities in respect of authorizing projects that are not designated as requiring an impact assessment, including projects that are to be carried out on federal lands, or projects outside of Canada. This licence amendment does not engage any such applicable IAA requirements.

¹⁶ SCAs are the technical topics used by CNSC staff across all regulated facilities and activities to assess, evaluate, review, verify and report on regulatory requirements and performance.

Safety and Control Regulations¹⁷ (GNSCR), the Class I Nuclear Facilities Regulations¹⁸ (CINFR), and other applicable regulations made under the NSCA.

20. The GNSCR require a licence amendment applicant to provide to the CNSC information regarding any changes in information as part of its application. Section 6 of the GNSCR provides:

An application for the amendment, revocation or replacement of a licence shall contain the following information:

- (a) 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;
- (b) a statement identifying the changes in the information contained in the most recent application for the licence;
- (c) 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; and
- (d) the proposed starting date and the expected completion date of any modification encompassed by the application.

Section 7 of the GNSCR also provides that:

An application for a licence or for the renewal, suspension in whole or in part, amendment, revocation or replacement of a licence may incorporate by reference any information that is included in a valid, expired or revoked licence.

21. Bruce Power provided information to satisfy the requirements set out in Section 6 of the GNSCR in attachment A of its application. Bruce Power noted that the proposed amendment would not result in the need for any changes to the material submitted in support of its most recent licence renewal¹⁹ and licence amendment²⁰ applications. In Appendix A.2 of CMD 23-H103, CNSC staff reported that its assessment of Bruce Power's licence application included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements.
22. The Commission concludes that Bruce Power's licence amendment application complies with the regulatory requirements respecting an application for a licence amendment. The Commission notes that CNSC staff's assessment confirms that Bruce Power's application complies with regulatory requirements.

¹⁷ SOR/2000-202.

¹⁸ SOR/2000-206.

¹⁹ 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, NK21- CORR-00531-13493/NK29-CORR-00531-14085/NK37-CORR-00531-02768.

²⁰ Letter, M. Burton to M. Leblanc, "Application for the Amendment of the Power Reactor Operating Licence", November 25, 2020, BP-CORR-00531-00982.

4.2 Regulatory and Technical Basis for the Proposed Amendment

23. The Commission examined the regulatory and technical basis for the proposed amendment, with a focus on the Fitness for Service SCA. The Commission considered both the applicant's submissions as well as CNSC staff's assessment and analysis.

4.2.1 Background

24. Bruce Power's licence amendment application follows multiple developments regarding the issue of [Heq] in pressure tubes. As noted in section 1.1 of CNSC staff's CMD 23-H103, the issue of [Heq] was raised during the [public hearing](#) on Bruce Power's licence renewal application in 2018,²¹ resulting in the Commission including licence condition 15.3 in the licence. As explained by CNSC staff:

At the time of Bruce Power's licence renewal in 2018, the upper hydrogen equivalent concentration (Heq) limits of the fracture toughness model in CSA standard N285.8, *Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors*,²² was 120 parts per million (ppm) by weight. It was projected that the end-of-life Heq values for some pressure tubes in extended operation²³ would exceed the 120 ppm limit.²⁴

The purpose of licence condition 15.3 was to provide clear compliance criteria for Bruce Power to maintain pressure tube fracture toughness sufficient for safe operation beyond 120 ppm. As noted in the Commission's 2018 [Record of Decision](#), "Pursuant to Licence Condition 15.3, approval by the Commission will be required for Bruce Power to operate with pressure tubes in excess of 120 ppm of [Heq]."²⁵

25. On July 26, 2021, a CNSC designated officer (DO) issued an [order](#) to Bruce Power in respect of the Bruce NGS after [elevated \[Heq\] in pressure tubes was discovered and reported to the CNSC](#). The discovery of elevated [Heq] at Bruce NGS A Unit 3 and Bruce NGS B Unit 6²⁶ was considered by the DO to put into question the predictive capability of the model for the [Heq] levels in operating reactors with pressure tubes in

²¹ CNSC Record of Decision, *Application to Renew the Power Reactor Operating Licence for Bruce A and Bruce B Nuclear Generating Stations*, 2018.

²² N285.8, *Technical requirements for in-service evaluations of zirconium alloy pressure tubes in CANDU reactors*, CSA Group, 2019. The Revision 1 model was included in the 2015 edition of the CSA standard N285.8. Update no. 1 to the 2015 edition was issued in 2019 and included an additional [Heq] limit of 80 ppm with 1.5 m of the front end of a pressure tube.

²³ Extended operation in this case refers to reactors operating beyond 210,000 equivalent full power hours (EFPH).

²⁴ Page 3 of [CMD 23-H103](#).

²⁵ Record of Decision (Application to review licence), *supra* note 18, p. 41.

²⁶ Pressure tube [Heq] measurements were taken from a selected Bruce NGS B Unit 6 pressure tube as a planned activity during the unit's Major Component Replacement project, which includes the replacement of all pressure tubes.

extended operation. The Commission confirmed the DO order following a public hearing held on [September 10, 2021](#).²⁷

26. The order required that:

Prior to the restart of any of Units 3, 4, 5, 7 or 8²⁸, 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.²⁹

CNSC staff established the following restart criteria for each option:

Criteria for option (a):

1. Licensee shall demonstrate an understanding of the mechanism leading to high Hydrogen equivalent (Heq) concentration in the region of interest, and are able to conservatively model Heq concentration in this region.

Criteria for option (b):

1. Sufficient inspection data shall be available for the reactor unit to justify, with a high degree of certainty, that no flaws are present in the region of interest greater than 0.15 mm in depth; and
2. Corrective actions shall be implemented for tubes containing flaws greater than the specified depth.³⁰

²⁷ CNSC Record of Decision, *Review by the Commission of 3 Designated Officer Orders Issued to Bruce Power and Ontario Power Generation Inc. on July 26-27, 2021; and Requests to Restart Reactors subject to the Orders*, DEC 21-H11, November 10, 2021.

²⁸ Bruce NGS Unit 6 was not subject to the order as it has been shut down since January 2020 for its Major Component Replacement project. Bruce NGS A Units 1 and 2 pressure tubes were refurbished in 2012 and have not operated long enough to generate pressure tubes with elevated [Heq].

²⁹ DEC 21-H11, *supra* note 24, para 11.

³⁰ *Ibid*, para 20.

27. Following a public hearing in writing on [November 12, 2021](#), the Commission determined that, by satisfying the criteria for option (b), Bruce Power had satisfied the terms of the order with respect to Bruce NGS Units 4, 5, 7 and 8.³¹ Further, following a public hearing in writing on [February 22, 2022](#), the Commission also determined that, by satisfying the criteria for option (b), Bruce Power had satisfied the terms of the order with respect to Bruce NGS Unit 3.³² With that decision, Bruce Power was no longer required to request authorization to restart any units pursuant to the order, as the Commission considered all of the requirements of the order to have been satisfied.
28. As set out in the above restart decisions, the Commission determined that, consistent with the requirements and objectives of licence condition 15.3, Bruce Power had demonstrated that pressure tube fracture toughness in the region of interest (ROI)³³ was sufficient for safe operation beyond 120 ppm [Heq]. The Commission noted that operation in exceedance of 120 ppm [Heq] applied to the ROI only, as outside of the ROI [Heq] could still be predicted by existing models.
29. Following the discovery of the elevated [Heq] near the outlet rolled joint, Bruce Power performed additional surveillance testing, as part of the Fitness for Service Program, on a pressure tube removed from Bruce Nuclear Generating Station Unit 6, which has been shut down since January 2020 for its Major Component Replacement project. The additional surveillance testing led to the [discovery of elevated \[Heq\] near the inlet end](#) of the pressure tube as well.³⁴ CNSC staff communicated its risk-informed approach to assessing the impact of elevated [Heq] near the inlet rolled joint to the Commission at the November 2022 Commission meeting ([CMD 22-M37](#)). In CMD 22-M37, CNSC staff reported its further analysis which led it to the conclusion that, even with elevated [Heq] at either inlet or outlet region of the pressure tube:
- Level 3³⁵ defense in depth was not affected by the type of pressure tube failure that could potentially result from reduced fracture toughness, since protection against single pressure tube failure is part of the design basis for all CANDU reactors.
 - The increase in Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF)³⁶ due to postulated increases in pressure tube failure

³¹ CNSC Record of Decision, *Request for Authorization to Restart Bruce Nuclear Generating Station A Unit 4 and Bruce NGS Units 5, 7, and 8 following future outages*, [DEC 21-H113](#), February 28, 2022.

³² CNSC Record of Decision, *Request for Authorization to Restart Bruce Nuclear Generating Station A Unit 3 following future outages*, [DEC 22-H100](#), March 9, 2022.

³³ In Section 4 of [CMD 21-H11](#), CNSC staff defined the “region of interest” for the Bruce NGS A and B, as the region of the pressure tubes 75 mm inboard from the outlet burnish mark and 360° of the pressure tube circumference.

³⁴ CMD 22-M16, *Event Initial Report – Bruce Power Elevated Hydrogen equivalent concentration [Heq] in the inlet rolled joint of a Bruce pressure tube removed from service*, March 24, 2022.

³⁵ There are 5 independent and redundant layers of [defence in depth](#), with Level 1 being the first layer of defence and level 5 being the last layer which aims to mitigate consequences of a radiological release in the highly unlikely event of a severe accident not controlled through the preceding layers. Level 3 defense in depth is achieved through the provision of inherent safety features to minimize the consequences of pressure tube failure and maintain at least one barrier to prevent radioactive releases.

³⁶ SCDF: Less than 1 occurrence in 10,000 years, LRF: Less than 1 occurrence in 100,000 years.

frequency was negligible for up to 3 years of continued operation. This conclusion was based on CNSC staff's review of Bruce Power's sensitivity analysis of the Probabilistic Safety Assessment (PSA) results, as well as CNSC staff's own independent PSA sensitivity analysis.

4.2.2 *Assessment of Proposed Amendment and Associated Compliance Verification Criteria*

30. In its application (CMD 23-H103.1), Bruce Power is proposing that licence condition 15.3 be removed from the licence, as it is no longer required. Bruce Power further proposes that licence condition 6.1 be updated to reflect the advancements in the licensing basis – including the restart decisions – and the state of industry knowledge on pressure tubes.

31. Licence condition 6.1 requires that:

The licensee shall implement and maintain a fitness for service program.

The Fitness for Service SCA covers activities that impact the physical condition of structures, systems, and components to ensure that they remain effective over time. Paragraph 6(d) of the *Class I Nuclear Facilities Regulations* requires that an application to operate a Class I nuclear facility contain the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

32. In Attachment A of CMD 23-H103.1, Bruce Power proposed 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. Bruce Power proposed that the compliance verification criteria documented within Section 6.1 of the associated Licence Condition Handbook be updated to include the following definitions of the ROIs 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 [CSA Group standard] N285.4³⁷ 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 results which demonstrate that the high [Heq] 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.

³⁷ N285.4, *Periodic inspection of CANDU nuclear power plant components*, CSA Group, 2019.

- 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.
33. In section 2.2 of CMD 23-H103, CNSC staff submitted that the fitness for service program requirements under licence condition 6.1 have been demonstrated to be effective for assuring the safe operation of pressure tubes. CNSC staff noted, however, that many of the models and the evaluation processes used to assess pressure tube fitness for service in CSA N285.8 have not been validated for levels of [Heq] that were observed near the rolled joint burnish marks in some Bruce NGS pressure tubes in extended operation.
34. Since the fitness for service compliance verification criteria associated with licence condition 6.1, established in Section 6.1 of the Licence Conditions Handbook, cannot be applied for the ROI of pressure tubes, CNSC staff recommended that the Commission include a new licence condition under the Fitness for Service SCA. Rather than accept Bruce Power's proposal, CNSC staff recommended the addition of licence condition 6.2 to require that Bruce Power implement and maintain an enhanced fitness for service program for fuel channels in extended operation.
35. CNSC staff noted that the applicability of the crack initiation, crack growth and fracture toughness models for the [Heq] levels in the regions of interest still needs to be demonstrated, and that Bruce Power has undertaken an R&D program to extend the [Heq] limits for the models used to demonstrate pressure tube fitness for service. CNSC staff recommend that licence condition 6.2 remain in place until Bruce Power completes the R&D work and can demonstrate to the Commission's satisfaction that it meets the fitness for service criteria under licence condition 6.1 applicable to the ROIs of pressure tubes.
36. In Part 2 of CMD 23-H103, CNSC staff submitted compliance verification criteria for the proposed licence condition 6.2 as a draft section of the Licence Conditions Handbook for the proposed licence. CNSC staff explained that the proposed criteria would establish the requirements for Bruce Power to report on the status of its R&D activities and the compliance verification approaches relating to the safe operability of pressure tubes when the validity of the fitness for service criteria established in the existing licence condition 6.1 cannot be confirmed.
37. CNSC staff proposed that ROIs be adopted for the interim evaluations of safe operability of pressure tubes as follows:
- Inlet region of interest (IROI): The region encompassing the full circumference of a pressure tube extending 20 mm axially inboard of the inlet rolled joint burnish mark.

- Outlet region of interest (OROI): The region encompassing the full circumference of a pressure tube extending 75 mm axially inboard of the outlet rolled joint burnish mark.
38. In section 2.2 of CMD 23-H103, CNSC staff noted that the compliance verification criteria for pressure tubes in extended operation has evolved and is focused on Bruce Power updating fitness for service evaluation methodologies for flaws in the regions where [Heq] is potentially elevated to levels observed near the rolled joints of some Unit 3 and Unit 6 pressure tubes. CNSC staff added that the work Bruce Power is undertaking is expected to take approximately 3 years to complete – CNSC staff’s compliance verification criteria in the Licence Conditions Handbook include a requirement for Bruce Power to submit progress reports to CNSC staff on six-month intervals. In the meantime, Bruce Power would be required to demonstrate that the alternative criteria adopted following the Unit 3 and Unit 6 events – i.e. the criteria that were used by Bruce Power to demonstrate to the Commission that it had satisfied option (b) of the order for the Bruce NGS units³⁸ – remain valid.
39. CNSC staff submitted that it would continue to monitor Bruce Power’s performance in respect of pressure tube fitness for service, through the compliance verification activities proposed by CNSC in relation to licence conditions 6.1 and 6.2. CNSC staff added that it would continue to update the Commission on pressure tube fitness for service at the Bruce NGS A and B through Commission meeting items, the annual [Regulatory Oversight Report on Nuclear Power Generating Sites](#), and other reporting mechanisms, as appropriate.

Views of Intervenors

40. The Commission considered the submissions from 8 intervenors. Six intervenors expressed support for Bruce Power’s licence amendment application.³⁹
41. Dr. Frank Greening ([CMD 23-H103.4](#)) disagreed with Bruce Power’s reason for requesting the licence amendment. Dr. Greening disagreed with Bruce Power’s confidence that there are no flaws present in the ROI, as not all pressure tubes can be inspected and tested. Dr. Greening provided a detailed assessment of the matter of elevated [Heq] in pressure tubes at the Bruce NGS. Dr. Greening submitted that, based on the reported measured results, Bruce Power was in non-compliance with regard to both CSA N285.4 and CSA N285.8, as well as licence condition 15.3.

³⁸ [DEC 21-H113](#), *supra* note 28, and [DEC 22-H100](#), *supra* note 29.

³⁹ Canadian Nuclear Laboratories ([CMD 23-H103.2](#)), the Canadian Nuclear Association ([CMD 23-H103.5](#)), the Canadian Nuclear Workers’ Council ([CMD 23-H103.6](#)), Ontario Power Generation Inc. ([CMD 23-H103.7](#)), the CANDU Owners Group Inc. ([CMD 23-H103.8](#)), and Kinectrics Inc. ([CMD 23-H103.9](#)).

42. Dr. Greening further submitted concerns regarding:
- the lack of understanding of the mechanism by which the elevated [Heq] is forming
 - the inadequacy of modelling (e.g., the fracture toughness model described in CSA N285.8, given the anomalous results)
 - the long timeframes required to conduct additional R&D to address the knowledge gaps pertaining to the above

Dr. Greening highlighted that the fracture toughness of a pressure tube depends on several variables including temperature, neutron fluence, and [Heq], and noted that the effects of these variables need to be included in a meaningful evaluation.

43. Dr. Greening further submitted dissatisfaction that Bruce Power had not determined the root cause of the elevated [Heq]. Dr. Greening's view is that licence condition 15.3 should remain in Bruce Power's licence until:
- i. Bruce Power provides a new fracture toughness model which is accepted and validated by the CNSC before any Bruce NGS units are allowed to operate; and
 - ii. Bruce Power provides a root cause report to explain how and why the rate of H/D (hydrogen/deuterium) entry is accelerating near some pressure tube rolled joints, leading to elevated levels of H/D – levels that exceed the 120 ppm CSA N285.8 limit.
44. The Saugeen Ojibway Nation (SON) ([CMD 23-H103.3](#)) submitted its concerns that the limit in licence condition 15.3 had been exceeded. The SON recommended that licence condition 15.3 be modified with new, science-based thresholds established on the basis of existing models. The SON submitted its view that allowing the Bruce NGS to continue to operate above the established limit while providing the industry with time to complete additional research was not a logical approach. The SON also noted that it was not reassured by CNSC staff's assessment that a pressure tube failure was in the design basis of the Bruce NGS, and that safety systems and mitigation measures were in place to safely shut down the reactor.

Submissions by the External Advisory Committee

45. Established on July 30, 2021, the EAC was created by the Commission, under its statutory authority to establish advisory committees, to complement the expertise of Commission Members, and to provide an external perspective for the benefit of Commission members in their role as decision-makers. Its goal is to provide Commission members with objective and impartial expert advice in technical matters related to pressure tubes, notably Heq exceedances and modelling. At the request of the Commission, the EAC provided an assessment of the submissions available on the record ([CMD 23-H103.10](#)).

46. The EAC agreed that licence condition 15.3 was no longer required, as the condition it required to be met had already been exceeded. The EAC also agreed with CNSC staff's recommendations and supported the inclusion of the proposed new licence condition 6.2, as the elevated [Heq] levels warranted rigour beyond the scope of licence condition 6.1. The EAC did not raise any concerns regarding Bruce Power's management of the pressure tube issue and the industry's response to investigate and address it.
47. The EAC disagreed with Dr. Greening's view that Bruce Power is in violation of CSA N285.8, on the basis that Clause D.13.2.3.1.3 of CSA N285.8 specifically allows a justification for fitness for service to be made in the case where the [Heq] exceeds the limits. The EAC noted that Bruce Power is following this clause. The EAC added that, in its view, the appropriate question, considering the high [Heq] values, is whether the justification for fitness for service is acceptable. While the EAC did not share Dr. Greening's concerns regarding aspects of formulation and approaches described in CSA N285.8, the EAC noted its agreement with Dr. Greening that Bruce Power needs to continue to investigate the origin of the increased [Heq], and whether this arises purely from redistribution of the hydrogen or from increased hydrogen pickup, or both.
48. The EAC raised 7 questions and made 3 recommendations for the Commission's consideration. The EAC recommended that a table of the required R&D and other activities be assembled and be agreed to by the licensee and the CNSC. The EAC also recommended an independent review of Bruce Power's Finite Element Diffusion Analysis by a technical expert to provide an additional level of assurance. The EAC noted that the industry has previously commissioned a review of complex technical reports using an independent expert endorsed by the CNSC. The EAC also commented that it had not been afforded the opportunity to review Bruce Power's reference material.
49. In [CMD 23-H103Q](#), the Commission sought responses to the questions raised by EAC from Bruce Power and CNSC staff. The Commission also asked the Commission Registry to follow up with the EAC regarding the review of reference material and to seek clarification regarding the recommended independent review of Bruce Power's Finite Element Diffusion Analysis. Through subsequent communication with the Commission Registry, captured in [CMD 23-H103.10A](#), the EAC reviewed the reference material and provided the requested clarification. The EAC noted the preliminary nature of the Finite Element Diffusion Analysis and highlighted that "when the work is more advanced and that a resulting report does propose a new methodology that is applicable industry-wide, this report should be reviewed by an independent expert before it accepted as an industry standard methodology by the CNSC."⁴⁰ The EAC also identified one supplemental question for the Commission's consideration, and confirmed that it had no further comments on the responses to questions.
50. The Commission subsequently sought responses for the supplemental question through [CMD 23-H103Q.A](#). The responses to the questions are discussed below. The EAC confirmed with the Commission Registry that it had no further comments or questions

⁴⁰ Page 3 of [CMD 23-H103.10A](#).

on the responses to the supplemental question; the EAC's conclusions remained unchanged.

51. In the EAC Report ([CMD 23-H103.10B](#)), the EAC expressed its view that “fitness for service of CANDU pressure tubes was preserved throughout the process. While there remains much work to be done to fully understand the phenomena that produce regions of high Heq, enough has been done by the licensees to definitively provide assurance that the plants can operate safely while the additional work is completed.”⁴¹

Responses to Questions

52. With respect to the definition of the ROI (question 2 for Bruce Power in CMD 23-H103Q), Bruce Power confirmed in CMD 23-H103.1A its understanding that the definition of the ROI in the licensing basis is the full 360° circumference of the pressure tube, as described in CNSC staff's proposed compliance verification criteria. Bruce Power noted that, based on its inspection/surveillance results and modelling results to date, it is confident that the extent of the ROI is less than 180°. Bruce Power acknowledged that additional R&D work will need to be completed before the definition of ROI could be changed in the licensing basis.
53. With respect to the verification of Bruce Power's Finite Element Diffusion Analysis on samples taken from pressure tubes (question 3 for Bruce Power in CMD 23-H103Q), Bruce Power confirmed in CMD 23-H103.1A that it had compared the analysis results to measurements from samples. Bruce Power explained that the results of examinations of localized areas of pressure tube inlets with elevated [Heq] showed a clear through-wall [Heq] gradient with the elevated [Heq] residing on the outside diameter of the pressure tube. Bruce Power reported that the results of the Finite Element Diffusion Analysis have been representative, or slightly conservative, relative to the measurements taken from the pressure tube samples.
54. Asked about the ramifications for scrape samples taken from the inside of pressure tubes if the elevated [Heq] has been found residing on the outside (question 4 for Bruce Power in CMD 23-H103Q), Bruce Power submitted in CMD 23-H103.1A that it was highly unlikely that scrape sampling would be able to measure elevated [Heq]. Bruce Power noted that scrape measurements performed at locations with elevated [Heq] on the outside had not found high [Heq] results.
55. Further on this subject (question 2 for CNSC Staff in CMD 23-H103Q), CNSC staff noted in CMD 23-H103.A that the diffusion of hydrogen isotopes through the pressure tube wall thickness will need to be modelled for extended operation of pressure tubes. CNSC staff submitted that, while scrape samples inside pressure tubes cannot be used to confirm that the model predicts appropriate [Heq] values at the outside surface, the scrape samples can provide ongoing confirmation that the near inside surface [Heq] measurements do not exceed model predictions for potential flaw locations. CNSC staff

⁴¹ Page 8 of [CMD 23-H108.10B](#).

highlighted that, in addition to scrape samples, model validation activities will require through-thickness [Heq] measurements from pressure tubes removed from service, to confirm the ability of the model to simulate [Heq] profiles near the inlet rolled joints.

56. CNSC staff added that the inlet rolled joint region Finite Element Diffusion Analysis will need to model the formation of the outside surface “blip”⁴² of elevated [Heq], as well as the through-thickness evolution of the region of elevated [Heq] associated with the blip, factoring in the sensitivity of model predictions to expected ranges of influential parameters. CNSC staff further added that the modelling will also need to demonstrate that there will be no adverse interactions between the outside surface region of elevated [Heq] and inside surface flaws for end-of-life conditions of pressure tubes, to confirm that existing methodologies can be used to verify fitness for service of pressure tubes with flaws.
57. In response to the supplemental question in CMD 23-H103Q.A on the applicability of the results of the Finite Element Diffusion Analysis for use in a fitness-for-service evaluation (question 1 for CNSC staff), CNSC staff reiterated in CMD 23-H103.B that it did not accept Bruce Power’s Proposal that the results of the Finite Element Diffusion Analysis could be used as compliance verification criteria for fitness for service. CNSC staff noted that its position is that the approach proposed by Bruce Power should only be adopted for fitness for service compliance verification when the [Heq] model has reached a sufficient state of development. CNSC staff further noted that it had previously communicated its risk-informed approach to the Commission at the November 2022 Commission meeting ([CMD 22-M37](#)).
58. In its response to the supplemental question in CMD 23-H103Q.A (question 1 for Bruce Power), Bruce Power clarified in CMD 23-H103.1B that although the preliminary results of the Finite Element Diffusion Analysis could not be directly applied in fitness for service evaluations of other pressure tubes, the results supported Bruce Power’s assessment that the observed “blip” of elevated [Heq] on the outside of a pressure tube would have no impact on existing pressure tube fitness for service evaluations. Bruce Power acknowledged that additional work would be required to further develop the methodology, and reiterated that it continues to follow the requirements of CSA N285.4 and CSA N285.8 to demonstrate fitness for service in the IROI. Bruce Power’s response also indicated Bruce Power’s understanding of CNSC staff’s position that the evaluation of all Bruce Power pressure tube fitness for service assessments will be conducted using CNSC staff’s risk-informed approach until the end of 2025, while industry completes its R&D program.
59. Regarding the tracking of actions (question 5 for Bruce Power and question 3 for CNSC staff in CMD 23-H103Q), Bruce Power submitted in CMD 23-H103.1A that it has been providing, and will continue to provide, routine updates on key R&D activities to CNSC staff. CNSC staff noted in CMD 23-H103.A that it tracks R&D activities used to assess safety margins within the licensing basis under the CNSC’s

⁴² The localized region of elevated [Heq] is referred to as a “blip” by the industry, which is based on the shape of the [Heq] profile.

compliance verification process. CNSC staff added that it is tracking Bruce Power's progress and submissions related to this matter under an internal tracking number (CNSC Action Item 2023-07-27173). CNSC staff noted that it would continue to update the Commission on the status of Bruce Power's R&D plan through annual updates in the CNSC's Regulatory Oversight Report on Nuclear Power Generating Sites, or as the need arises.

60. In CMD 23-103.1A, Bruce Power also provided information concerning its ongoing work to ensure that pressure tubes remain fit for service and to prevent pressure tube failure (question 6 to Bruce Power in CMD 23-H103Q). Bruce Power noted that it has not relied on the ability to mitigate a pressure tube failure as its sole justification for continued operation. Bruce Power noted its extensive pressure tube fitness for service program, which incorporates findings from in-service inspections, surveillance, and R&D. Bruce Power submitted that it has completed multiple assessments that have demonstrated that pressure tubes remain fit for service with the presence of elevated hydrogen equivalent concentration in both the inlet and outlet rolled joint area. Bruce Power added that it uses the information from these assessments to inform its operations to provide further safety margins. Bruce Power also submitted that its hydrogen equivalent concentration R&D program is intended to further validate the inputs used in these assessments and produce predictive tools for the future. Bruce Power emphasized that a pressure tube failure would have serious economic and reputational consequences, even if public safety was not threatened.

4.2.3 Conclusion on Regulatory and Technical Basis for the Proposed Amendment

61. The Commission is satisfied that licence condition 15.3 is no longer applicable, given that the [Heq] limit of 120 ppm has been exceeded. The Commission acknowledges the concerns raised by intervenors regarding the exceedance of the limit. The Commission notes that its previous decisions to authorize the restart of the Bruce NGS units in extended operation were on the basis that Bruce Power had demonstrated that pressure tube fracture toughness in the ROI was sufficient for safe operation beyond 120 ppm [Heq]. The Commission appreciates the view of the EAC that, in the EAC's opinion, the fitness for service of CANDU pressure tubes has been preserved throughout the process of addressing the issue.
62. The Commission is satisfied that Bruce Power is not in violation of CSA N285.8, because Bruce Power is following Clause D.13.2.3.1.3 of CSA N285.8 and providing acceptable justification for fitness for service in the case where the [Heq] is exceeding the limits.
63. The Commission does not accept Bruce Power's proposal to update licence condition 6.1 to reflect the advancements in the licensing basis and the state of industry knowledge on pressure tubes. The Commission agrees with CNSC staff and the EAC that:

- the fitness for service criteria associated with licence condition 6.1 cannot be applied for the ROI of pressure tubes; and
- the matter of elevated [Heq] levels warrants enhanced rigour beyond the scope of licence condition 6.1.

The Commission finds that proposed licence condition 6.2 recommended by CNSC staff, to require that Bruce Power implement and maintain an enhanced fitness for service program for fuel channels in extended operation, will provide for adequate regulatory oversight. The Commission notes that Bruce Power is required to demonstrate that it continues to meet the criteria used to satisfy option (b) of the order while updating its fitness for service evaluation methodologies for flaws in the regions where [Heq] is potentially elevated.

64. The Commission recognizes that the R&D work that Bruce Power is undertaking is expected to take approximately 3 years to complete, in addition to the work that has already taken place over several years, and acknowledges the long timeframe to complete this work. The Commission notes the views of the EAC that, while there remains much work to be done to fully understand the phenomena that produce regions of high Heq, enough has been done by the licensees to provide well-reasoned assurance that the plants can operate safely while the additional work is completed. While CNSC staff have proposed that Bruce Power submit research progress reports semi-annually, the Commission wants to remain engaged on this matter. As such, the Commission directs CNSC staff to provide updates on Bruce Power's progress in its R&D activities through the regular *Status Report on Power Reactors*, which is presented at each public Commission Meeting.
65. The Commission acknowledges the concerns raised by Dr. Greening regarding the need to better understand the mechanisms that led to the formation of elevated [Heq] and to address the models used to demonstrate pressure tube fitness for service. The Commission expects Bruce Power to consider Dr. Greening's submissions as it continues to investigate the cause(s) of the elevated [Heq] and to update the models.
66. With respect to the EAC's recommendation regarding a consolidated table to track progress, while the Commission is satisfied that CNSC staff has appropriate mechanisms in place to effectively track the work through its compliance verification activities, the Commission is of the view that such a table will provide an objective and transparent means to monitor progress. The Commission directs CNSC staff to develop a table to track and communicate the ongoing work to the Commission through the aforementioned *Status Report on Power Reactors*.
67. The Commission also accepts the EAC's recommendation that Bruce Power engage an independent third-party to further assess its technical reports. If a new methodology for evaluating pressure tube fitness for service that is applicable industry-wide is proposed, Bruce Power shall have it reviewed by an independent third party before submitting it for CNSC acceptance.

4.3 Indigenous Engagement and Consultation

68. The Commission considered the various Indigenous engagement activities of Bruce Power and CNSC staff in relation to this matter. Indigenous consultation refers to the common law duty to consult with Indigenous Nations and communities pursuant to section 35 of the [Constitution Act, 1982](#).⁴³ This is distinct from engagement activities conducted by the applicant and CNSC staff, carried out as part of the application process and on an ongoing basis.

4.3.1 Indigenous Consultation

69. The common law duty to consult with Indigenous Nations and communities applies when the Crown contemplates action that may adversely affect established or potential Indigenous and/or treaty rights. The CNSC, as an agent of the Crown and as Canada's nuclear regulator, recognizes and understands the importance of building relationships and engaging with Canada's Indigenous Nations and communities. The CNSC ensures that its licensing decisions under the NSCA uphold the honour of the Crown and consider Indigenous Nations and communities' potential or established Indigenous and/or treaty rights pursuant to section 35 of the [Constitution Act, 1982](#).
70. The duty to consult is engaged wherever the Crown has "knowledge, real or constructive, of the potential existence of an Aboriginal right or title and contemplates conduct that might adversely affect it".⁴⁴ Licensing decisions of the Commission, where Indigenous interests may be adversely impacted by its decision, will therefore engage the duty to consult, and the Commission must be satisfied that it has met the duty prior to making the relevant licensing decision.
71. In section 2.3 of CMD 23-H103, CNSC staff submitted that the proposed licence amendment – to remove licence condition 15.3 – was not for a new project and was not likely to cause adverse impacts to Indigenous and/or treaty rights.

4.3.2 Indigenous Engagement

72. In section 2.3 of CMD 23-H103, CNSC staff submitted that it is committed to building long-term relationships with Indigenous Nations and communities who have interest in CNSC-regulated facilities within their traditional and/or treaty territories. CNSC staff noted that its Indigenous engagement practices include sharing information, discussing topics of interest, seeking feedback and input on CNSC processes, and providing opportunities to participate in environmental monitoring.
73. The Saugeen Ojibway Nation (SON) ([CMD 23-H103.3](#)) noted that nuclear development has occurred on its territory over the past 60 years, and expressed that it

⁴³ *Constitution Act, 1982*, Schedule B to the *Canada Act 1982*, 1982, c. 11 (U.K.).

⁴⁴ *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73 at para 35.

has ongoing concerns regarding the operation of the Bruce NGS. The SON highlighted that increased risk, and the perception of risk, can cause fear, strain, and dread. The SON added that increased information sharing and transparency between the CNSC, Bruce Power, and the SON can help mitigate such concerns. To that end, the SON proposed that the Commission include a licence condition requiring Bruce Power to keep the SON informed about [Heq] levels, pressure tube fitness, and the ongoing R&D into fracture toughness modelling.

74. In response to questions from the Commission on its engagement efforts regarding pressure tube fitness for service (questions 1 and 7 for Bruce Power in CMD 23-H103Q), Bruce Power highlighted in CMD 23-H103.1A that it has existing engagement protocols with the SON, as well as with the Historic Saugeen Métis (HSM) and the Métis Nation of Ontario (MNO), which outline its requirement to report to the communities on regulatory matters. Bruce Power noted that it meets regularly with each community. Bruce Power submitted that it would continue to utilize the existing protocols and address any gaps through the protocol agreements. Bruce Power noted that the agreement between the SON and Bruce Power was set to expire, and that a new comprehensive agreement was being drafted; as such, there would be an opportunity to review the protocols and ensure the adequacy of communication.
75. In its response to Commission questions (questions 1 and 4 for CNSC staff in CMD 23-H103Q), CNSC staff submitted in CMD 23-103.A that it encourages Bruce Power to follow up with each and every identified Indigenous Nation and community in the vicinity of the Bruce NGS to confirm whether its communication and engagement processes are satisfactory and appropriately tailored to the needs of the Indigenous Nation or community, or to identify what adjustments need to be made.
76. CNSC staff noted that it also has regular meetings with each of the identified Indigenous Nations and communities, per signed Terms of Reference of Long-Term Engagement. CNSC staff further noted that it seeks feedback from Indigenous Nations and communities on whether the information flow from Bruce Power and CNSC staff is adequate, and that it endeavours to incorporate this feedback in its future engagement activities. CNSC staff reiterated its commitment to continue engaging the SON about elevated [Heq] in pressure tubes and other licensing-related topics.
77. With respect to licence conditions for informing interested parties of licensed activities, CNSC staff explained that licence condition G.5 requires that Bruce Power implement and maintain a public information and disclosure program (PIDP). CNSC staff noted that the requirements and expectations for communication and engagement are set out in CNSC's regulator document [REGDOC-3.2.1, *Public Information and Disclosure*](#).⁴⁵ CNSC staff submitted that, for this specific licence amendment application, and as verified through ongoing compliance verification activities, CNSC staff is satisfied with Bruce Power's communication and engagement with identified key target audiences. CNSC staff confirmed that Bruce Power communicated and engaged not

⁴⁵ REGDOC-3.2.1: *Public and Aboriginal Engagement – Public Information and Disclosure*, version 1, CNSC, May 2018.

only with stakeholders but also with Indigenous Nations and communities in the vicinity of the Bruce NGS, including the SON, HSM and MNO.

4.3.3 *Conclusion on Indigenous Consultation and Engagement*

78. The Commission concludes that the proposed licence amendment will not result in any changes to Bruce Power's operations that might cause any adverse impacts to any potential or established Indigenous and/or treaty rights.⁴⁶ The Commission is satisfied that CNSC staff's ongoing engagement activities have been adequate. The Commission acknowledges the current efforts and commitments made by Bruce Power in relation to Indigenous engagement, as well as CNSC staff's efforts in this regard on behalf of the Commission.
79. The Commission finds that Indigenous engagement activities carried out in respect of the proposed licence amendment application were adequate on the basis that the proposed licence amendment does not give rise to potential new adverse impacts that engage the consultation duty and no further impacts to the health of persons or the environment are expected.
80. With respect to the SON's recommendation that the licence include a condition to require that Bruce Power keep the SON informed regarding [Heq] levels, pressure tube fitness, and the ongoing R&D into fracture toughness modelling, the Commission is satisfied that this obligation is fulfilled by licence condition G.5 requiring that the licensee implement a public information and disclosure program. The Commission expects Bruce Power to continue to engage directly with the SON and other interested Indigenous communities regarding the ongoing developments with respect to [Heq] and pressure tube fitness for service, and to ensure that their communication needs are being met.
81. The Commission likewise expects CNSC staff to fulfill its commitment to continue engaging with the SON, as well as other Indigenous Nations and communities and interested parties, about elevated [Heq] in pressure tubes and other licensing-related topics.

⁴⁶ *Rio Tinto Alcan v. Carrier Sekani Tribal Council*, 2010 SCC 43 at paras 45 and 49.

4.4 Licence Amendments

82. In Part 2 of CMD 23-H103, CNSC staff included a proposed amended licence PROL 18.03/2028 and draft changes to the associated Licence Conditions Handbook. The proposed licence removes licence condition 15.3 relating to pressure tube fracture toughness and includes the proposed new licence condition 6.2 relating to a fitness for service program for fuel channels in extended operation:

The licensee shall implement and maintain an enhanced fitness for service program for fuel channels in extended operation.

83. As described in section 4.2 of this *Record of Decision*, the Commission is satisfied that:
- licence condition 15.3 is no longer applicable and can thus be removed from the licence
 - the proposed licence condition 6.2 will provide for adequate regulatory oversight of fuel channels in extended operation.

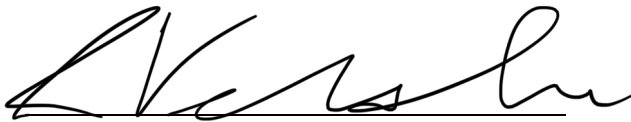
The Commission accepts the proposed amended licence as recommended by CNSC staff. The amended licence remains valid until September 30, 2028. The Commission notes that CNSC staff can bring any matter to the Commission as required.

84. Regarding CNSC staff's recommendation that licence condition 6.2 remain in place until the R&D work committed to by Bruce Power is complete and until Bruce Power can demonstrate to the Commission's satisfaction that the fitness for service criteria under licence condition 6.1 applicable to the ROIs of pressure tubes can be met, the Commission notes that it will consider any future licence amendment application that may be made in a separate public proceeding of the Commission.

5.0 CONCLUSION

85. The Commission has considered Bruce Power's application to amend the power reactor operating licence for the Bruce NGS A and B to remove licence condition 15.3 and to consolidate all requirements for fitness for service applicable to pressure tubes under licence condition 6.1. The Commission has also considered the information and submissions of Bruce Power, CNSC staff and the EAC, as well as the interventions submitted for the hearing. Based on its consideration of the evidence on the record, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, amends the power reactor operating licence issued to Bruce Power for the Bruce NGS A and B, to remove licence condition 15.3 and add licence condition 6.2, as recommended by CNSC staff. The amended licence, PROL 18.03/2028, remains valid until September 30, 2028.

86. The Commission finds that the matter of the fitness for service of pressure tubes has evolved over time with the discovery of elevated [Heq], and the subsequent analysis of new information from ongoing inspections and testing, as well as continued research and development. The Commission is satisfied that the industry is responding to the new issues as they arise, and that the work of CNSC staff in its analysis, as well as the review and expert advice of the EAC, have assisted the Commission to be confident that its regulatory oversight maintains high standards of safety while responding to new developments in a reasoned and science-based manner.



Rumina Velshi
President,
Canadian Nuclear Safety Commission

October 13, 2023

Date

Appendix A – Intervenors

Intervenors –Written Submissions	Document Number
Canadian Nuclear Laboratories	CMD 23-H103.2
Saugeen Ojibway Nation	CMD 23-H103.3
Frank Greening	CMD 23-H103.4
Canadian Nuclear Association	CMD 23-H103.5
Canadian Nuclear Workers' Council	CMD 23-H103.6
Ontario Power Generation Inc.	CMD 23-H103.7
CANDU Owners Group Inc.	CMD 23-H103.8
Kinectrics Inc.	CMD 23-H103.9