CMD 26-H104 - CNSC staff Submission

Bruce Power’s Request to Increase Reactor Power Limits

Classification	UNCLASSIFIED
Type of CMD	Original
CMD Number	26-H104
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Public hearing date	June, 2026
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Summary	On August 19, 2025, Bruce Power submitted a request seeking Commission approval to increase the reactor, channel, and bundle power limits at Bruce A and Bruce B Nuclear Generating Stations. The increase in the authorized power limits constitutes a licensing basis change.
Actions required	CNSC staff recommend that the Commission: 1. **Authorize** Bruce Power to increase the reactor power limits to intermediate power levels (95.5% full power at Bruce NGS A and 96% full power at Bruce NGS B). 2. **Establish** a Regulatory Hold Point through Licence Condition 15.5, requiring Bruce Power to obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to implementing any power uprates beyond the current limits and up to the intermediate power levels for all units.

	3. **Delegate** authority to the Executive Vice President and Chief Regulatory Operations Officer, Regulatory Operations Branch for the administration of the regulatory hold point associated with the proposed power uprate.

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CMD 26-H104 - Soumission du personnel de la CCSN

Demande de Bruce Power pour l'augmentation des limites de puissance des réacteurs

Classification	Non classifié
Type du CMD	Version initiale
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CMD(s) de référence	S.O.
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Pièces jointes	S.O.
Sommaire	Le 19 août 2025, Bruce Power a soumis une demande d'approbation de la Commission visant à augmenter les limites de puissance des réacteurs, des canaux et des grappes de combustible des centrales nucléaires de Bruce-A et Bruce-B. Cela constitue une modification du fondement d'autorisation.
Actions requises	Le personnel de la CCSN recommande que la Commission : 1. **Autorise** Bruce Power à augmenter les limites de puissance des réacteurs jusqu'aux niveaux de puissance intermédiaires (soit 95.5 % pleine puissance pour les réacteurs de Bruce-A et 96 % pleine puissance pour les réacteurs de Bruce-B).

	2. **Établisse** un point d'arrêt réglementaire (PAR) au moyen de la condition de permis 15.5, exigeant que Bruce Power obtienne l'approbation de la Commission, ou le consentement d'une personne autorisée par la Commission, avant de mettre en œuvre toute augmentation de puissance au-delà des limites actuelles et jusqu'aux niveaux de puissance intermédiaires pour toutes les tranches. 1. **Délègue** au Premier vice-président et chef de la réglementation des opérations le pouvoir d'administrer le PAR associé à l'augmentation de puissance proposée.

CMD 26-H104

CNSC Staff Submission

Bruce Power’s Request to Increase Reactor Power Limits

Signed by:

2026-03-31

X

Signed by: Viktorov, Alexandre

Alexandre Viktorov, Ph. D.
Director General, Directorate of Power Reactor Regulation

Bruce Power's Request to Increase Reactor Power Limits

Canadian Nuclear Safety Commission

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Land acknowledgement

The Canadian Nuclear Safety Commission (CNSC) acknowledges that the Bruce Nuclear Generating Stations (NGS) A and B are located in the Municipality of Kincardine, on the eastern shore of Lake Huron, within Saukiing Anishnaabekiing. This is the traditional territory of the Saugeen Ojibway Nation (SON), the shared treaty and traditional territory of the Saugeen First Nation and the Chippewas of Nawash Unceded First Nation (Neyaashiinigmiing). Bruce NGS A and B are also located on traditional harvesting territories of the Métis Nation of Ontario (MNO) Region 7 and the Historic Saugeen Métis (HSM) peoples.

CNSC staff are committed to ongoing, respectful engagement with Indigenous Nations and communities, promoting open dialogue, supporting reconciliation, and working together to ensure the safe regulation of nuclear activities.

Plain language summary

Bruce Power Inc. (Bruce Power) established Project 2030 (P2030) to increase reactor power for refurbished units, as part of an initiative to increase the total electrical output from the Bruce NGS A and B.

The Bruce NGS A and B reactors are currently authorized to operate at a maximum power level of 92.5% Full Power (FP) and 93.0% FP, respectively.

On August 19, 2025, Bruce Power submitted a request seeking Commission approval to increase the current reactor power levels to intermediate power levels (IPLs) of 95.5% FP at Bruce NGS A and 96% FP at Bruce NGS B.

CNSC staff reviewed Bruce Power's request submission and supporting documents to evaluate the impact of the proposed power increase across all CNSC safety and control areas, and present a recommendation to the CNSC Commission on whether Bruce Power will continue to meet the regulatory requirements described in subsection 24(4) of the *Nuclear Safety and Control Act*.

Inherently, increasing reactor power level results in a proportional increase in the rate of fissions and core heat generation, which in turn, increases the heat load required to be removed by the heat transport system. These changes propagate through the plant's thermal-hydraulic and neutronic behaviour and affect several aspects of operation such as safety margins, system operating limits, and equipment aging etc.

The key elements of the request include demonstrating adequate design, operational and safety analysis margins, and that appropriate measures are in place to ensure that design modifications, documentation revisions, and training are adequately implemented to support safe operation at IPLs.

Bruce Power's request submission indicates that the programs currently in place will be used to implement the proposed power uprate changes. CNSC staff considered the results of compliance verification activities to gain assurance that the existing programs remain adequate to support safe operation at IPLs.

The purpose of this Commission Member Document (CMD) is to present CNSC staff's conclusions and recommendations to inform the Commission's decision on Bruce Power's request to increase the reactor power limits at Bruce NGS A and B to IPLs.

CNSC staff have concluded that:

- the safety analysis demonstrates adequate safety margins for operation at IPLs,
- there are established programs to manage the power level increase and ensure that the plant design and operation remain compliant with all applicable regulatory requirements,
- the proposed changes in reactor power limits are within the existing reactor design and does not alter the existing safety barriers or the safety functions that prevent accidents or reduce their consequences, i.e., defence in depth levels are maintained.

Overall, CNSC staff's assessment concludes that Bruce Power plans to implement the requested power increase in a manner that will continue to meet the regulatory requirements described in subsection 24(4) of the *Nuclear Safety and Control Act*.

CNSC staff recommend that the Commission approve Bruce Power's request and accept CNSC staff recommendations to establish a Regulatory Hold Point (RHP) and delegation of authority. Given that there are a number of activities, completion of which can only be verified as the project progresses closer to the power increase, CNSC staff propose that the Commission establish a RHP under Licence Condition (LC) 15.5 to track completion of items associated with gaining assurance of Bruce Power's operational readiness prior to implementing the proposed power uprate in any unit.

Should the Commission approve Bruce Power's request and accept CNSC staff recommendations, the Bruce NGS A and B Licence Conditions Handbook (LCH) will be updated to account for the RHP and new power limits. There will be no change to the licence conditions in the Bruce Nuclear Generating Stations A and B Power Reactor Operating Licence (PROL 18.04/2028).

Referenced documents in this CMD are available to the public upon request, subject to confidentiality considerations.

CMD Structure

This Commission Member Document (CMD) includes the following:

- An overview of the matter being presented
- Overall conclusions and recommendations
- Environmental Protection Review
- General discussion pertaining to the SCAs that are relevant to this submission
- Consultation and Engagement
- Discussion about other matters of regulatory interest
- Appendices material that complements Sections 1 through 5
- Current licence
- Current licence conditions handbook
- Draft licence conditions handbook for the proposed changes

1 Overview

1.1 Background

Bruce Power Inc. is the licence holder and operator of the Bruce NGS A and B which consist of 8 reactor units. Throughout this document, the licensee will be referred to as Bruce Power.

Bruce NGS A and B are situated on the shores of Lake Huron in the Municipality of Kincardine in Bruce County, Ontario. The stations are operated by Bruce Power under a lease agreement with the owner, Ontario Power Generation (OPG).

Figure 1: Bruce NGS A and B (source: Bruce Power)

1.1.1 Power History of Bruce Power Units

All Bruce NGS A and B reactor units were originally designed to operate at 100% FP. However, only 88% of the generated steam was originally utilized for electricity production and the remaining portion was allocated to heavy water production on the site.

Bruce Power discontinued heavy water production and implemented a series of secondary side improvements to optimize electricity generation between 1984 and 1993. Bruce NGS A, Units 2 and 4 were tested to operate safely at up to 100% FP until 1992. Between 1987 and 1992, reactor power was also increased to 100% FP at Bruce NGS B.

In 1993, reactor power for all units was temporarily reduced to 60% FP due to safety analysis-related concerns, particularly regarding Loss of Coolant Accident (LOCA) scenarios. As the identified concerns were being addressed and safety enhancements were being implemented, power levels were restored to 92.5% at Bruce NGS A in 2003 and 93% FP at Bruce NGS B in 2004.

1.1.2 Bruce Power Project 2030

Bruce Power began an initiative in 2019, to identify and implement opportunities to increase the electrical output at the Bruce NGS A and B. Subsequently, in 2021, this led to the creation of the project now called P2030.

Bruce Power aims to implement a power uprate up to 100% FP for all refurbished units.

A power uprate requires that the safety analyses demonstrate that there will be adequate safety margins; and that the design and operating margins are improved as required by the results of the safety analysis.

All new safety analyses, required to support P2030, considered advancements in safety analysis methods and operating experience. P2030 design changes involve the installation of some new components on the primary and secondary side systems that incorporate modern design engineering while maintaining the same reactor core size and Primary Heat Transport System (PHTS) capacity.

Bruce Power has outlined a two-step approach for the demonstration of adequate safety margins:

- Step 1: Demonstrate that safety margins are acceptable for operation up to the IPLs, defined as 95.5% FP for Bruce NGS A and 96% FP for Bruce NGS B.
- Step 2: Demonstrate that safety margins support operation of both Bruce NGS A and B units up to 100% FP.

Bruce Power's current request is seeking Commission approval for Step 1, i.e., operation at the IPLs. Bruce Power will seek Commission approval for Step 2, i.e., operation up to 100% FP in a separate submission, should it decide to pursue a future power uprate.

Should the Commission approve Bruce Power's request, Bruce Power plans to increase power to IPLs for all refurbished units.

1.1.3 Status of Bruce A and Bruce B Nuclear Generating Station Units

The reactors at Bruce NGS A and B are currently authorized to operate up to a maximum power level of 92.5% FP and 93.0% FP, respectively. The current operating status of the Bruce NGS A and B Units is outlined in Table 1. The Major Component Replacement (MCR) project for all units is estimated to be completed in 2033.

Table 1: Status of Bruce NGS A and B Units

Reactor	Unit	Status
Bruce A	1	In service (refurbished)
	2	In service (refurbished)
	3	Currently in MCR
	4	Currently in MCR
Bruce B	5	In service (MCR planned)
	6	In service (refurbished)
	7	In service (MCR planned)
	8	In service (MCR planned)

1.2 Highlights

1.2.1 Summary of Bruce Power's Request

In April 2025, Bruce Power submitted a letter of intent [1] to request Commission approval to increase reactor power limits to IPLs for all refurbished units.

On August 19, 2025, Bruce Power submitted a request to the CNSC [2] pursuant to Licence Conditions (LCs) G.1 and G.2 of the Bruce NGS A and B PROL 18.04/2028, to request

Commission approval to implement changes to reactor, channel, and bundle power limits at the Bruce NGS A and B.

The request seeks Commission approval to operate all refurbished units at IPLs of 95.5% FP for Bruce NGS A and 96% FP for Bruce NGS B. Bruce Power states that the original design bases for both stations support operation at 100% FP, however; the currently authorized licence limits are 92.5% FP at Bruce NGS A and 93% FP at Bruce NGS B.

Bruce Power indicates that operation at IPLs maintains compliance with the applicable regulatory requirements and with the Bruce NGS A and B Power Reactor Operating Licence PROL 18.04/2028. The request submission and supporting documents include information to demonstrate how Bruce Power will continue to meet the regulatory requirements for the applicable safety and control areas within the CNSC regulatory framework.

The request submission states that the proposed changes for the power uprate to IPLs remain within the existing reactor design bases and are supported by deterministic and probabilistic safety assessments.

Bruce Power's submission includes all existing and newly performed safety analyses that are required for demonstrating adequate safety margins associated with an increased reactor output up to the proposed IPLs.

The request submission and supporting information also include a description of measures that Bruce Power will follow to implement design modifications, operating changes, documentation updates and training updates that may be required to support the power uprate to IPLs.

The request submission indicates that Bruce Power would like to implement the first power uprate on Unit 6, following its planned 2027 outage. Bruce Power intends to implement any required changes at power and during the outage, prior to increasing power to the IPLs.

Bruce Power also notes that information about P2030 has been shared through its Public Information and Disclosure Program, with ongoing engagement of Indigenous Nations and communities and local interested parties.

1.2.2 CNSC Staff Review of Bruce Power's Request

Bruce Power's request to the Commission is focused on demonstrating the presence of sufficient safety margins to justify the proposed power uprate. Bruce Power's submission and complementary information also describe the required changes to be implemented for safe operation at IPLs and include information demonstrating how Bruce Power will continue to meet the regulatory requirements.

CNSC staff performed a comprehensive review on each of the 14 SCAs to determine whether:

- the safety analysis demonstrates sufficient safety margins
- any changes would be required to the compliance verification criteria in the LCH
- the existing Bruce Power programs are sufficient to manage transition to, and operation at IPLs and ensure that the plant design and operation will remain compliant with all applicable regulatory requirements.

The details of the CNSC staff review are presented in Section 3 of the CMD. The following key points are summarized below:

- The proposed changes to the plant design and operation for the power uprate to IPLs remain within the existing reactor design supported by safety analysis such that:
    - Safety Analysis predicts adequate safety margins for operation at IPLs.
    - The requested increase in reactor power to the IPL do not involve altering of the existing safety barriers or the safety functions that prevent accidents or reduce their consequences, i.e., defence in depth levels are maintained.
- The proposed power uprate does not require changes to any LC under Bruce NGS A and B PROL 18.04/2028.
- Bruce Power's programs and processes are well established and there are processes in place for managing the transition to, and operation at, IPLs.

Approval of the request will authorize Bruce Power to proceed with the proposed changes. CNSC staff will only be able verify a number of items, such as, design changes, operating procedures, and training material updates, at a time closer to, but in advance of the power uprate. Therefore, CNSC staff recommend establishment of an RHP to track the completion of the changes and to verify power uprate readiness.

1.2.3 Purpose of the CMD

The purpose of this CMD is to provide CNSC staff's conclusions and recommendations to support the Commission's decision on the Bruce Power request for approval to increase the reactor power limits for all refurbished units to IPLs at Bruce NGS A and B.

This CMD includes information summarizing CNSC staff's review of the Bruce Power's request and supporting documents, including:

1. summary of the outcomes,
2. highlights of CNSC staff's Indigenous consultation and engagement, and
3. CNSC staff recommendations to the Commission.

1.3 Overall Conclusions

CNSC staff reviewed Bruce Power's request, including supporting documents, and conclude that:

1. Bruce Power continues to 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,
2. The safety analysis predicts adequate safety margins for operation at IPLs,
3. There are established programs to manage the power level increase and ensure that the plant design and operation will remain compliant with all applicable regulatory requirements.
4. The proposed changes in reactor power limits are within the existing reactor design and does not alter the existing safety barriers or the safety functions that prevent accidents or reduce their consequences, i.e., defence in depth levels are maintained.

CNSC staff also note the following:

5. No concerns were identified with respect to potential new impacts to Indigenous and/or treaty rights.
6. CNSC staff have a robust regulatory oversight program in place to verify Bruce Power's compliance with all applicable regulatory requirements at IPLs.
7. CNSC staff would update the Commission on the status of the power increase implementation of each unit, if the Commission approves Bruce Power's request.

1.4 Overall Recommendations

CNSC staff recommend that the Commission:

1. **Authorize** Bruce Power to increase the reactor power limits to IPLs.
2. **Establish** an RHP in LC 15.5, requiring Bruce Power to obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to implementing any power uprates beyond the current limits and up to the IPLs for all units.
3. **Delegate** authority to the Executive Vice President and Chief Regulatory Operations Officer (EVP-CROO), Regulatory Operations Branch (ROB) for the administration of the RHP associated with the proposed power uprate.

CNSC staff propose establishing a Regulatory Hold Point (RHP) authorized under Licence Condition (LC) 15.5 to track completion of key items associated with gaining assurance of Bruce Power's operational readiness for the proposed power uprate. Bruce Power cannot implement some of the P2030 changes until Commission approval is granted and subsequently, the project is progressed to a stage closer to the implementation of the power uprate. Therefore, CNSC staff can only verify several items, such as design changes, and updates to operating and training procedures, at a time closer to the power uprate.

If the Commission approves CNSC staff's recommendation for the use of an RHP:

- Bruce Power will not be allowed to increase power beyond 92.5%FP for Bruce NGS A units and 93%FP for Bruce NGS B units if it cannot meet the pre-requisites for the release of the RHP.
- CNSC staff will perform compliance verification activities to confirm that the identified actions have been completed.
- CNSC staff will provide the Commission with updates, when available, regarding the release of the RHP.

If the Commission accepts CNSC staff's recommendation, CNSC staff will revise the Bruce NGS A and B Licence Conditions Handbook (LCH) as specified in Appendix C.6 of this submission.

There will be no changes to the licence conditions in the Bruce NGS A and B PROL 18.04/2028.

2 Environmental Protection Review

CNSC staff conduct Environmental Protection Reviews (EPR) for applications to provide the Commission with the necessary environmental information required for licensing decisions under the *Nuclear Safety and Control Act* (NSCA) and associated regulations. The EPRs help support the Commission's conclusion on whether the proposal provides adequate protection of the environment and the health of people.

CNSC staff reviewed the Bruce Power's request to identify the appropriate type of environmental review. As part of this process, CNSC staff had to assess whether an integrated impact assessment or a federal lands review under the *Impact Assessment Act* (IAA) is required. For this request, neither have been determined as required because it does not include activities listed in the IAA *Physical Activities Regulations* that require an impact assessment, or that meet the definition of a project on federal lands.

An EPR was conducted for this request based on the information and assumptions provided by Bruce Power, the results are presented in Section 3.9 of this CMD.

CNSC staff found that the environmental protection information submitted in the request is sufficient to meet the applicable regulatory requirements under the NSCA and associated regulations.

3 General Assessment of SCAs

The CNSC has a standard set of Safety and Control Areas (SCA) and Specific Areas (SpA) as outlined in CNSC Regulatory Document REGDOC3.5.3, *Regulatory Fundamentals*, as well as on the CNSC public webpage: Safety and control areas - Canadian Nuclear Safety Commission. CNSC staff and Bruce Power independently identified the SCAs that are impacted by the request to increase power limits, as outlined in Table 2. There were no SCAs that were identified as having a high impact from the P2030 project, i.e., there were no changes required to the programs for any SCA.

A list of SpAs impacted by the requested power uprate is provided in Appendix A.4.

The Bruce NGS A and B LCH describes the regulatory requirements that are compliance verification criteria, including, regulations, licence conditions, CNSC Regulatory Documents (REGDOC) and Canadian Standards Association (CSA) standards. CNSC staff note that the power uprate does not require the addition of any new compliance verification criteria (CVC).

CNSC staff reviewed Bruce Power's request submission and supporting documentation against all applicable regulatory requirements and also considered Bruce Power's current performance to formulate conclusions and recommendations.

CNSC staff intend to conduct compliance verification activities, such as inspections, in accordance with the PRRP-COM-IR-101, *PRRP Compliance Verification Strategy*, [53] to verify compliance of the P2030 project as changes are implemented to support the power uprate to IPL.

This section is organized by SCA and presents key information on how regulatory requirements are satisfied and CNSC staff conclusions on Bruce Power's request.

Table 2 : Bruce Power's Assessment on Power Uprate Impact on SCAs

Functional Area	Safety and Control Area	Power Uprate Impact on SCA
Management	Management System	Negligible
	Human Performance Management	Low
	Operating Performance	Medium
Facility and Equipment	Safety Analysis	Medium
	Physical Design	Medium
	Fitness for Service	Negligible
Core Control Processes	Radiation Protection	Negligible
	Conventional Health and Safety	Negligible
	Environmental Protection	Medium
	Emergency Management and Fire Protection	Negligible
	Waste Management	Low
	Security	Negligible
	Safeguards and Non-Proliferation	Negligible
	Packaging and Transport	Negligible

	Nuclear Facility Specific	Low

Impact Categorization Criteria, according to Bruce Power:

Negligible –Bruce Power will confirm and document in the application.

Low – change management required.

Medium – increased focus, analyses and change management required.

High – requires change to the programs that fall under the SCA and impacts Management System at Bruce Power.

3.1 Management System

The management system SCA covers the framework that establishes the processes and programs required to ensure an organization achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.

3.1.1 Regulatory Requirements

The applicable regulatory requirements for the Management System SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- CSA N286-12 – *Management System Requirements for Nuclear Facilities* (2012)
- REGDOC-2.1.2 – *Safety Culture* (2018)

3.1.2 Discussion

Management System

Bruce Power’s management system is documented in BP-MSM-1, *Management System Manual* [3] and describes the organizational structure, programs and processes that covers the licensed activities. These programs, associated procedures and standards are expected to support the implementation of the proposed P2030 activities.

There is no expected change to the Management System for the proposed P2030 activities and Bruce Power’s Management System meets regulatory requirements for operation at IPLs.

CNSC staff conclude that Bruce Power has an established management system in place that will meet all applicable regulatory requirements for the proposed P2030 activities.

Organization

CNSC staff determined that Bruce Power's organizational structure is adequately defined, and roles and responsibilities are documented. There is no expected change to this SpA for the proposed P2030 changes.

CNSC staff conclude that Bruce Power's organization remains adequate to meet regulatory requirements during operation at IPLs.

Performance Assessment, Improvement and Management Review

Bruce Power has a program in place to conduct self-assessments and independent assessments, in accordance with CSA N286-12. There is no expected change or to this SpA for the proposed P2030 activities.

CNSC staff conclude that Bruce Power's program remains adequate to meet regulatory requirements during operation at IPLs.

Operating Experience (OPEX), Problem Identification and Resolution (PI&R)

Bruce Power has an established programs for the use of experience and problem identification and resolution, in accordance with CSA N286-12, that will continue to be utilized for the proposed P2030 changes. There is no expected change to this SpA as a result of the proposed power uprate.

CNSC Staff conducted an inspection of Bruce Power's Engineering Change Control (ECC) program in September 2025 which was focused on Bruce Power's implementation of ECC for P2030. CNSC staff noted that Bruce Power's ECC process includes requirements to collect, review and address relevant internal and external experience through design planning. CNSC staff concluded that Bruce Power reviewed and documented operating experience from previous reactor power uprates at Bruce Power and across the broader nuclear industry.

CNSC staff conclude that Bruce Power's existing processes remain adequate to meet regulatory requirements during operation at IPLs.

Change Management

Bruce Power's ECC process establishes the steps required to control, track, and maintain configuration during changes to Systems, Structures, Components (SSCs) and design basis documentation. There is no expected change to this SpA for the proposed P2030 activities.

In September 2025, CNSC staff conducted an inspection of the ECC programs which sampled P2030 engineering changes. CNSC staff observed that the engineering changes were primarily in the preliminary design phase and Bruce Power continues to progress them through their ECC process as the P2030 project evolves.

CNSC staff identified 12 regulatory compliant findings, and 5 non-compliant findings. The non-compliances were with licensee procedures and were determined to be of negligible safety significance.

CNSC staff conclude that the ECC process is aligned with regulatory requirements and it remains adequate to manage the changes required for operation at IPLs.

Configuration Management

Bruce Power's Configuration Management program defines how the design configuration is established, controlled, and maintained in accordance with the CSA N286-12*,* standard. This program governs the ECC process which includes provisions to identify and update information that is impacted by the engineering change. There is no expected change to this SpA for the proposed P2030 changes.

CNSC staff conclude that the configuration management program meets CSA N286-12 requirements and remains adequate to manage the changes required for operation at IPLs.

Records Management

Bruce Power's documents and records are governed through Bruce Power document, BP-PROG-03.01, *Records Management* [4]. There is no expected change to this SpA for the proposed P2030 activities.

CNSC staff conclude that the record management program meets CSA N286-12 requirements, and remains adequate to meet regulatory requirements during operation at IPLs.

Supply and Contractor Management

Bruce Power has established and implemented programs for supply and contractor management, which also apply to P2030. There is no expected change to this SpA for the proposed P2030 changes.

CNSC staff conclude that the Bruce Power supply and contractor management program is in compliance with the CSA N286-12 requirements and remain adequate to meet regulatory requirements during operation at IPLs.

3.1.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff will conduct compliance verification activities to confirm that the required pre-requisites are completed, prior to the release of the proposed RHP. This will include verifying that the change management and configuration management elements meet all applicable regulatory requirements.

3.1.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.1.4 Conclusion

Bruce Power maintains and implements an established management system in accordance with CSA N286-12. CNSC staff conclude that there is no expected change to the management system for the proposed P2030 changes and it remains adequate to manage changes associated with operation at IPLs.

3.2 Human Performance Management

The Human Performance Management SCA covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee personnel are in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

3.2.1 Regulatory Requirements

The applicable regulatory requirements for the Human Performance Management SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- REGDOC-2.2.4 – *Fitness for Duty, Volume II: Managing Alcohol and Drug Use*, Version 3 (2021)
- REGDOC-2.2.4 – *Fitness for Duty: Managing Worker Fatigue* (2017)
- REGDOC-2.2.2 – *Personnel Training*, Version 2 (2016)

- REGDOC-2.2.3, Vol. III, V2 – *Personnel Certification, Volume III: Certification of Reactor Facility Workers*
- CNSC-EG1, Rev 0 –Requirements and Guidelines for written and oral certification examinations for shift personnel at nuclear power plants
- CNSC-EG2, Rev 0 – *Requirements and Guidelines for simulator-based certification examinations for shift personnel at nuclear power plants*
- Requalification Standard, Rev 2 – *Requirement for the requalification testing of certified shift personnel at nuclear power plants*

3.2.2 Discussion

Personnel Certification:

Bruce Power has a personnel certification program that meets all applicable regulatory requirements. There is no expected change to this program for the proposed P2030 changes; however, training and examination material will require updates to reflect operation at the new IPLs.

In accordance with REGDOC-2.2.3 Vol III, sub-section 15.2.1, Bruce Power is required to administer training material updates, including formal knowledge and performance-based evaluations, to address any technical and procedural changes associated with P2030 modifications.

Bruce Power is required to revise course materials, operational documentation, and simulator-based training, including changes to simulator modeling, processes and standards, in accordance with the ECC and Systematic Approach to Training programs.

Bruce Power is also required to implement updates to initial certification examinations and requalification tests to reflect the reactor power change and any associated impacts to operations. Bruce Power is required to revise the impacted reusable examination questions and simulator-based scenarios to ensure that they reflect the impact of operation at IPLs.

The power uprate to IPLs has no impact on certification timelines and milestones. CNSC's regulatory oversight will continue to inform the certification and renewal of shift personnel, and the dedicated power uprate training and associated evaluations will ensure that certified shift personnel remain competent for IPL-specific operational changes.

CNSC staff conclude that the existing personnel certification program remains adequate to meet regulatory requirements during operation at IPLs.

Human Performance Program

REGDOC-2.2.1, *Human Performance*, Version 2 was published on January 26, 2024. CNSC staff intend to conduct a compliance activity to verify implementation of REGDOC-2.2.1*,* Human Performance, Version 2. Bruce Power has established and implemented elements of a human performance program, including limits to hours of work, fitness for duty, and minimum staffing complement requirements. These elements are governed and implemented by various programs at Bruce Power such as:

1. Limits of Hours of Work – BP-PROC-00005 [5]
2. Conduct of Business – BP-PROG-16.01 [6]
3. Human Resource Management – BP-PROG-02.01 [7]
4. Fitness for Duty – BP-PROC-00610 [8]
5. Bruce Power Shift Complement and Fitness for Duty Standard for any Complement Staff Exceeding a 12-Hour Shift – BP-STND-00152 [9]

These established program elements are applicable to the proposed P2030 changes and are not expected to change as a result of the power uprate to IPLs.

CNSC staff conclude that Bruce Power has appropriate human performance controls in place to meet regulatory requirements for operation at IPLs.

Personnel Training

LC 2.3 and REGDOC-2.2.2 provide the regulatory requirements for the development and implementation of training programs for workers to ensure that they are competent and qualified to perform the duties of their position.

Bruce Power has established and implemented a personnel training program outlined in documents, such as, BP-PROG-02.02, *Worker Learning and Qualification* [10], and BP-PROC-01071, *Systematic Approach to Training Process* [11]. The elements of the personnel training program are not expected to change as a result of the proposed power uprate to IPLs, however; training material would have to be updated.

Bruce Power indicates that they will follow the Systematic Approach to Training program to ensure that the training materials are revised to reflect the changes associated with the IPLs.

CNSC staff conclude that the personnel training program remains adequate to meet regulatory requirements during operation at IPLs.

3.2.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff will conduct compliance verification activities to confirm that the required training materials are updated, and staff training is completed. This will include verifying through

- proposed RHP pre-requisite that document change requests for personnel training and certification training materials are created;
- compliance verification activities that required training materials including initial certification examinations and requalification tests have been updated to reflect operation at IPLs.

3.2.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.2.4 Conclusion

CNSC staff conclude that Bruce Power is qualified to implement the proposed power uprate without introducing undue risk to health, safety, security, or the environment, as it relates to the Human Performance Management SCA.

However, CNSC staff note that updates to training and examination materials for operation at IPL cannot be implemented until a later stage in the P2030 project. CNSC staff will verify that the updates are completed prior to the release of the proposed RHP.

3.3 Operating Performance

The Operating Performance SCA includes an overall review of the conduct of the licensed activities and the activities that enable effective performance. This SCA also includes an accident management program for design and beyond design basis accidents.

3.3.1 Regulatory Requirements

The applicable regulatory requirements for the Operating Performance SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*

- *Class I Nuclear Facilities Regulations*
- CSA N290.15 – *Requirements for the safe operating envelope for nuclear power plants*, 2010 Update No. 1 (2016)
- REGDOC-2.3.2 – *Accident Management*, V2, Updated September 2015
- REGDOC-3.1.1 – *Reporting Requirements for Nuclear Power Plants*, Version 3

3.3.2 Discussion

Safe Operating Envelope (SOE)

CSA standard N290.15 outlines the detailed regulatory requirements for an SOE.

Bruce Power has well-established governance and documentation to maintain, update, and implement the SOE program. The SOE program meets the requirements of CSA N290.15, however; the SOE will require updates to reflect operation at IPL.

Bruce Power has submitted updated safety analysis to support the proposed power uprate, which must be converted into operational limits and conditions and reflected within the SOE documentation prior to increasing power to IPLs.

SOE documents, such as, the Operating Policies and Principles (OP&P), Operational Safety Requirements (OSR), Instrument Uncertainty Calculations (IUC), Impairment Manuals (IMs), and other lower tier documents will require revision to reflect the new operational limits and conditions.

Bruce Power indicated that SOE document updates will be implemented prior to increasing power to IPLs. As per, licence condition G.1 and G.2, these are written notification (WN) documents (see Appendix A.6) and Bruce Power will be required to notify CNSC staff of any changes.

CNSC staff concluded that Bruce Power has an SOE program that meets the requirements of CSA N290.15, and will remain adequate for operation at IPL.

Accident Management and Recovery and Severe Accident Management and Recovery

Bruce Power has an accident management and recovery program and severe accident management program that meets all applicable regulatory requirements. There is no expected change to this SpA from the proposed power uprate.

In August 2025, CNSC staff verified effectiveness of Bruce Power's severe accident management program through a desktop inspection and concluded that Bruce Power is capable of responding to abnormal incidents, design basis accidents and beyond design basis accidents.

CNSC staff conclude that Bruce Power's accident management and recovery program and severe accident management program remain adequate to meet all applicable regulatory requirements during operation at IPLs.

3.3.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff will conduct compliance verification activities to confirm that the required pre-requisites are completed, prior to the release of the proposed RHP. This will include verifying that SOE documents are updated to reflect operating limits and conditions for operation at IPLs.

3.3.3.1 Proposed Changes to the LCH

The proposed change in the Operating Performance Section of the Bruce NGS A and B LCH is to update the power limits for operation at IPLs.

The Bruce NGS A and B LCH provides a table of limits for bundle, channel and reactor thermal power under Section 3.1 based on safety analysis limits. The following two tables provide the proposed changes in the power limits for the operation up to IPLs (Bruce A 95.5% FP and Bruce B 96% FP) in comparison with the existing power limits (Bruce A 92.5% FP and Bruce B 93% FP).

Table 3 : Comparison between the existing reactor power limits and the proposed limits applicable at IPL for Bruce A

Power Limit Description	**Current Limits**		**Proposed limits at IPLs**	
	Inner Flow Zone	Outer Flow Zone	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 969 kilowatts	Shall not exceed 857 kilowatts	Shall not exceed 1000 kilowatts	Shall not exceed 885 kilowatts

Total power generated in any fuel channel	Shall not exceed 6.84 megawatts under normal steady-state operating conditions	Shall not exceed 6.25 megawatts under normal steady-state operating conditions	Shall not exceed 7.060 megawatts under normal steady-state operating conditions	Shall not exceed 6.450 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel (current)	Shall not exceed 2619.6 megawatts (92.5% full power) under steady-state operating conditions		Shall not exceed 2705 megawatts (95.5% full power) under steady-state operating conditions	

Table 4 : Comparison between the existing reactor power limits and the proposed limits applicable at IPL for Bruce B.

Power Limit Description	**Current Limits**		**Proposed limits at IPLs**	
	Inner Flow Zone	Outer Flow Zone	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 837 kilowatts under normal steady-state operating conditions		Shall not exceed 864 kilowatts under normal steady-state operating conditions	
Total power generated in any fuel channel	Shall not exceed 6.70 megawatts under normal steady-state operating conditions	Shall not exceed 6.23 megawatts under normal steady-state operating conditions	Shall not exceed 6.912 megawatts under normal steady-state operating conditions	Shall not exceed 6.432 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel (current)	Shall not exceed 2634 megawatts (93% full power) under steady-state operating conditions		Shall not exceed 2719 megawatts (96% full power) under steady-state operating conditions	

3.3.4 Conclusion

CNSC staff conclude that Bruce Power has an SOE program that meets CSA N290.15, and includes measures to ensure that Bruce Power will update their SOE documentation to reflect changes associated with P2030. CNSC staff will verify that SOE documents are updated and that they meet regulatory requirements prior to the release of the proposed RHP.

3.4 Safety Analysis

Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards.

3.4.1 Regulatory Requirements

The applicable regulatory requirements for the Safety Analysis SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- CSA N286.7 – *Quality assurance of analytical, scientific, and design computer programs* (2016)
- REGDOC-2.4.1, *Deterministic Safety Analysis* (2014)
- REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants* (2014)

3.4.2 Discussion

Bruce Power's request focuses on demonstrating adequate safety analysis margins for operation at IPLs. CNSC staff's review includes evaluating the safety analysis consistency with regulatory requirements.

Demonstration of adequate margin is essential for confirming that the facility can operate safely under normal, transient, and accident conditions, and is therefore a central consideration in CNSC staff's overall recommendation.

There are several unique design features of the Bruce NGS reactors that are important from the safety analysis perspective. Examples common to Bruce NGS A and B include the single loop design which increases the degree of voiding, two flow regions which influence flow redistribution, and for Bruce NGS A units, the absence of adjusters which reduces the ability to fine-tune reactivity during operation and shutdown systems which are less efficient than those at Bruce NGS B. CNSC staff completed a detailed review of the submitted P2030 analyses, which included consideration of these factors, among others.

Deterministic Safety Analysis (DSA)

DSA is performed for the postulated initiating events (PIE) and conditions that form the design basis of the nuclear power plant (NPP). The objective of the DSA is to demonstrate that the radiological consequences of a given PIE are within the applicable limits specified in the siting guide [12] which is a licensing basis document for the Bruce NGS. The DSA is documented in site-specific Safety Reports (Part 3).

The process to identify the scope of work required to support a power uprate was defined by Bruce Power in the site-specific safety analysis impact reports (SAIRs) [13]. This involved reviewing the PIEs and identifying the systems and parameters that are affected by the uprate and influence the safety analysis results. The SAIR identifies where analysis is required to be re-performed for cases where the existing analysis could not demonstrate adequate margins for operation at IPLs; and where assessments are needed to confirm the adequacy of the existing margin to support the IPL safety case.

The work identified as being required to support the power uprate, and later submitted by Bruce Power to the CNSC, included analyses related to the following appendices of Bruce Power's safety report:

- Appendix 1 – Fuel Handling System Failures
- Appendix 2 – Electrical System Failures
- Appendix 4 – Small Break Loss of Coolant Accidents
- Appendix 5 – Large Break Loss of Collant Accidents
- Appendix 7 – Feedwater and Steam Supply System Failures
- Appendix 8 – Shutdown Cooling and Maintenance Cooling System Failures
- Appendix 11 – Common Mode Events

and assessments related to:

- Appendix 3 – Control Failures
- Appendix 6 – Heat Transport and Auxiliary System Pipe Breaks Outside Containment
- Appendix 7 – Feedwater and Steam Supply System Failures
- Appendix 9 – Main Moderator and Moderator Auxiliary System Failures
- Appendix 11 – Common Mode events

An administrative protocol [14] between CNSC staff and Bruce Power was established to govern the review of the DSA submissions for P2030. The protocol defined the review process, provided a submission schedule and documented an issue resolution strategy.

Bruce Power introduced the concept of an interim power level [15]. The analysis supporting IPLs was performed with the intent of demonstrating that the current safety margins are effectively maintained at a power level of 95.5 %FP (Bruce A) or 96.0 %FP (Bruce B). The majority of the DSA work has historically been performed for 100%FP, which is already bounding for IPLs. However, some analysis could not show sufficient margin at 100%FP, so these analyses were performed at IPL.

CNSC staff's review of DSA evaluates compliance with the regulatory requirements indicated in Section 3.4.1. It provides assurance of the quality of the safety analysis and the validity of its conclusions.

In cases where outstanding issues were observed, their significance was evaluated against the objectives of the IPL to determine whether they represented a barrier to the power uprate. Appendix A.5.3 explains the safety significance of the residual safety analysis items.

CNSC staff provided feedback on the outcome of the SAIR screening process and IPL impacts, and concluded that there were no major impediments or barriers to the proposed safety analysis scope, with recommendations for confirmatory work [16], [17]. CNSC staff also concluded that the safety systems will continue to meet their performance requirements for operation at IPL. Key CNSC staff feedback to the licensee is summarized below:

- CNSC staff noted that it is important to identify and address interdependencies between the updated safety analyses, potential design and operational impacts during the implementation of P2030. Bruce Power stated that this is managed in accordance with the ECC program. See Section 3.1 and 3.5 for further discussion on the ECC program.
- CNSC staff requested that analysis for normal operating conditions (NOC) be performed and submitted. In response, Bruce Power submitted the analysis.
- CNSC staff's review acknowledged that the safety analysis work enabling the IPL did not require all existing analysis to be updated. Pre-existing analysis that is already bounding for IPL would not be updated or re-performed. Therefore, it may not explicitly follow modern standards. Bruce Power committed that any new or revised analysis will follow modern standards.

CNSC staff performed reviews of Bruce Power's technical basis documents, assessments, and analysis reports submitted on behalf of P2030, and in accordance with the process described in the administrative protocol [14]. CNSC staff's review findings form the basis of the CNSC staff conclusion presented in this section of the CMD. Details of the individual CNSC staff reviews and their conclusions can be found in Appendix A.5.4. Key outcomes of the submission reviews are also presented below:

- For Neutron Overpower Protection (NOP), a confirmatory analysis was performed and submitted to enhance confidence in the installed value of the NOP trip setpoint (TSP). The methods used in this analysis were questioned by CNSC staff, which triggered the protocol's issue resolution process [14]. This process had two distinct outcomes:
    - As an alternative to performing confirmatory analysis, a qualitative argument was established to support the continued applicability of the installed value of the NOP TSP for IPLs. In short, the MCR work, which is required to enable IPLs, will restore the reactor conditions to a configuration aligned with the analysis that derived the existing NOP TSP values, and thus reenforce the existing NOP TSPs. CNSC staff concluded that this was acceptable for unaged conditions [18].
    - Bruce Power made a commitment to modernize the NOP analysis methods for future iterations of NOP analysis.
- For Large Break Loss of Coolant Accident (LBLOCA), 4 key long-standing issues are affecting the confidence in the analysis results. These items are generic in nature and not specific to the IPL under P2030. The details of these issues are given in Appendix A.5.4 of the CMD:
    - the potential for fuel element (FE) to pressure tube (PT) contact,
    - the applicability of the interim acceptance criteria (IAC),
    - the prevention of prompt criticality, and
    - the completeness of information regarding the IPLs, such as long-term cooling following an LBLOCA [19].

  Following a discussion period, CNSC staff concluded that the resolution of these issues is not a prerequisite for the IPLs, in recognition of Bruce Power's position that the analyses demonstrate acceptable safety margins, and the shutdown systems continue to effectively ensure fuel channel integrity across the full range of LBLOCA break sizes at IPLs. However, resolution of these concerns will strengthen the IPL safety case and would be a key consideration for any future power increases beyond the IPLs. This position was communicated to Bruce Power on May 5, 2025 [20]. Bruce Power provided a resolution strategy for these issues, which is under review by CNSC staff.

- The CNSC staff noted two additional points that are applicable to the analysis of all event categories:
    - Limit of Operating Envelope (LOE) analysis method uses an assumption that credits the assumed conservative operating parameters to offset the negative effects of unaccounted for modelling uncertainties and limitations. CNSC staff agrees that this

is a reasonable engineering expectation, but it has not been definitively proven for general LOE applications.

- Verification and validation basis for coupled codes. The current analysis tools/models are validated individually, rather than holistically, due to a lack of available guidance and representative tests. When coupled and used for iterative calculations, the analysis results may be affected.

Bruce Power submitted a white paper [54] to define the issues, confirm the validity of the P2030 analysis for IPLs, and provide a high-level resolution strategy. CNSC staff reviewed the paper and concluded that the resolution of these issues is not an impediment to IPLs but recommended a comprehensive resolution plan be submitted to strengthen the safety case [21]. While these issues are not exclusive to P2030, their significance may be impacted by a power uprate.

Bruce Power consolidated the P2030 analyses and assessments into integrated site-specific summary reports [22] [23] [24] which were reviewed by CNSC staff for consistency with the underlying analysis [25] [26]. No major inconsistencies were identified.

There are a limited number of safety analysis residual items remaining outstanding. The items that are required to be addressed for power uprate to IPLs are categorized as short-term residual actions. The other items mentioned above are categorized as long-term residual actions. These are more complex issues and most of these items are not exclusively related to P2030. The demonstrated safety margins are adequate for operation at IPLs, however, their resolution will provide positive safety-benefits to P2030, largely aimed at providing additional confidence to the IPLs safety case. Bruce Power also provided a list of residual actions, for short- and long-term, with connected targeted completion dates. The short term and long-term actions can be found in Appendix A.5.1 and Appendix A.5.2 respectively. Overall, the safety significance of the residual actions is regarded by CNSC staff to be low which is detailed in Appendix A.5.3.

Probabilistic Safety Analysis (PSA)

PSA is performed to evaluate the safety of a nuclear power plant in relation to potential initiating events that might be caused by random component failure or human errors, as well as, by internal and external hazards. The outcome of this analysis is used to verify that the quantitative safety goals for Core Damage Frequency (CDF) and Large Release Frequency (LRF) are met, and to identify plant vulnerabilities, risk-important SSCs, and operational procedures to support plant design. The Level 1 PSA assesses the potential for core damage and the Level 2 PSA assesses large releases of radioactivity from containment.

CNSC staff reviewed the risk impact of raising the reactor power to IPLs for the level 1 and Level 2 PSA for internal events [22] [23] [24].

The level 1 internal events full power PSA shows that the power uprate to IPLs does not impact the availability of trip parameters for shutting down the reactor. Consequently, the failure to shutdown sequences and their frequencies remain unchanged.

The DSA has not identified any instances where the 2 out of 3 operating logic for heat removal systems changes due to the power uprate to IPLs. Consequently, the loss of heat sink accident sequences, and their frequencies remain unchanged. As a result, the core damage frequency remains the same.

The level 2 PSA uses the Modular Accident Analysis Program for CANDU (MAAP-CANDU) as one of the computational tools. The MAAP CANDU analysis [27] was revisited with the assumption of a core decay from a 100% FP initial reactor power state. The results showed that there are no changes in the assignment of release categories to the sequences credited in the Level 2 PSA and consequently no increase in LRF.

CNSC staff conclude that Bruce Power has a PSA that demonstrates that regulatory requirements for CDF and LRF are met for operation at IPL.

3.4.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power’s performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff will conduct compliance verification activities to confirm that the required pre-requisites are completed, prior to the release of the proposed RHP. This will include verifying that all the residual safety analysis items to support operation at IPLs is complete, and demonstrate compliance with the applicable regulatory requirements.

3.4.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.4.4 Conclusion

Based on the review of Bruce Power’s safety analysis submissions, CNSC staff conclude that there are no fundamental barriers to the IPLs with respect to Safety Analysis and it predicts adequate safety margins for operation at IPLs. The safety systems will continue to perform their required safety functions and meet performance requirements for operation at IPLs.

CNSC staff expect that Bruce Power will complete the currently outstanding short-term actions listed in Appendix A.5.1 prior to power uprate to IPLs and that the long-term actions listed in Appendix A.5.2 are considered as commitments that enable and support sustained operation at IPLs. CNSC staff will verify the completion of currently outstanding short-term actions prior to power uprate to IPLs.

Resolution of the long-term actions is not a pre-requisite to power uprate to IPLs and completion of the short-term actions will be verified prior to the removal of the proposed RHP. The safety significance of proposed hold point details related to safety analysis SCA is low.

Any power uprate beyond IPLs would require re-evaluation of the margins demonstrated by the safety analysis and is not covered in this request.

3.5 Physical Design

The Physical Design SCA relates to activities that impact on the ability of the SSCs to meet and maintain their design basis, given new information arising over time and taking changes in the external environment into account.

3.5.1 Regulatory Requirements

The applicable regulatory requirements for the Physical Design SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- CSA N290.12 – *Human factors in design for nuclear power plants* (2014)
- CSA N290.14 – *Qualification of digital hardware and software for use in instrumentation and control applications for nuclear power plants* (2015)
- CSA N291 – *Requirements for safety-related structures for nuclear power plants* (2015)
- CSA N285.0 – *General requirements for pressure-retaining systems and components in CANDU nuclear power plants*, 2012 Update No. 1 (Sep. 2013) & Update No. 2 (Nov. 2014)
- CSA N289.1 – *General requirements for seismic design and qualification of CANDU nuclear power plants* (2008)
- CSA N289.2 – *Ground motion determination for seismic qualification of CANDU nuclear power plants* (2010)
- CSA N289.3 – *Design procedures for seismic qualification of CANDU nuclear power plants* (2010)

- CSA N289.4 – *Testing procedures for seismic qualification of nuclear power plant structures, systems, and components* (2012)
- CSA N289.5 – *Seismic instrumentation requirements for nuclear power plants and nuclear facilities* (2012)
- CSA N290.13 – *Environmental qualification of equipment for CANDU nuclear power plants*

3.5.2 Discussion

The original design of Bruce NGS A and B supports operation up to 100%FP, while the current power limits authorize Bruce A to operate up to 92.5%FP and Bruce B to operate up to 93%FP. Bruce Power identified several physical modifications to plant equipment and systems to improve reliability of operations at IPL. Bruce Power initiated a systematic review to assess the required station related system, subsystem, and interfacing systems upgrades. The design changes and modifications remain within the bounds of analyzed safety case under which safe operation was demonstrated. The physical design changes or modifications associated with Project 2030 and its sub-projects are managed in accordance with Bruce Power's ECC process. The following list provides examples of physical modifications that may be required for the Bruce B Reactor Power Increase to 96%FP:

- Main Boiler Feed System Improvements: Scope of work to replace existing Main Boiler Feed Pump (MBFP) Impellers with larger Impellers to increase flow. Pump Motors will be re-rated to accommodate higher High Pressure (HP) requirements.
- Bruce B Main Steam Improvements (Analysis): The scope of work is to complete stress analysis and hydraulic analysis to confirm safe operation of the main steam system for 96%FP operation. The analysis may result in any minor physical changes (supports/hangers adjustments) requirement.
- Bruce B Transition Break LOCA LCDP TSP Increase: The scope of work is to increase the TSP of the SDS2 Low Core Delta Pressure (LCDP) trip to trip sooner in support of the safety analysis for Transition Break LOCA at increased Reactor Power.
- Bruce B Large Break LOCA SDS1 Time Constant Modification for Higher Reactor Power Operation: The scope of work is to reduce (i.e., speed up) the time constant of the SDS1 ion chamber amplifiers to support safety analysis for LBLOCA. This is accomplished by replacing the amplifiers with new ones that have lower time constants, supported by safety analysis and field testing.

- Bruce B Irradiated Fuel Port SV Qualification and Replacement: The scope of work is to modify Controlled Air Valve-Solenoid Valve 1 (CAV-SV1) to ensure cooling is automatically restored to irradiated fuel (I/F) bundles in the Irradiated Fuel Port (IFP) transfer chamber when required by safety analysis.

3.5.2.1 Design Governance

Human Factors in Design

CNSC staff note that there are several P2030 modifications that have human factors in design implications. Bruce Power has an engineering change control process that is used to implement all design changes, including P2030 modifications.

CNSC staff recently conducted an inspection of Bruce Power's Engineering Change Control and Human Factors in Design process which sampled engineering changes being developed as part of P2030. More information regarding this inspection is provided in Section 3.1.2.

CNSC staff concluded that there are established processes in place to ensure that there is no undue risk to health, safety, security, or the environment.

Environmental Qualification of Equipment

CNSC staff determined that Bruce Power maintains an environmental qualification (EQ) program in accordance with the regulatory requirements that ensures that all required equipment in the nuclear facility is qualified to perform its safety functions if exposed to harsh environmental conditions resulting from credited Design-Basis Accidents (DBAs) and that this capability is preserved for the life of the plant. Bruce Power is currently evaluating the increase in reactor power for impact on post-accident conditions. As Bruce Power provides the final impact assessment, CNSC staff will review to confirm that Bruce Power has taken appropriate measures to address any impacts to the EQ program.

CNSC staff determined that Bruce Power's seismic qualification (SQ) program is adequate to ensure that all seismically credited safety-related SSCs in a nuclear power plant are designed, installed and maintained to perform their safety function during and/or after a design basis earthquake or site design earthquake and also ensures an adequate margin against review level earthquakes during operation at IPLs.

Pressure Boundary

CNSC staff determined that Bruce Power has a documented pressure boundary program that meets all applicable regulatory requirements. Bruce Power indicated in their request submission that there are no anticipated changes to pressure boundary programs resulting from the proposed power uprate.

Bruce Power has stated that all aspects of Bruce Power's Pressure Boundary Program apply to P2030 and has committed to following their ECC process. As detailed design and execution work proceed on the required modifications, CNSC staff will conduct ongoing regulatory oversight to verify that applicable Pressure Boundary requirements continue to be met.

3.5.2.2 System Design

Bruce Power maintains configuration management of systems, structures and components using the management system document, BP-PROC-01081, *Engineering Change Control*, [28]. P2030 may lead to instances where systems, structures, components and tools (SSCTs) design requirements, physical configuration or facility configuration information must change using the engineering change control process.

Bruce Power has an established Engineering Change Control (ECC) process to govern design changes and Bruce Power confirmed that there are no anticipated changes to the ECC process under Project 2030. In addition, Bruce Power stated that they will be using their ECC process to perform and document the design changes resulting from IPL.

CNSC staff acknowledge the existence and use of this process, and that it was the subject of a Type II Inspection in September 2025. More information regarding this inspection is provided in Section 3.1.2.

Bruce Power indicated that they performed a confirmatory assessment in addition to the ECC process to identify the scope of the modifications required for this project using a Hazard and Operability Study (HAZOP)/System Assessment. CNSC staff note that this assessment is not required by the Bruce Power's management system and is an additional step in order to validate the robustness of the ECC process for P2030 modifications. The system assessment is specified as a deliverable in the design plan for P2030 and is authorized by the design authority.

CNSC staff have reviewed the information provided by Bruce Power and have identified potential concerns regarding the governance for the system assessment/HAZOP process and its interface with the Bruce Power ECC process. Given that the system assessment is an additional measure that is not a regulatory requirement, CNSC staff note that the ECC process is sufficient to ensure that all SSCs will be able to function safely within their design parameters under all operating states.

Electrical Power Systems

CNSC staff determined that the electrical power systems at Bruce A and B meets design requirements based on the results of past inspections and desktop reviews. Bruce Power has an established ECC process to manage any proposed design changes that may affect the electrical power systems due to P2030.

Instrumentation and Control

CNSC staff determined that instrumentation and control systems at Bruce A and B meets design requirements based on the results of compliance verification activities. Bruce Power has an established ECC process to manage any necessary I&C upgrades that may be required for the proposed power uprate.

Fire Protection Design

CNSC staff determined that Bruce Power’s fire protection design program meets regulatory requirements. Bruce Power indicated in their request submission that there are no anticipated changes to the fire protection design program resulting from the proposed power uprate for operation at IPLs. .

3.5.2.3 Component Design

Fuel Design

The power uprate to IPLs does not result in fuel design change. The existing fuel design is qualified up to (and beyond) the IPLs. Also, the fuel defect rate is not expected to be impacted by the proposed power uprate. CNSC staff determined that Bruce Power has a well-developed reactor fuel inspection program and fuel usage will continue to remain safe and that fuel performance requirements will continue to be met during operation at IPLs.

3.5.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power’s performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff note that the engineering changes are primarily in the preliminary design phase as Bruce Power continues to progress the changes through their ECC process and engineering changes are subject to change as the design progresses.

CNSC staff will conduct compliance verification activities to confirm that the required pre-requisites are completed, prior to the release of the proposed RHP. This will include verifying that:

- design changes required for operation at IPLs are installed,
- SSCs are available to support operation safely within their design limits at IPLs,
- appropriate measures are taken to address any impacts to the EQ program,
- applicable pressure boundary requirements continue to be met at IPLs, and
- electrical power systems and I&C systems continue to meet design requirements at IPLs.

3.5.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.5.4 Conclusion

The original design of Bruce NGS A and B supported operation up to 100%FP. The requested increase in reactor power to the IPL do not involve altering of the existing safety barriers or the safety functions that prevent accidents or reduce their consequences.

CNSC staff concluded that Bruce Power has an established process under management system to manage design changes required to support operation at IPLs and ensure that the plant design and operation will remain compliant with all applicable regulatory requirements and. CNSC staff will continue to review as Bruce Power continues to evaluate design/engineering changes associated with IPLs.

CNSC staff will verify that all the required design changes are installed and SSCs continue to meet design requirements, prior to the release of the proposed RHP. ...

3.6 Fitness for Service

The Fitness for Service SCA covers activities that impact on the physical condition of structures, systems and components to ensure that they remain effective over time. This includes programs that ensure all equipment is available to perform its intended function when called upon to do so.

3.6.1 Regulatory Requirements

The applicable regulatory requirements for the Fitness for Service SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- REGDOC-2.6.1 – *Reliability Programs for Nuclear Power Plants* (2017)
- REGDOC-2.6.2 – *Maintenance Programs for Nuclear Power Plants* (2017)
- REGDOC-2.6.3 – *Aging Management* (2014)
- CSA N285.4 – *Periodic inspection of CANDU nuclear power plant components* (2014)
- CSA N285.5 – *Periodic inspection of CANDU nuclear power plant containment components* (2018)
- CSA N285.7 – *Periodic inspection of CANDU nuclear power plant balance of plant systems and components* (2015)
- CSA N285.8 – *Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors* (2021)
- CSA N287.7 – *In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants* (2008)
- CSA N291 – *Requirements for safety-related structures for nuclear power plants* (2015)

The Bruce NGS A and B LCH lists a series of program documents developed by the licensee to satisfy regulatory requirements. These documents are reviewed by CNSC staff to confirm compliance with licensing basis requirements and form the basis for compliance verification reviews conducted by CNSC staff through compliance verification activities. The licensee is required to notify CNSC staff of any revisions to the WN program documents.

Bruce Power is in the process of implementing a CSA standard N285.7, *Periodic inspection of CANDU nuclear power plant balance of plant systems and components*, compliant periodic inspection program with the program document expected to be submitted for CNSC staff acceptance by October 1, 2028 and subsequent inclusion as a WN document in the Bruce NGS A and B LCH.

3.6.2 Discussion

LC 6.1 requires Bruce Power to implement and maintain a fitness for service program and, per Licence Condition 6.2 Bruce Power is required to implement and maintain an enhanced fitness for service program for fuel channels in extended operation. These requirements cover activities that impact on the physical condition of SSCs important to safe operation to ensure that they remain effective over time.

In its request submission Bruce Power indicated that:

- These power limit changes result in negligible impact on physical, policy, programmatic, procedural, process, organizational, operational, etc., changes for the Fitness for Service SCA.
- There are no significant impacts to the program and procedural documents in the Fitness for Service section of the Bruce NGS A and B LCH that would result from the proposed P2030 uprate to IPLs from a major component aging perspective. If approved, changes to the power limits will be reflected in future document revisions as needed and will be submitted to CNSC staff in accordance with the associated CSA standard.
- The Equivalent Full Power Hours (EFPH) will be accumulated faster, potentially impacting the Fuel Channel Life Cycle Management and the Primary Heat Transport (PHT) Feeder Piping and Pressure Tube inspection documents. This will result in end-of-life related editorial changes to the documents, which will be of minor significance.

CNSC staff acknowledge that the regulatory requirements outlined in Section 3.6.1 are not impacted by the proposed power increase since these requirements are applicable, regardless of the operating power level.

Bruce Power has not submitted the results of their review of the program and procedure documentation to support their conclusions summarized above, but has conducted a system-by-system review of potential impacts of the proposed power increase considering the effects on component aging. The general conclusion was that the increase in reactor power can increase the rate of aging of some components, which would result in some components reaching the end of their expected end of operating life at an earlier calendar date and may require an increase in the frequency of inspection and maintenance activities. It is also possible that some of the design review activities may generate conclusions that could impact fitness for service program activities. However, CNSC staff acknowledge that program changes can be managed within the current regulatory framework for the Fitness for Service SCA.

Fitness for service programs follow a plan-do-check-act process as outlined in REGDOC-2.6.3 (reproduced below). This process requires ongoing monitoring of program effectiveness by the licensee during the “check” stage, actions by the licensee in response to findings in the “act” stage and subsequent revisions to programs and program implementation in the “plan” and “do” stages. Should the power increase impact aging rates, CNSC staff expect that the licensee’s fitness for service programs will be sufficient to respond to findings prior to any impacts on safe operation of SSCs.

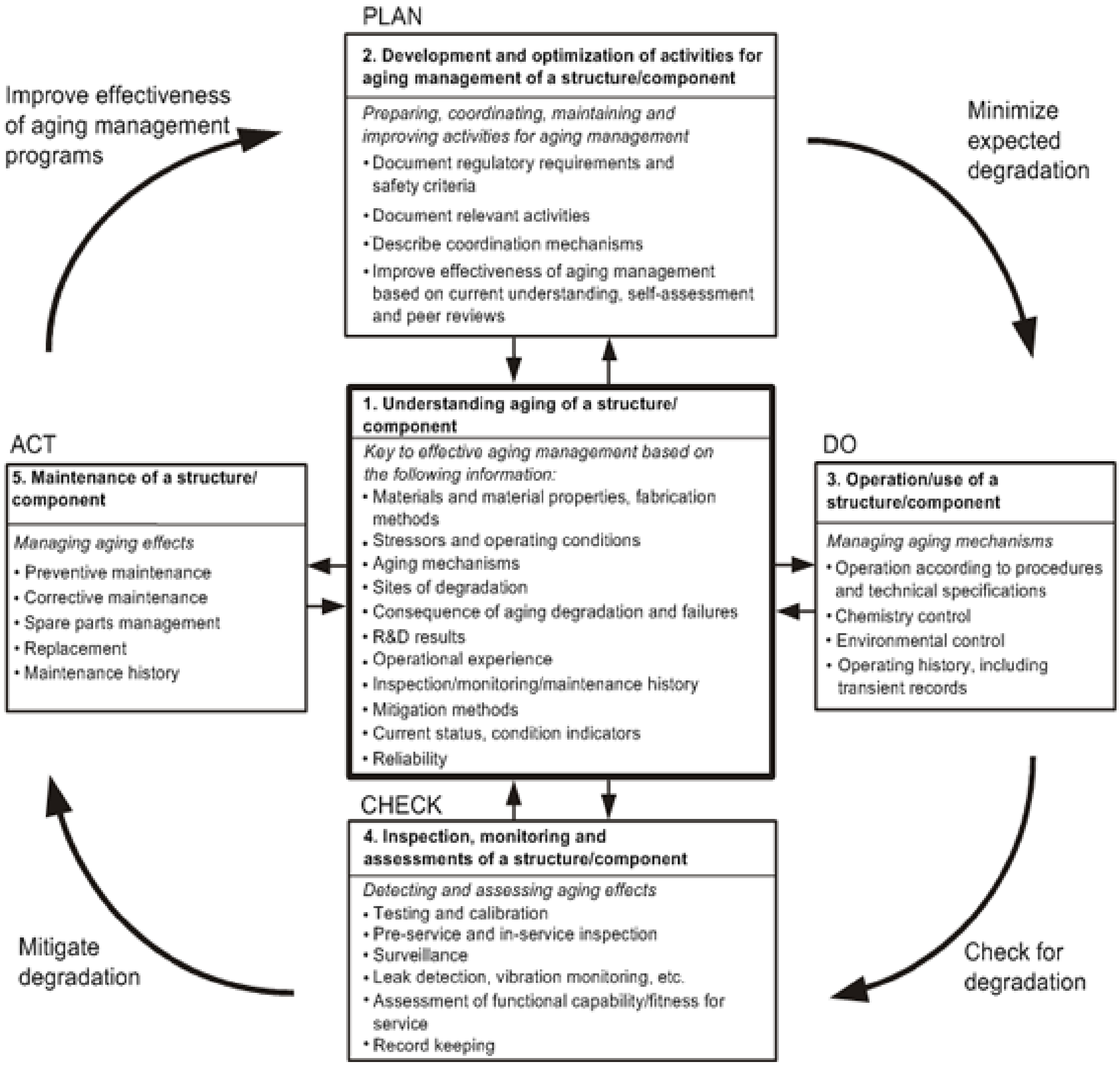

Figure 2 : Aging management process as per REGDOC-2.6.3

3.6.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities at IPLs to verify that it continues to meet regulatory requirements.

There are several licensee reporting mechanisms that are the subject of desktop reviews by CNSC staff, which are used to assess program effectiveness, including:

- Reporting per REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*
    - Quarterly report on safety performance indicators
    - Quarterly report on nuclear power plant pressure boundaries

- Annual report on research and development
- Annual report on risk and reliability
- Event reports

- Periodic inspection program reports

In addition, the CNSC's baseline compliance inspection program includes scheduled inspections of licensee fitness for service program implementation, which are supplemented by field inspections and reactive inspections as necessary.

3.6.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.6.4 Conclusion

CNSC staff evaluated Bruce Power's request by considering the adequacy and past performance of Bruce Power's fitness for service program in the context of the proposed power uprate and concluded that Bruce Power's existing programs comply with the requirements of the Bruce NGS A and B PROL and the Bruce NGS A and B LCH and the existing CVC remains adequate to manage the changes to this SCA during operation at IPLs.

CNSC staff will verify that the specified fitness for service documents are updated to reflect operation at IPLs and that they meet regulatory requirements prior power uprate to IPLs. CNSC staff will continue to carry out routine regulatory oversight activities to verify that Bruce Power sustains safe operation at IPLs.

3.7 Radiation Protection

The Radiation Protection SCA covers the implementation of a radiation protection program in accordance with the *Radiation Protection Regulations*. The program must ensure that contamination levels and radiation doses received by individuals are monitored, controlled and maintained As Low As Reasonably Achievable (ALARA).

3.7.1 Regulatory Requirements

The applicable regulatory requirements for the Radiation Protection SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Radiation Protection Regulations*

3.7.2 Discussion

Section 4 of the *Radiation Protection Regulations* requires licensees to establish a radiation protection program to keep exposures ALARA, taking economic and social factors into account.

CNSC staff have determined that Bruce Power meets the applicable regulatory requirements and staff expectations in this area as demonstrated by past performance, which includes implementing and maintaining an effective radiation protection program.

Bruce Power has stated that there will be negligible impacts to the Radiation Protection SCA from operating at IPLs, and that the existing Radiation Protection Program will apply at IPLs. CNSC staff have reviewed Bruce Power's request submission and concur with Bruce Power's conclusions.

CNSC staff maintain oversight at Bruce Power through routine compliance verification activities. CNSC staff are satisfied that Bruce Power's current Radiation Protection Program is adequate for operation at IPLs to ensure contamination levels and radiation doses received by individuals are monitored, controlled and maintained As Low As Reasonably Achievable (ALARA).

3.7.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.7.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.7.4 Conclusion

CNSC staff determined that Bruce Power implemented and maintained an effective radiation protection program at Bruce NGS A and B. CNSC staff are satisfied that Bruce Power will continue to implement sufficient measures in accordance with the *Radiation Protection Regulations* for the protection of workers during operation at IPLs.

3.8 Conventional Health and Safety

The Conventional Health and Safety SCA covers the implementation and maintenance of a program to manage workplace safety hazards and to protect personnel and equipment.

3.8.1 Regulatory Requirements

The applicable regulatory requirements for the Conventional Health and Safety SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*

Nuclear Power Plants in Ontario are regulated by:

- *Ontario Occupational Health and Safety Act*
- *Labour Relations Act*

3.8.2 Discussion

Bruce Power's conventional health and safety program is regulated by the *Occupational Health and Safety Act (Ontario)*, the *Labour Relations Act (Ontario)*, and supported by Bruce Power's occupational health and safety policy. Bruce Power has indicated there will be negligible impact to the current Health and Safety Management Program from the proposed P2030 activities.

CNSC staff maintain regulatory oversight of this SCA at Bruce Power through the conduct of compliance verification activities such as inspections, surveillance and monitoring, following up on events, and discussions with staff. CNSC staff are satisfied that Bruce Power's current program and processes, along with the *Occupational Health and Safety Act (Ontario)*, are adequate to address conventional health and safety hazards with negligible impact by the intended power increase.

3.8.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.8.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.8.4 Conclusion

CNSC staff conclude that operation at IPLs has negligible impact on the conventional health and safety SCA at Bruce NGS A and B. CNSC staff have determined that Bruce Power has a mature program that complies with the requirements of the Bruce NGS A and B PROL and additional provincial legislation, and are satisfied that Bruce Power will implement sufficient measures in accordance with the requirements.

3.9 Environmental Protection

The Environmental Protection SCA covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

3.9.1 Regulatory Requirements

The applicable regulatory requirements for the Environmental Protection SCA include the following:

- https://laws-lois.justice.gc.ca/eng/acts/C-15.31/*Canadian Environmental Protection Act*
- *Fisheries Act*
- *Species at Risk Act*
- *Migratory Birds Convention Act*, 1994
- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- REGDOC-2.9.1 – *Environmental Protection: Environmental Principles, Assessments and Protection Measures*, Version 1.2 (2020)
- CSA N288.1 – *Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities* (2020)
- CSA N288.4 – *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills* (2010)
- CSA N288.5 – *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills* (2011)
- CSA N288.6 – *Environmental risk assessment at Class I nuclear facilities and uranium mines and mills* (2012)
- CSA N288.7 – *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills* (2015)
- CSA N288.8 – *Establishing and implementing action levels for releases to the environment from nuclear facilities* (2017).

3.9.2 Discussion

CNSC staff have determined that Bruce Power has implemented and maintains an effective environmental protection program at Bruce NGS A and B that meets the applicable regulatory requirements. CNSC staff maintain regulatory oversight at Bruce A and Bruce NGS B through environmental compliance verification activities.

Bruce Power has indicated there will be negligible impact to the current environmental protection program from the proposed P2030 changes. The requested power uprate may lead to an increase in heat released into Lake Huron which could have an impact on the fish habitat. Bruce Power submitted PERA Gap Analysis [29]. Based on the review of the analysis, CNSC staff are satisfied that risks to the environment or human health for the continued operation, including the proposed power uprate, are low to negligible and that Bruce Power’s current program is adequate for the proposed power uprate.

3.9.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power’s performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff oversight for this SCA will focus on effluent and emissions control (releases). CNSC staff compliance verification of the Environmental Risk Assessment will focus on the impact of the proposed power uprate on fish habitat due to the potential increase in heat being released into Lake Huron.

3.9.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.9.4 Conclusion

CNSC staff have determined that Bruce Power has a mature environmental protection program that complies with the requirements of the Bruce NGS A and B PROL, the Bruce NGS A and B LCH, and existing programs will continue to apply during operation at IPLs. CNSC staff are satisfied that Bruce Power will continue to implement sufficient measures to protect the environment and people during operation at IPLs.

3.10 Emergency Management and Fire Protection

The Emergency Management and Fire Protection SCA covers emergency plans and emergency preparedness programs which exist for emergencies and for non-routine conditions including any results of exercise participation. This also includes response to conventional emergency as well as fire response.

3.10.1 Regulatory Requirements

The applicable regulatory requirements for the Emergency Management and Fire Protection SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- REGDOC-2.10.1 – *Nuclear Emergency Preparedness and Response*, Version 2 (2016)
- CSA N293 – *Fire protection for nuclear power plants* (2012 - R2017)
- CSA N393 – *Fire Protection for facilities that process, handle, or store nuclear substances* (2022)

3.10.2 Discussion

Based on the review of the past performance, CNSC staff determined that Bruce Power implemented and maintained effective emergency preparedness and fire protection programs at Bruce NGS A and B that meet regulatory requirements. The power limit changes result in negligible impact on the Emergency Management and Fire Protection SCA.

Bruce Power indicated that the proposed power uprate will not require any new conventional or nuclear emergency response governance, programs, and processes to meet regulatory requirements. That is, Bruce Power's existing emergency preparedness and response program, will not be impacted by the operation at IPLs. CNSC staff have reviewed Bruce Power's request submission, and supporting documentation, and concur with Bruce Power's conclusions.

3.10.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power’s performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.10.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.10.4 Conclusion

Bruce Power has established and maintains comprehensive preparedness and response provisions. CNSC staff are satisfied that Bruce Power's programs continue to effectively address potential accidental releases of nuclear and hazardous substances by protecting the environment, safeguarding human health and safety, and upholding national security during operation at IPLs.

3.11 Waste Management

The Waste Management SCA covers internal waste-related programs which form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. It also covers the planning for decommissioning.

3.11.1 Regulatory Requirements

The applicable regulatory requirements for the Waste Management SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- CSA N292.3– *Management of low- and intermediate-level radioactive waste* (2014)

3.11.2 Discussion

CNSC staff assessed the impact of operation at the proposed power level across all Bruce Power activities that are likely to affect the generation of waste. This includes changes in the volume or type of waste to be generated, or changes to the waste that will impact how it is to be handled or stored.

Operation at the proposed power level is expected to result in a 3% increase in used nuclear fuel. However, operating at IPLs will also result in a proportionally shortened unit-run time, causing a negligible effect on the long-term effect on waste nuclear fuel.

Routine low-level waste (LLW) (e.g., personal protective equipment, maslin cloth wipers, etc.) is not expected to increase with operating power. Routine intermediate-level waste (ILW) (PHT ion exchange resins and filters, etc.) are expected to increase slightly, but negligibly over time.

CNSC staff also reviewed the impact of operating at the proposed power level on waste generated from modifications or upgrades to the reactors, heat transport system or fuel handling systems. Existing change control processes are satisfactorily robust to identify work that would result in the significant generation of LLW or ILW.

Additionally, operation at IPLs is not expected to increase the volume of LLW or ILW as a result of isotope production activities under current practices.

CNSC staff have assessed Bruce Power's request across the Waste Management SCA and have confirmed that Bruce Power’s programs referenced in the request submission are adequate and able to support the continued operation of the plant at IPLs.

3.11.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power’s performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.11.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.11.4 Conclusion

CNSC staff concluded that Bruce Power implemented and maintained a waste management program at Bruce NGS A and B that meets CNSC requirements, and is sufficient to manage the waste during operation at IPLs in accordance with the requirements.

3.12 Security

The Security SCA covers the programs required to implement and support the security requirements stipulated in the regulations, the Bruce NGS A and B PROL, orders, or in expectations for the facility or activity.

3.12.1 Regulatory Requirements

The applicable regulatory requirements for the Security SCA include the following:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- *Nuclear Security Regulations*
- REGDOC-2.2.4 – *Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness* (2018)
- REGDOC-2.12.1 – *High-Security Facilities, Vol. I: Nuclear Response Force*, Version 2 (2018)
- REGDOC-2.12.1 – *High-Security Facilities, Vol. II: Criteria for Nuclear Security Systems and Devices* (2018)
- REGDOC-2.12.2 – *Site Access Security Clearance* (2013)
- REGDOC-2.12.3 – *Security of Nuclear Substances: Sealed Sources* (2013)
- CSA N290.7 – *Cyber security for nuclear power plants and small reactor facilities* (2014)

3.12.2 Discussion

CNSC staff determined that Bruce Power has a security program that meets the requirements of the Nuclear Security Regulations and associated regulatory documents and that power limit changes result in negligible impact on the Security SCA.

Bruce Power indicated that the power uprate will not require any changes to Bruce Power’s security program, including existing security information, classifications, provisions, processes, or practices, and operation at increased power level does not introduce any requirements that will directly affect security operations. CNSC staff have reviewed Bruce Power's request submission, and supporting documentation, and concur with Bruce Power's conclusions.

3.12.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power’s performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.12.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.12.4 Conclusion

CNSC staff evaluated Bruce Power's request and determined that operation at IPLs will not impose new challenges to Bruce Power's security program.

Bruce Power has an established security program that meets regulatory requirements and made adequate provisions for the maintenance of national security. CNSC staff are satisfied that Bruce Power will continue to implement and maintain an effective nuclear security program at the Bruce NGS A and B that will continue to meet regulatory requirements during operation at IPLs.

3.13 Safeguards and Non-Proliferation

The Safeguards and Non-Proliferation SCA covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements as well as other measures arising from the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). This SCA comprises a safeguards program and a non-proliferation program.

The scope of the non-proliferation program for Bruce Power includes the tracking and reporting of foreign obligations and origins of nuclear material. This tracking and reporting assist the CNSC in the implementation of Canada's bilateral Nuclear Cooperation Agreements with other countries. The import and export of controlled nuclear substances, equipment and information identified in the Nuclear Non-proliferation Import and Export Control Regulations require separate authorization from the CNSC, consistent with section 3(2) of the *General Nuclear Safety and Control Regulations*.

3.13.1 Regulatory Requirements

The applicable regulatory requirements for the Safeguards and Non-Proliferation SCA include the following:

- The *Treaty on the Non-Proliferation of Nuclear Weapons*
- The *Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*
- *Protocol Additional to the Agreement Between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*
- *Nuclear Safety and Control Act*

- *General Nuclear Safety and Control Regulations*
- *Nuclear Non-proliferation Import and Export Control Regulations*
- *Class I Nuclear Facilities Regulations*
- REGDOC-2.13.1 – *Safeguards and Nuclear Material Accountancy* (2018)

3.13.2 Discussion

In order to satisfy regulatory requirements, Bruce Power is required to:

- Facilitate the installation, operation, and maintenance of IAEA equipment and seals, and report any interruption, alteration, or defacement to the CNSC as per section 30 of the *General Nuclear Safety and Control Regulations*.
- Provide IAEA inspectors with necessary access to verify Canada's declarations to the IAEA as required by Canada-IAEA safeguards agreements.
- Maintain an accurate program of nuclear material accountancy to establish quantities of safeguarded nuclear material. This includes measurement taking, record keeping, preparation and submission of accounting reports, and verification of accounting information.

Based on the review of the past performance, CNSC staff determined that Bruce Power implemented and maintains a safeguards and non-proliferation program at Bruce NGS A and B that ensures the effective implementation of both safeguards measures and nuclear non-proliferation commitments and that power limit changes result in negligible impact on the Safeguards and Non-Proliferation SCA.

CNSC staff reviewed Bruce Power's request submission and the supplemental information and concluded that the power increase will have no meaningful impact on this SCA beyond providing updated design information and taking the increased power levels into account when reporting nuclear production and loss for spent fuel.

3.13.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.13.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.13.4 Conclusion

CNSC staff concluded that Bruce Power has an established safeguards and non-proliferation program that will be able to accommodate operation at IPLs while fulfilling the regulatory requirements.

CNSC staff determined that operation at IPLs will not impose additional requirements to Bruce Power's safeguards program.

3.14 Packaging and Transport

The Packaging and Transport SCA covers programs for the safe packaging and transport of nuclear substances to and from the licensed facility.

3.14.1 Regulatory Requirements

The applicable regulatory requirements for the Packaging and Transport SCA include the following:

- *Transportation of Dangerous Goods Regulations* (TDGR)
- *Packaging and Transport of Nuclear Substances Regulations*, 2015 (PTNSR 2015).

3.14.2 Discussion

Based on the review of the past performance, CNSC staff have verified that Bruce Power has a packaging and transport program that ensures compliance with both the TDGR and the PTNSR 2015.

Bruce Power indicated that the power uprate will not require any changes to Bruce Power's packaging and transport program. CNSC staff have reviewed Bruce Power's request submission and supporting documentation, and concur with Bruce Power's conclusions.

3.14.3 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance in this SCA through compliance verification activities to verify that it continues to meet regulatory requirements.

3.14.3.1 Proposed Changes to the LCH

There are no proposed changes to the Bruce NGS A and B LCH for this SCA.

3.14.4 Conclusion

Bruce Power has an established packaging and transport program that meets regulatory requirements. CNSC staff are satisfied that Bruce Power will continue to implement and maintain an effective packaging and transport program at the Bruce NGS A and B that will continue to meet regulatory requirements during operation at IPLs.

CNSC staff determined that operation at IPLs will not impose any new requirements to Bruce Power's packaging and transport program.

3.15 Nuclear Facility Specific Conditions

The following section presents CNSC staff review conclusions for the facility specific conditions applicable to the P2030 uprate to IPL.

3.15.1 Integrated Implementation Plan

The Integrated Implementation Plan (IIP) contains commitments, including the timeframes for implementation, from the Bruce A and B Periodic Safety Reviews (PSRs). Bruce Power indicated in its request submission that power uprate will have no impact to the IIP and CNSC staff concur with that.

3.15.2 Return-to-Service Plan

Return to service (RTS) involves returning the reactor and associated nuclear and non-nuclear systems to commercial operation. Based on the information provided in the request submission, CNSC staff concluded that power uprate to IPLs has no impact on the RTS Plan.

3.15.3 Regulatory Hold Points for Return to Service and Continued Operation

The use of RHPs is an established practice at the CNSC, and their use has been recognized as a tool promoting regulatory efficiency while retaining robust oversight. The release of an RHP is conditional on a verification that pre-requisites approved by the Commission have been met. For example, there are RHPs for the return to service of each unit undergoing an MCR outage for which Commission, or consent of a person authorized by the Commission approval will be sought prior to proceeding to the subsequent commissioning phase. These hold points require regulatory verification to confirm operational readiness of the plant safety systems to satisfy regulatory requirements for staged progress through the commissioning phases up to full power operation.

The P2030 project will result in design modifications that have to be implemented, documentation that has to be updated, such as SOE limits and conditions, and training that has to be completed prior to implementation of the power uprate. These changes will be implemented both while the units are online and during their planned outages. The first unit that Bruce Power intends to power uprate is Unit 6 after the completion of its planned maintenance outage in 2027.

Due to the nature of some activities, CNSC staff will not be able to verify that the changes have been completed in compliance with all applicable regulatory requirements and commitments until a later date that is closer to the completion of the work.

CNSC staff propose that the Commission establish an RHP under Licence Condition (LC) 15.5 (Section 3.15.3.1) to confirm Bruce Power's readiness to operate at IPLs prior to implementing the proposed power uprate in any unit.

With respect to the removal of this RHP, CNSC staff recommends that the Commission delegates the authority to the EVP-CROO, ROB (Section 5.2).

3.15.3.1 Proposed Changes to the LCH

CNSC staff proposes the addition of the following section to LC 15.5:

Operation Beyond 92.5% Full Power for Bruce A and 93% Full Power for Bruce B

The CNSC Commission has established one regulatory hold point (RHP) for operation beyond 92.5% full power (FP) for Bruce A units and 93% FP for Bruce B units. An approval will be sought from the Commission or consent of a person authorized by the Commission prior to power increase to 95.5% FP for Bruce A units and 96% FP for Bruce B units. Compliance verifications will be undertaken to confirm operational readiness of the plant safety systems to satisfy regulatory requirements for up to 95.5% FP for Bruce A units and 96% FP for Bruce B units. This RHP is consistent with the regulatory approach described in REGDOC-2.3.1.

Compliance Verification Criteria:

The licensee shall seek approval of the Commission or consent of a person authorized by the Commission prior to the removal of the following regulatory hold point for the power increase beyond 92.5% FP for each Bruce A unit and 93% FP for each Bruce B unit.

Pre-requisites for Release of Hold Point Prior to exceeding 92.5% full power for Bruce A units and 93% full power for Bruce B units:

1. Completion of all remaining safety analysis items are verified. All CNSC staff comments associated with safety analysis reviews will have been addressed such that any outstanding comments would be of low safety significance.
2. All required online and outage design modifications are installed to support operation up to the IPL and meet applicable regulatory requirements; the criteria to be used:
    a. List and descriptions of all required design modifications are submitted, once identified, at least 90 days prior to uprate for each unit,
    b. Prior to power uprate beyond 92.5% FP for Bruce A and 93%FP for Bruce B, up to 95.5% FP for Bruce A and 96%FP for Bruce B, notification of the completion of modifications identified in item 2. a. are submitted,
    c. A commitment is provided prior to power uprate beyond 92.5% FP for Bruce A and 93%FP for Bruce B to submit notification of completion of commissioning activities within 90 days following power uprate to 95.5% FP for Bruce A and 96%FP for Bruce B.
3. Documentation has been updated to support operation at IPL;
   the criteria to be used: confirmation that change requests were initiated, document markups are completed and commitment provided to submit confirmation of document issuance for:
    a. Operating Policies and Principles updates
    b. Operational Safety Requirements updates
    c. Instrument Uncertainty Calculations updates
    d. Impairment Manuals updates
4. The required training to support operation at the IPL is completed;
    a. Change requests for initial training submitted.
    b. Specified training (e.g., gap training) to support operation at the IPL is completed and affected personnel are qualified.

Upon removal of this regulatory hold point, Bruce Power shall operate the reactor within the following limits as indicated in power limits table under LC 3.1

3.15.4 Cobalt-60 and Lutetium-177

Bruce Power is required to implement and maintain a program for the production of the nuclear substances Cobalt-60 and Lutetium-177.

- Bruce Power harvests Cobalt-60 during the removal of Cobalt adjusters from each of the Bruce B reactors.
- An Isotope Production System (IPS) in Bruce B is used to produce Lutetium-177 (Lu-177) from Ytterbium-176 (Yb-176) oxide powder.

3.15.4.1 Discussion

All aspects of the program for the production of the nuclear substances (cobalt-60 and lutetium177) described in the LC 15.10 apply to operation at IPLs.

The Bruce Power's request submission indicated that the potential impacts of the power uprate to IPLs on cobalt-60 production are being considered as part of the 36 Month Outage Interval sub-project and will be the subject of a separate WN to the CNSC. Also, potential impacts of power uprate to IPLs on the adjuster rods will be evaluated before the proposed power uprate in any of the units and Bruce Power indicated that a separate notification will be provided to CNSC.

Currently, Bruce Power has an IPS installed in Unit 7 only. Unit 7 will not increase power to IPL until after the completion of the MCR. The analyses supporting the current isotope production have been performed based on the pre-MCR operating conditions of Unit 7, which assumed operation at 93%FP or lower. Analysis at 96% FP will be performed for the Unit 6 IPS project (i.e. a post-MCR core). Bruce Power indicated that this analysis will be submitted by late 2026 to support the installation and operation of an isotope production system in Unit 6 during the planned maintenance outage. This safety analysis will be bounding for all Bruce B units for post-MCR operation with an installed IPS. Bruce Power has not yet formally proposed installing an IPS in the Bruce A units, however; similar to Bruce B, analysis would be performed to support isotope production at the 95.5% reactor power level.

3.15.4.2 Regulatory Focus

CNSC staff will continue to monitor Bruce Power's performance for the production of Cobalt-60 and Lutetium-177 through compliance verification activities to verify that it continues to meet regulatory requirements.

CNSC staff will conduct compliance verification activities to confirm that the required pre-requisites are completed, prior to power uprate to IPLs. This will include verifying that the impacts of power uprate to IPLs on the isotopes is evaluated.

3.15.4.3 Conclusion

Proposed power uprate results in the requirement to revise Cobalt-60 and Lutetium-177 procedures to reflect the IPLs which will be completed prior to implementing the changes. As indicated by Bruce Power, these documents are subject to written notifications in accordance with the Bruce NGS A and B LCH.

CNSC staff conclude that Bruce Power has a mature program for the production of the nuclear substances Cobalt-60 and Lutetium-177 and this program will be able to accommodate operation at IPLs while fulfilling the regulatory requirements. CNSC staff will verify that the impacts of power uprate to IPLs on the adjuster rods is evaluated, prior to the release of the proposed RHP.

4 Consultation and Engagement

4.1 Indigenous Consultation and Engagement

The common-law duty to consult with Indigenous Nations and communities applies when the Crown contemplates actions that may adversely affect potential or established Indigenous and/or treaty rights. The CNSC ensures that all of its licence decisions under the NSCA uphold the honour of the Crown and uphold Indigenous peoples' potential or established Indigenous and/or treaty rights pursuant to section 35 of the Constitution Act, 1982.

CNSC staff are 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. The CNSC's Indigenous engagement practices include sharing information, discussing topics of interest, seeking feedback and input on CNSC processes, and providing opportunities for participation in environmental monitoring. The CNSC also provides funding support (through the CNSC's Participant Funding Program (PFP) and Indigenous and Stakeholder Capacity Fund) for Indigenous peoples to meaningfully participate in Commission proceedings and ongoing regulatory activities.

4.1.1 Discussion and Conclusion

The Bruce NGS A and B site resides on lands and waters within Saukiing Anishnaabekiing. These are the traditional lands and treaty territory of the people of the Saugeen Ojibway Nation (SON) which includes the Chippewas of Nawash and Saugeen First Nation. The lands and waters upon which the Bruce NGS A and B is situated are also of interest to Metis Nation of Ontario (MNO) Region 7, Historic Saugeen Metis (HSM), and the Chippewas of Kettle and Stony Point First Nation (CKSPFN). The CNSC has ensured it has carried out a thorough engagement process so that CNSC staff can understand, and work to address, any concerns that Indigenous Nations and communities may have with respect to Bruce Power's request. The CNSC is committed to keeping the identified Indigenous Nations and communities informed of ongoing activities in their territories.

Based on the information received in the request submission it is unlikely that the proposed requested activities would cause new adverse impacts to the exercise of established or potential Indigenous and/or treaty rights as continued operations will not change the Bruce NGS A and B site characterization or result in the installation of new facilities at the site, a change to the site footprint, or any new licensed activities on site. As such, CNSC staff are of the opinion that Commission approval for the Bruce NGS A and B to operate up to the IPLs will lead to no new impacts on the exercise of rights.

CNSC staff and Bruce Power have conducted engagement activities with all identified Indigenous Nations and communities to ensure they were aware of the request, to identify and address potential concerns and questions and encourage their participation in the Commission proceeding process.

4.1.2 CNSC staff Engagement Activities

The Indigenous Nations and communities listed below have been identified based on analysis conducted by CNSC staff using Crown Indigenous Relations and Northern Affairs Canada's (CIRNAC) Aboriginal and Treaty Rights Information System (ATRIS) and other mapping tools, as well as through a review of existing CNSC and open resources including records of Indigenous Nations and communities who may have expressed interest in Bruce Power's operations in the past. Should other Indigenous Nations and communities not included in the list identify interest in the request moving forward, they will be added as appropriate.

CNSC staff identified the following Indigenous Nations and Communities who have Indigenous and/or Treaty rights in the area where Bruce Power is located:

- SON which is comprised of Saugeen First Nation and the Chippewas of Nawash Unceded First Nation (Neyaashiinigmiing).

In addition, CNSC staff have identified the following Indigenous Nations and communities that have expressed interest in the Bruce Power site:

- HSM
- MNO (Region 7)
- CKSPFN

A Notice of Public Hearing was made public on November 10, 2025, and sent directly to the identified Indigenous Nations and communities on November 12, 2025. The notice also included information on participant funding. The CNSC made available up to $50,000 through its PFP to support Indigenous Nations and communities and members of the public in providing value added information to the Commission through informed and topic-specific interventions. CNSC staff sent a reminder email regarding the availability of PFP support and the application deadline (January 12, 2026) on January 5, 2026.

Full details on the participant funding made available and all parties that were awarded funding are available in Section 4.2 of this CMD. SON applied for and received funding to participate in this Commission hearing.

CNSC staff offered to meet with all identified Indigenous Nations and communities to discuss the request and raised the Bruce Power's request in regular meetings under Terms of Reference (TOR) for long-term engagement arrangements with SON, HSM and MNO (Region 7).

CNSC staff discussed this request during regularly scheduled meetings with SON as per the TOR and engagement workplan. As part of the discussions and engagement SON has expressed concerns regarding the potential increase in heat being released into Lake Huron as a result of the proposed power uprate. Section 3.9.3 identifies this concern as a regulatory focus item for CNSC staff.

CNSC staff have continued discussions in regularly scheduled meetings as per the TOR and ran a workshop for the SON Environment Office and their experts on March 9th 2026 to better understand how CNSC conducts and makes safety analysis determinations, and deterministic analysis methodologies employed by the CNSC relating to this request. In addition, SON requested for more information with regards to how CNSC staff reviews requests in order to support SON's own review of the request and this CMD. This request was also addressed in the March 9th 2026 workshop.

CNSC staff met with MNO Region 7 at a semi-annual meeting on Nov 5th, 2025 as per the MNO and CNSC TOR for long-term engagement and discussed P2030. In addition, CNSC staff have provided updates about the request in monthly MNO Lands Resources and Consultations department meetings.

CNSC staff provided details about P2030 to HSM on November 6th, 2025 as part of the semi-annual meeting as outlined by the CNSC-HSM TOR for long-term engagement.

Chippewas of Kettle and Stony Point were notified of the PFP opportunity, and CNSC staff offered to meet to discuss Bruce Power's request in greater detail through meetings upon request. They have not responded to this offer to date.

All the identified Indigenous Nations and communities have been encouraged to participate in the regulatory review process and in the Commission hearing through written interventions to advise the Commission directly of any concerns they may have in relation to this request.

4.1.3 Licensee Engagement Activities

As Bruce Power's request is unlikely to result in any adverse impact on Indigenous and/or Treaty rights, the requirements in REGDOC-3.2.2, *Indigenous Engagement*, do not apply.

However, Bruce Power's request does include details on Bruce Power's Indigenous engagement policy and activities completed to date. The request submission states that Indigenous engagement is ongoing, with regular updates being provided to identified Indigenous Nations and communities since 2023. Bruce Power also indicated that their outreach has been extended to the SON, HSM, and the MNO (Region 7).

Bruce Power identified the following activities:

- Focused engagement with local Indigenous communities began in early 2023, with follow-up meetings and information provided upon request.
- Meetings were held with the HSM in mid- and late January 2025.
- The MNO (Region 7) requested copies of the associated presentations and technical documentation- this was provided to them by Bruce Power.
- General information was shared with the SON in December 2024 as part of Bruce Power's annual Regulatory Look Ahead package. This was followed in January 2025 by a more detailed P2030 information package and a February 2025 discussion.
- Enquiries were received in the areas of thermal output, water intake, and the associated impacts on fisheries, including impingement and entrainment. In response, Bruce Power provided the requested documentation and analyses to the identified Indigenous Nations and communities, including:
    - The Bruce A and B: Safety Control Area #9 Environmental Protection Gap Analysis

- The Engineering Evaluation assessing Bruce A and B's compliance with Permits To Take Water (PTTW) and Environmental Compliance Approval temperature differential limits
- A briefing note outlining Bruce Power's collaboration with the Electric Power Research Institute (EPRI) on thermal innovations and low-grade energy recovery.

Bruce power also notes in their request submission that the project will continue to evaluate improvements to the circulating water system, including potential mitigation measures, which they will continue to engage with Indigenous Nations and communities on. CNSC staff note that thermal effluent and the circulating water system at the Bruce NGS A and B are of great interest and concern for the SON in particular as noted above.

4.1.4 Conclusion

CNSC staff have conducted consultation and engagement activities with the identified Indigenous Nations and communities including project notification, meetings, opportunities to apply for funding, addressing issues and concerns, and encouragement of participating in Commission hearing processes via interventions. Based on CNSC staff's engagement activities to date, CNSC staff have not identified any concerns with respect to potential new impacts to Indigenous and/or treaty rights relating to the request. CNSC staff and Bruce Power have worked to meaningfully engage each Nation and identify potential solutions and commitments to address the concerns raised by Indigenous Nations and communities to date.

CNSC staff are committed to ongoing engagement and collaboration with interested Indigenous Nations and communities and will continue to provide opportunities for meaningful long-term engagement and collaboration with respect to Bruce Power's projects, operations and activities in relation to the application for P2030. CNSC staff encourage Bruce Power to continue engagement with Indigenous Nations and communities regarding P2030.

4.2 Licensee Public Information and Engagement

A Public Information and Disclosure Program (PIDP) is a regulatory requirement for licence applicants and licensees of Class I nuclear facilities, uranium mines and mills and certain Class II nuclear facilities. These requirements are found in *REGDOC-3.2.1, Public Information and Disclosure*.

The primary goal of the PIDP is to ensure that information related to the health, safety and security of persons and the environment, and other issues associated with the lifecycle of nuclear facilities are effectively communicated to the public. The program must include a commitment to, and protocol for ongoing, timely communication of information related to the licensed facility during the course of the licence period.

CNSC staff's expectations of a licensee's public information program and disclosure protocol are commensurate with the level of risk of the facility, as well as the level of public interest in the licensed activities. The program and protocol may be further influenced by the complexity of the nuclear facility's lifecycle and activities, and the risks to public health and safety and the environment perceived to be associated with the facility and activities.

Licence Condition G.5 requires Bruce Power to implement and maintain a PIDP. This program is supported by a disclosure protocol that outlines the type of facility information to be shared with the public and that provides details on how that information is to be shared. CNSC staff monitor Bruce Power's implementation of its PIDP to ensure that communication with target audiences is regular and meaningful. CNSC staff also review yearly program summaries to verify that Bruce Power is taking public feedback into consideration and making program adjustments accordingly.

Bruce Power indicated that it has undertaken comprehensive public communication and engagement activities in support of P2030, beginning with the public release of information in October 2021 announcing its objective to increase site capability to 7,000 MW in alignment with national climate objectives and future clean-energy demands.

CNSC staff determined that Bruce Power has a well-established public information and disclosure program that meets the requirements of REGDOC-3.2.1. The program ensures that information about P2030 and during IPLs is effectively communicated to the public.

4.2.1 Discussion and Conclusion

CNSC staff concluded that Bruce Power maintains and implements a satisfactory PIDP that complies with the requirements of REGDOC-3.2.1. The program demonstrated that Bruce Power communicated information related to the health, safety and security of people and the environment, as well as other matters relevant to the lifecycle of its facilities, in an effective and accessible manner. Staff also observed that the program supported open and transparent communication with identified audiences and stakeholders. The program ensured that target audiences affected by and interested in the licensed facilities and activities were informed on a timely basis about operations, activities, and anticipated effects on the environment and the health and safety of persons.

4.3 Participant Funding Program

The CNSC established the Participant Funding Program (PFP) in 2011 to:

1. enhance individual, not-for-profit organization and Indigenous Nations and Communities participation in the CNSC's environmental assessment (EA) and licensing processes for major nuclear facilities (e.g., uranium mines, nuclear power plants, nuclear substance processing, or nuclear waste facilities)
2. assist individuals, not-for-profit organizations and Indigenous Nations and Communities to bring value-added information to the Commission through informed and topic-specific interventions related to EAs and licensing (i.e., new, distinctive and relevant information that contributes to a better understanding of the anticipated effects of a project)

4.3.1 Discussion and Conclusion

In advance of the hearing in writing, the CNSC made up to $50,000 available through its PFP to assist Indigenous Nations and communities, members of the public and interested parties in reviewing Bruce Power's request and associated documents, and in participating in the Commission hearing process by providing topic-specific written interventions for the Commission's hearing in writing. The deadline to apply for funding was January 12, 2026. CNSC has considered the recommendations of the independent funding review committee (FRC) on the allocation of participant funding and awarded $11,500 to Canadian Environmental Law Association (CELA) and $37,720 to SON.

The CNSC continues to share regulatory and scientific information with the public through social media, webinars, community outreach, and updates on its website. It also uses tools like the PFP and online notifications to encourage people to take part in the Commission's hearing process, as described above. Through the PFP, the CNSC has provided support to interested members of the public, Indigenous groups, and other stakeholders to help them prepare for and participate in the Commission's hearing.

5 Other matters of regulatory interest

5.1 Land Use and Occupation

The proposed power uprate does not result in any change in land use and occupation. However, P2030 is supported by Bruce Power's projects and licensed activities progressing under MCR, Lifetime Asset Management Plan (LAMP), and other ongoing improvement initiatives. In its request submission Bruce Power indicated that CNSC will receive independent notification of any associated land use modifications within the exclusion zone through the routine correspondence generated by these initiatives.

5.2 Delegation of Authority

The Commission may include in a licence any condition it considers necessary for the purposes of the NSCA. The Commission may delegate authority to CNSC staff with respect to the administration of licence conditions, or portions thereof.

There are already two licence conditions in the Bruce A and B PROL that contain the phrase "a person authorized by the Commission":

- LC 3.2 (Restart after a serious process failure)
- LC 15.5 (Removal of regulatory hold points)

With respect to the new hold point under LC 15.5 associated with Bruce Power's power uprate request, CNSC staff recommend the Commission delegate the authority for consent to increase reactor power limits 92.5% FP for Bruce A units and 93% FP for Bruce B units to the following CNSC staff:

- Executive Vice-president and Chief Regulatory Operations Officer, Regulatory Operations Branch

Regulatory Hold Point

With respect to LC 15.5 (removal of RHPs), CNSC staff recommend that the Commission delegate the authority to remove RHP for power uprate beyond 92.5% FP for Bruce A and 93% FP for Bruce B to the EVP-CROO, ROB.

Prior to releasing an RHP, approval of the Commission or the consent of a person authorized by the Commission must be obtained, and CNSC staff will subsequently provide notice to the licensee that the RHP has been released, verify completion of prerequisites and provide a report to the delegated authority who will issue a record of decision. The same process is currently being used successfully for return to service after MCR.

CNSC have identified an RHP associated with this request which is detailed under Section 3.15.3.1.

Bruce Power will not be allowed to increase power beyond 92.5%FP for Bruce NGS A units and 93%FP for Bruce NGS B units if it cannot meet the pre-requisites for the release of the RHP. Releasing this RHP will enable power uprate to a maximum of IPLs.

6 Conclusions

Matters for Consideration

Bruce Power has requested that the Commission amend its power limits under licence condition 3.1, to authorize operation at IPLs. In determining conclusions and recommendations to the Commission, CNSC staff evaluated whether Bruce Power is a qualified applicant pursuant to paragraphs 24(4)(*a*) and (*b*) of the NSCA. Bruce Power's request was considered against regulatory requirements including:

- Applicable legislation and regulations
- Relevant CNSC REGDOCs
- Existing licensing basis of Bruce Nuclear Generating Stations A and B.

CNSC staff assessment of Bruce Power's request also considers:

- Suitability of Bruce Power's existing programs to determine if the power uprate activities can be accommodated in accordance with the CNSC Regulatory Framework
- Engagement with applicable Indigenous Nations and communities

CNSC staff reviewed Bruce Power's request submission, including supporting documents, and conclude that:

1. Bruce Power continues to 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,
2. The safety analysis predicts adequate safety margins for operation at IPLs,
3. There are established programs to manage the power level increase and ensure that the plant design and operation will remain compliant with all applicable regulatory requirements.
4. The proposed changes in reactor power limits are within the existing reactor design and does not alter the existing safety barriers or the safety functions that prevent accidents or reduce their consequences, i.e., defence in depth levels are maintained.

CNSC staff also note the following:

5. No concerns were identified with respect to potential new impacts to Indigenous and/or treaty rights.

6. CNSC staff have a robust regulatory oversight program in place to verify Bruce Power's compliance with all applicable regulatory requirements at IPLs.
7. CNSC staff would update the Commission on the status of the power increase implementation of each unit, if the Commission approves Bruce Power's request.

Bruce Power cannot implement some of the P2030 changes until Commission approval is granted and subsequently, the project progresses to a stage closer to the implementation of the power uprate. Therefore, CNSC staff can only verify a number of items, such as, design changes, operating procedures, and training material updates, at a time closer to the power uprate. The items that must be completed prior to the power uprate will be the subject of CNSC staff regulatory oversight. Consequently, CNSC staff propose establishing a Regulatory Hold Point (RHP) authorized under Licence Condition (LC) 15.5 to track completion of key items associated with gaining assurance of Bruce Power's operational readiness for the proposed power uprate in any of the units.

If the commission approves CNSC staff's recommendation for the use of an RHP:

- Bruce Power will not be allowed to increase power beyond 92.5%FP for Bruce NGS A units and 93%FP for Bruce NGS B units if it cannot meet the pre-requisites for the release of the RHP.
- CNSC staff will perform compliance verification activities to confirm that the identified actions have been completed.
- CNSC staff will provide the Commission with updates, when available, regarding the release of the RHP.

CNSC staff recommend that the Commission:

1. **Authorize** Bruce Power to increase the reactor power limits to IPLs.
2. **Establish** an RHP in LC 15.5, requiring Bruce Power to obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to implementing any power uprates beyond the current limits and up to the IPLs for all units.
3. **Delegate** authority to the EVP-CROO, ROB for the administration of the RHP associated with the proposed power uprate.

If the Commission accepts CNSC staff's recommendation, CNSC staff will revise the Bruce NGS A and B Licence Conditions Handbook (LCH) as specified in Appendix C.6 of this submission.

No change to the licence conditions in the Bruce NGS A and B PROL 18.04/2028 is needed.

7 References

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[25] CNSC letter, A. Bulkan to M. Burton, "Bruce A: Integrated Safety Analysis Summary Report for the Intermediate Power Level, Project 2030", April 22, 2025, e-Doc 7506289.

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8 Glossary

For definitions of terms used in this document, see REGDOC-3.6, *Glossary of CNSC Terminology*, which includes terms and definitions used in the *Nuclear Safety and Control Act* and the Regulations made under it, and in CNSC regulatory documents and other publications.

Additional terms and acronyms used in this CMD are listed below.

ALARA	As Low As Reasonably Achievable
ATRIS	Aboriginal and Treaty Rights Information System
AoR	Analysis of Record
CDF	Core Damage Frequency
CELA	Canadian Environmental Law Association
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada
CKSPFN	Chippewas of Kettle and Stony Point First Nation
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
CVC	Compliance Verification Criteria
DBA	Design Basis Accident
DSA	Deterministic Safety Analysis
EFPH	Equivalent Full Power Hours
EA	Environmental Assessment
EQ	Environmental Qualification
EPR	Environmental Protection Reviews
EPRI	Electric Power Research Institute
EVP-CROO	Executive Vice President and Chief Regulatory Operations Officer
FE	Fuel Element
FP	Full Power
FRC	Funding Review Committee
HAZOP	Hazard and Operability Study

HSM	Historic Saugeen Métis
HTS	Heat Transport System
IAA	Impact Assessment Act
IAC	Interim Acceptance Criteria
IAEA	International Atomic Energy Agency
I/F	Irradiated Fuel
IFP	Irradiated Fuel Port
IIP	Integrated Implementation Plan
ILW	Intermediate-Level Waste
IM	Impairment Manual
IPL	Intermediate Power Level
IUC	Instrument Uncertainty Calculations
LAMP	Lifetime Asset Management Plan
LBLOCA	Large Break Loss of Coolant Accident
LC	Licence Condition
LCDP	Low Core Delta Pressure
LCH	Licence Conditions Handbook
LLW	Low-Level Waste
LOE	Limit of Operating Envelope
LRF	Large Release Frequency
MBFP	Main Boiler Feed Pump
MCR	Major Component Replacement
MNO	Métis Nation of Ontario
MSM	Management System Manual
NGS	Nuclear Generating Station
NOC	Normal Operating Conditions
NOP	Neutron Overpower Protection
NPP	Nuclear Power Plant

NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NSCA	Nuclear Safety and Control Act
OPG	Ontario Power Generation
OPEX	Operating experience
OP&P	Operating Policies and Principles
OSR	Operational Safety Requirements
PFP	Participant Funding Program
PHTS	Primary Heat Transport
PHT	Primary Heat Transport System
PIE	Postulated Initiating Event
PI&R	Problem Identification and Resolution
PROL	Power Reactor Operating Licence
PSR	Periodic Safety Review
SQ	Seismic Qualification
PSA	Probabilistic Safety Analysis
PT	Pressure Tube
PTTW	Permits To Take Water
REGDOC	CNSC Regulatory Document
RTS	Return To Service
ROB	Regulatory Operations Branch
ROH	Reactor Outlet Header
SAIR	Safety Analysis Impact Reports
SCA	Safety and Control Area
SG	Steam Generator
SOE	Safe Operating Envelope
SON	Saugeen Ojibway Nation
SpA	Specific Areas of Safety Control Area
SSCs	Systems, Structures, Components

SSCTs	Systems, Structures, Components and Tools
TOR	Terms of Reference
TSP	Trip Setpoint
WN	Written Notification

Appendix A: Basis for Recommendation(s)

A.1 : Regulatory Basis

The regulatory basis for nuclear power plants in Canada is primarily governed by the NSCA. The CNSC's regulatory framework encompasses laws, regulation, guidance documents that set out the requirements for the safe operation of nuclear facilities, ensuring public safety and environmental protection.

The primary requirements for the Bruce Nuclear Generating Stations A and B arise from the following laws and CNSC regulations:

- *Nuclear Safety and Control Act*
- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- *Radiation Protection Regulations*
- *Nuclear Security Regulations*
- *Nuclear Non-proliferation Import and Export Control Regulations*
- *Transportation of Dangerous Goods Regulations* (TDGR)
- *Packaging and Transport of Nuclear Substances Regulations,* 2015 (PTNSR 2015).

A.2 : Detailed Summary of CNSC Staff's Assessment of the Request

CNSC staff assessment of Bruce Power's request included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements. The completeness check verified whether the request included the prescribed information in accordance with the *Nuclear Safety and Control Act* and applicable regulations.

The sufficiency check verified whether the request included sufficient and quality information in order for CNSC staff to conduct the technical assessment. The technical assessment verified whether the request included adequate safety and control measures to address CNSC requirements. Documents originally submitted as part of the request may have been revised, updated, or replaced over the course of the assessment to address CNSC requirements.

Table A. 1 : General Application Requirements

Pursuant to Section 3 of the ***General Nuclear Safety and Control Regulations*** **Licences – General Application Requirements**	**Location in Application or Supporting Document(s) as Noted by Bruce Power**	**Complete?**	**Sufficient?**	**Adequate?**
(1) An application for a licence shall contain the following information:				
(a) the applicant's name and business address;	Nuclear Power Reactor Operating Licence Bruce Nuclear Generating Stations A and B (PROL 18.04/2028) referred in the request submission *"Bruce A and B: Request Commission Approval of Change to Reactor Power Limits, Project 2030"* [2]	Y	Y	Y
(b) the activity to be licensed and its purpose;	N/A - There is no change in the activity to be licensed or its purpose due to requested power uprate.			

Pursuant to Section 3 of the *General Nuclear Safety and Control Regulations* Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Bruce Power	Complete?	Sufficient?	Adequate?
(c) the name, maximum quantity, and form of any nuclear substance to be encompassed by the licence;	N/A – There is no change in nuclear substance to be encompassed by the licence due to requested power uprate.			
(d) a description of any nuclear facility, prescribed equipment, or prescribed information to be encompassed by the licence;	N/A – There is nuclear facility design change associated with this request.			
(e) the proposed measures to ensure compliance with the *Radiation Protection Regulations*, the *Nuclear Security Regulations* and the *Packaging and Transport of Nuclear Substances Regulations, 2015;*	Attachment A Sections 3.7, 3.12, 3.14 of the request submission "*Bruce A and B: Request Commission Approval of Change to Reactor Power Limits, Project 2030*" [2]	Y	Y	Y

Pursuant to Section 3 of the ***General Nuclear Safety and Control Regulations*** Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Bruce Power	Complete?	Sufficient?	Adequate?
(f) any proposed action level for the purpose of section 6 of the *Radiation Protection Regulations*;	N/A - All aspects of the Radiation Protection Program apply to operation at IPLs; there is no proposed action level for the purpose of section 6 of the *Radiation Protection Regulations*			
(g) the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment, or prescribed information;	N/A			
(h) the proposed measures to prevent loss or illegal use, possession, or removal of the nuclear substance, prescribed equipment, or prescribed information;	N/A			

Pursuant to Section 3 of the *General Nuclear Safety and Control Regulations* **Licences – General Application Requirements**	**Location in Application or Supporting Document(s) as Noted by Bruce Power**	**Complete?**	**Sufficient?**	**Adequate?**
(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	All safety analysis related submissions listed under the references of "*Bruce A and B: Request Commission Approval of Change to Reactor Power Limits, Project 2030*" [2].	Y	Y	Y

Pursuant to Section 3 of the *General Nuclear Safety and Control Regulations* **Licences – General Application Requirements**	**Location in Application or Supporting Document(s) as Noted by Bruce Power**	**Complete?**	**Sufficient?**	**Adequate?**
(j) the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed, or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste;	Attachment A Section 3.11 of the request submission "*Bruce A and B: Request Commission Approval of Change to Reactor Power Limits, Project 2030*" [2] and Table 2 of clarification provided by Bruce Power in "*Responses to 27NOV2025 and 04DEC2025 Email Requests for Clarifications re. P2030*" [51]	Y	Y	Y

Pursuant to Section 3 of the *General Nuclear Safety and Control Regulations* Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Bruce Power	Complete?	Sufficient?	Adequate?
(k) the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the [NSCA] and the regulations made under it, including the internal allocation of functions, responsibilities and authority;	Attachment A Section 3.1 of the request submission "*Bruce A and B: Request Commission Approval of Change to Reactor Power Limits, Project 2030*" [2]	Y	Y	Y
(l) a description of any proposed financial guarantee relating to the activity to be licensed;	Attachment A Section 3.11 of the request submission "*Bruce A and B: Request Commission Approval of Change to Reactor Power Limits, Project 2030*" [2]	Y	Y	Y

Pursuant to Section 3 of the *General Nuclear Safety and Control Regulations* Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Bruce Power	Complete?	Sufficient?	Adequate?
(m) any other information required by the [NSCA] or the regulations made under it for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.	N/A			

A.3 : Technical Basis

The technical foundation for the recommendations in this CMD is informed by pertinent regulatory requirements, standards, and international guidance. Each relevant SCA is evaluated against the regulatory requirements listed in the relevant subsections of Section 3.

A.4 : Specific Areas (SpAs) for This Facility Type

The following table identifies the specific areas that comprise each SCA for Bruce A and Bruce B facilities. The SpAs marked with an asterisk are the ones that are explicitly discussed in Section 3. Where no SpAs are marked, CNSC staff have incorporated those considerations into a broader, integrated evaluation of that SCA.

Table A. 2: Specific Areas (SpAs) for This Facility Type

Functional Area	Safety and Control Area	Specific Areas
Management	Management System	• Management System (*) • Organization (*) • Performance assessment, improvement and management review (*) • Operating experience and Problem Identification and Resolution (*) • Change Management (*) • Safety Culture • Configuration Management (*) • Records Management (*) • Supply and Contractor Management (*) • Business Continuity
	Human Performance Management	• Human Performance Program (*) • Personnel Training (*) • Personnel Certification (*) • Work Organization and Job Design • Fitness for Duty
	Operating Performance	• Conduct of Licensed Activity • Procedures • Reporting and Trending • Outage Management Performance • Safe Operating Envelope (*) • Severe Accident Management and Recovery (*)

		• Accident Management and Recovery (*)
Facility and Equipment	Safety Analysis	• Deterministic Safety Analysis (*) • Probabilistic Safety Analysis (*) • Criticality Safety • Severe Accident Analysis • Management of safety issues (including R&D programs) • Hazard Analysis
	Physical Design	• Design Governance (*) • Site Characterization • Facility Design • Structure Design • System Design (*) • Component Design (*)
	Fitness for Service	• Equipment Fitness for Service / Equipment Performance (includes Reliability) (*) • Maintenance (*) • Structural Integrity • Aging Management (*) • Chemistry Control (*) • Periodic Inspection and Testing (*)
Core Control Processes	Radiation Protection	• Application of ALARA • Worker Dose Control • Radiation Protection Program Performance • Radiological Hazard Control

	Conventional Health and Safety	• Performance • Practices • Awareness
	Environmental Protection	• Effluent and Emissions Control (releases) • Environmental Management System (EMS) • Assessment and Monitoring • Protection of the People • Environmental Risk Assessment
	Emergency Management and Fire Protection	• Conventional Emergency Preparedness and Response • Nuclear Emergency Preparedness and Response • Fire Emergency Preparedness and Response
	Waste Management	• Waste Characterization (*) • Waste Minimization (*) • Waste Management Practices (*) • Decommissioning Plans • Cost Estimate
	Security	• Facilities and Equipment • Security Practices • Response Arrangements • Drills and Exercises • Cyber Security
	Safeguards and Non-Proliferation	• Nuclear Material Accountancy and Control

		• Access and Assistance to the IAEA • Operational and Design Information • Safeguards Equipment, Containment and Surveillance • Import and export
	Packaging and Transport	• Packaging Design and Maintenance • Packaging and Transport • Registration for Use

A.5 : Safety Analysis Review Supporting Details

A.5.1 : Bruce Power's Residual Short-term Actions

Table A. 3: Residual In-progress Actions [30]

Short-Term Action	Related Analysis	TCD
Complete sensitivity cases with a lower Reactor Outlet Header (ROH) pressure to demonstrate that using nominal ROH pressure together with conservative assumptions covers the case with lower ROH pressure. This is being managed through the Safety Analysis Improvement Program.	Loss of Flow (Appendix 2) Control Failures (Appendix 3)	June 2027
Ensure completion of the Conexus Nuclear Inc. Work Package to enhance the basis of the dynamic approach to simulate the subcritical core state for In Core LOCA analysis.	In Core LOCA (Appendix 4)	TCD will be provided APR 2026 (based on Conexus schedule)

Ensure the design team completes the development of the design changes, and they are progressed through the ECC process consistent with CNSC understanding per [31].	Various	Prior to IPLs (covered by SCA5)
Respond to CNSC staff feedback on Bruce Power's White Paper on the Analysis Approach for Ongoing Deterministic Safety Analysis.	Various	05FEB2026
Respond to CNSC staff Stage 2 feedback on Bruce A and Bruce B Appx 1 & 11 analyses	Irradiated Fuel Port and Seismic Events (Appendices 1 & 11)	18FEB2026
Respond to CNSC staff feedback on Bruce A and Bruce B Appx 7 analyses	Feedwater (Appendix 7)	27FEB2026
Respond to CNSC staff further feedback on Bruce A and Bruce B Appx 4 In-Core LOCA analysis	In Core LOCA (Appendix 4)	30JAN2026
Confirm the supporting NOP analysis for the Intermediate Power Level (IPL)	NOP Analysis (Appendix 3)	31MAR2026

To date, Bruce Power has provided required information for the items noted above in accordance with the indicated schedule. CNSC staff are reviewing these submissions upon receipt.

Regarding the short-term items in the table above Bruce Power indicated that;

ROH pressure sensitivity cases for Loss of Flow and Control Failures are being managed through the Safety Analysis Improvement Program (item #1 in the table above)

The strategy to establish the basis for dynamic in core LOCA analysis is being developed through CONEXUS Work Package, *Evaluation of Physics Code Predictions of Dynamic Reactivity in a Shutdown State*. This work package was approved under the 2025/26 R&D program and is currently ongoing, with completion targeted for March 30, 2027.

The final review stage of Appendix 1 and Appendix 11 identified the need for additional information that needs to be addressed by Bruce Power in the short term. CNSC staff concluded that these remaining items are of low safety significance.

In addition to the above actions captured by Bruce Power, CNSC staff also communicated the following recommendations for resolution in the short-term:

- CNSC staff recommended that Bruce Power provide [52]
  - the criteria that will be used to determine when the analysis supporting the installed NOP TSP value will need to be re-assessed, and
  - the approximate EFPD or date that the NOP TSP effectiveness will be re-confirmed based on the observed aging trends post-MCR.

A.5.2 : Bruce Power's Residual Long-term Actions

Table A. 4: Future Planned Work for the Longer Term Including Operation at 100%FP [30]

Long-Term Action	Related Analysis
Update of the NOP analysis methodology - **Engage CNSC staff in the development of the updated NOP methodology through CONEXUS Joint Project JP479501, "Modernization of NOP/ROP Analysis Methodology".** - **Consider CNSC staff feedback on Project 2030 NOP IPL analysis, where relevant**	NOP (Appendix 3)
Demonstration of SDS2 effectiveness over the longer term. This is being managed through the Safety Analysis Improvement Program.	Large Break LOCA (Appendix 5)
Follow-up on LBLOCA plan for addressing CNSC staff feedback, per [32].	Large Break LOCA and Transition Break LOCA (Appendix 5)
Opportunities to improve trip coverage in the longer term, per [33].	Transition Break LOCA (Appendix 5)
Comparison of maximum Figure of Merit over the entire transient against the Derived Acceptance Criteria, per [34].	Loss of Flow (Appendix 2)

Address additional CNSC staff feedback in [35] on Bruce B Control Failures assessment (Appx 3)	Control Failures (Appendix 3)

Bruce Power indicated that, the long-term item on the demonstration of SDS2 effectiveness for LBLOCA is being managed through Safety Analysis Improvement Program.

In addition to the above actions captured by Bruce Power, CNSC staff also communicated the following recommendations that require resolution in the long-term:

- CNSC staff recommended that Bruce Power
    - develop a consistent and technically justified Fuel Handling DAC [45].
    - provide resolution to the issues identified in Bruce Power's white paper submission [54] describing the DSA analysis approach [21].

A.5.3 : Safety Significance of Residual Actions

The short-term actions identified by Bruce Power have the potential to impact the CNSC staff conclusions related to the IPLs submissions. However, the safety significance of these items is low and there is a low risk of their resolution affecting the CNSC staff position. This should not be interpreted to mean that they do not require resolution in connection to IPLs.

The long-term actions identified by Bruce Power are targeted at addressing the more complex feedback from the CNSC staff reviews. This includes the resolution of the feedback connected to NOP, LB-LOCA, LOE, and coupled analysis methods, among others. Most of these items are not exclusively related to P2030, but their resolution will have positive safety-benefits to P2030, largely aimed at providing additional confidence to the IPLs safety case. The safety significance of these items to P2030 IPLs is greater than that of the short-term actions, but CNSC staff have determined that their resolution should not be a prerequisite for IPLs. Rather, having established plans for their resolution and a commitment made as a part of IPLs commissioning, is considered by CNSC staff to be a reasonable approach.

The 2 additional CNSC staff recommendations that are listed under Appendix A.5.1 and Appendix A.5.2 are also regarded with low safety significance for IPLs. However, the CNSC staff recommendation, related to the re-assessment date for the NOP TSP, will define the re-analysis and/or assessment date for the NOP TSP.

A.5.4 : Summary of CNSC Staff DSA Reviews and Conclusions

This section provides a summary of the CNSC staff DSA reviews and conclusions. The full review details can be found in the respective references.

Safety Report Appendix 1: Fuel Handling System Failures

Fuel Handling System Failures cover events that occur during fuel transfer to/from the reactor and during fuel storage post-irradiation. The SAIR concluded that this event type required re-analysis and so, for both Bruce A and Bruce B, technical basis documents and analysis reports were submitted for review.

The CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs [55] [56] with recommendations to develop fuel handling derived acceptance criteria and to provide future confirmation that the autoflood system design requirements/performance is consistent with the assumed performance in the analysis [45].

The final review stage of Appendix 1 identified the need for additional information that needs to be addressed by Bruce Power in the short term. CNSC staff concluded that these remaining items are of low safety significance.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Safety Report Appendix 2: Electrical System Failures (Loss of Flow)

Electrical system failures cover events that lead to a loss of forced circulation within the primary heat transport system. The SAIR concluded that this event type required re-analysis and so, for both Bruce A and Bruce B, technical basis documents and analysis reports were submitted for review.

The CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs, with recommendations to perform additional sensitivity cases to confirm the effects of varied header pressures on the analysis figure of merit, to ensure safety systems are credited at their minimum performance, and to ensure that the analysis covers the full transient including post-trip [36] [37].

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Safety Report Appendix 3: Control Failures

Control Failures cover events that induce positive or negative reactivity effects in the core, changing the core reactivity profile, power level, or both. Typically, these events are separated into reactivity transients and NOP analysis covering very slow (quasi steady-state) events. The SAIR concluded that the transient reactivity events required further assessment and that the NOP events could be screened from the P2030 scope.

Assessments of transient events were performed and submitted for review. The CNSC staff reviews concluded that the assessments are sufficient to support a power increase to IPL, with confirmatory work needed to demonstrate alignment with requirements and address longer-term safety issues associated with control failure accidents as the plants age [38] [39].

Despite being screened from requiring update, confirmatory NOP analyses were performed and submitted for review. The review of the analysis submissions produced a series of recommendations from CNSC staff, including to replace their analysis method "*with a practical method which can be supported by engineering data and information*" [40] which resulted in Bruce Power formally communicating their intent to investigate alternative means to demonstrate the adequacy of the installed NOP TSPs for operation at 100 %FP. A fulsome review of the analysis framework was performed and documented by CNSC staff, with consideration of the findings from a recent independent review conducted under a CNSC research project. This review recommendations were provided to Bruce Power for consideration during the development of a new analysis method [41].

To support the IPLs safety case, the pre-existing design basis analysis that derived the installed value of the NOP TSP is considered as sufficient to support operations at IPLs for unaged conditions [18]. This position is based on recognition that

- MCR would restore the unit conditions to be aligned with those assumed in the design-basis analysis, and
- since the time of the design basis analysis there have been improvements and physical changes (ex: introduction of 37M fuel) that would act to improve the analysis results.

To sustain IPLs operations, a new or updated NOP TSP safety case will be required before aged conditions becomes significant enough to impact the validity of the design basis analysis. This future safety case will re-derive or re-support the installed NOP TSP values, with consideration of various candidates for the limiting events, the quality of the input information, and operational constraints.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Safety Report Appendix 4: Small Break Loss of Coolant Accidents

Small Break Loss of Coolant Accidents cover events that involve a break in the PHTS with a discharge rate of up to 950 kg/s, across various regions inside and outside the core. The SAIR concluded that this event type required re-analysis and so, for both Bruce A and Bruce B, technical basis documents and analysis reports were submitted for review.

For breaks outside the core, the CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs, with minor recommendations for editorial improvements to the analysis documentation [42] [36].

For breaks inside the core, the CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs, with recommendations for future confirmatory work to enhance the confidence in the analysis methods and inputs.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Safety Report Appendix 5: Large Break Loss of Coolant Accidents

Large Break Loss of Coolant Accidents cover events that involve a break in the PHTS with a discharge rate above the threshold for small breaks. This includes transition break ranging from 950 kg/s up to 3000 kg/s[1], and Large Breaks with discharge rates above 3000 kg/s. The SAIR concluded that this event type required re-analysis and so, for both Bruce A and Bruce B, technical basis documents and analysis reports were submitted for review.

For Transition Break Loss of Coolant Accidents, the CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs, with a recommendation to continue to pursue actions to resolve a single parameter trip coverage windows [43] [44].

For Large Break Loss of Coolant Accidents, the CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs, with a recommendation to further verify and document the information on relative SDS effectiveness [43] [44].

During the initial phase of the review of Bruce Power's LBLOCA analysis, CNSC staff also identified four key issues that affect the general credibility of the analyses [19]. The discussion of these issues was separated from the general review of the LB-LOCA submissions. Following a period of discussion and information exchanges, a summary of the issues, the dispositions provided by Bruce Power, and CNSC staff's final evaluation was communicated on July 18, 2025 [43]. The key aspects of those issues are echoed here:

- *FE-PT Contact:* Fuel channel failure due to sustained contact between the fuel element and pressure tube is the possible under the high temperatures expected during a postulated LBLOCA event. According to the requirements of REGDOC-2.4.1,

[1] Bruce A was modified from 1800kg/s to be 3000 kg/s in the Project 2030 analysis to be consistent with Bruce B SR value.

Deterministic Safety Analysis, qualitative acceptance criteria shall be established to prevent development of complex configurations or physical phenomena that cannot be modelled with high confidence. Such criteria do not currently exist, and fuel bundle deformation models are not yet available to reliably model this behavior. To support the argument of PT integrity, Bruce Power performed detailed thermal-mechanical analysis. CNSC staff's review of this analysis concluded that the methods considered all key phenomena involved in FE/PT contact, but the justification for the boundary conditions was not complete and may not fully represent the actual fuel conditions.

- *Interim Acceptance Criteria:* The CNSC IAC were communicated to the licensees in 2011 [46]. They were established to act as temporary criteria for the evaluation of LB-LOCA analysis results, until a set of criteria applicable to fast events are developed by industry and agreed to by the CNSC. Operation of the Bruce reactors above their current power levels was not considered during the development of the IAC and so, there is ambiguity about what effect this may have on their applicability to P2030. To provide assurance, CNSC staff proposed that the P2030 analysis results should be bounded by the results of the LB-LOCA licensing results for the equilibrium core. Bruce Power agreed to "*demonstrate that the safety margins in the Analyses of Record are effectively maintained*". The establishment of evidence-based derived acceptance criteria is still outstanding and will act to provide confidence in the P2030 LB-LOCA analysis conclusions.
- *Prompt Criticality:* Prompt criticality occurs when the fission chain reaction is sustained by prompt neutrons alone, with no reliance on delayed neutrons, and leads to an exponential power increase. A technical position on the avoidance of prompt criticality was communicated to Bruce Power and other licensees in 2001 [47]. All parties agreed that the avoidance of prompt criticality is highly desirable, and that all practical measures should be taken to avoid or significantly reduce its predicted duration in safety analysis. This led to several initiatives aimed at reducing or eliminating prompt criticality. The duration of prompt criticality predicted as a part of the P2030 analysis is longer than the Analysis of Record (AoR) and the mitigating actions, that acted as a basis for past acceptance, are no longer actively being pursued. Bruce Power's position is that the predicted prompt criticality is an artefact of the conservative analysis methods, and that it would be offset by the negative reactivity induced by fuel string relocation (FSR), which is conservatively not credited in the LB-LOCA analysis. CNSC staff acknowledged that FSR would have a counterbalancing effect to prompt criticality, but only for accidents which exhibit flow reversal. Qualified analysis models of this behaviour are not available.

- *Completeness of Information Supporting IPLs:* The LB-LOCA analysis was performed using the LOE methods for power pulse phase immediately following the break and relies on the pre-existing analysis for the remaining aspects of the LB-LOCA safety case related to long-term cooling, containment response, and dual failures. To ensure the continued alignment between the old/new analyses, CNSC staff identified a list of confirmatory activities. Bruce Power provided a comparison of key parameters from the old/new analyses to build confidence in the applicability of the existing analysis. CNSC staff's review did not identify any major misalignments but noted that a direct comparison is complicated by changes to the analysis methods, codes, assumptions, and phenomena.

The overall position regarding the generic issues identified in the Project 2030 LB-LOCA analysis was communicated on May 5, 2025 [20]. Despite these 4 issues being unresolved, CNSC staff recognized and agreed with Bruce Power's position that the safety margins shown by the analyses demonstrate acceptable safety margins, and that the shutdown systems continue to effectively ensure fuel channel integrity across the full range of LBLOCA break sizes at Intermediate Power Level. Therefore, CNSC staff concluded that the resolution of identified gaps should not be a prerequisite for the IPLs. However, resolution of these concerns will strengthen the IPLs safety case and will be a key consideration for any future power increases beyond the IPLs. Bruce Power provided a resolution strategy for these issues, which is under review by CNSC staff.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

<u>Safety Report Appendix 6: Heat Transport System Breaks Outside Containment</u>

Heat Transport System Breaks Outside Containment cover events that lead to a discharge of PHTS inventory outside the containment boundary. The SAIR concluded that this event type required further assessments, which were performed and submitted for CNSC staff review.

The CNSC staff reviews concluded that the assessments are sufficient to support a power increase to IPLs [45] [49].

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

<u>Safety Report Appendix 7: Feedwater and Steam Supply System Failures</u>

Feedwater and Steam Supply System Failures cover events that lead to a degradation or loss of the Steam Generators (SGs) as a heat sink to the HTS. The SAIR concluded that this event type required both assessments and re-analysis and so, for both Bruce A and Bruce B, consolidated reports were submitted for review.

The CNSC staff reviews concluded that the analyses and results are sufficient to support a power increase to IPLs, with recommendations to provide assurance that the dual parameter trip coverage is provided by diverse, rather than redundant, trip parameters [37] [48].

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

<u>Safety Report Appendix 8: Shutdown Cooling and Maintenance System Cooling System Failures</u>

Shutdown Cooling and Maintenance System Cooling System Failures cover events that lead to a rise in the fuel temperature that occur during the operation of the cooling systems while the reactor is shut down. The SAIR concluded that this event type required re-analysis and so, for both Bruce A and Bruce B, technical basis documents and analysis reports were submitted for review.

The CNSC staff reviews concluded that the that the outcome of the analyses and assessments are sufficient to support a power increase to IPLs, with recommendations to provide code and model accuracy information and confirm the limiting location for this event type [49] [50].

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

<u>Safety Report Appendix 9: Main Moderator and Moderator System Auxiliary System Failures</u>

Main Moderator and Moderator System Auxiliary Failures covers breaks and failures of the moderator system that result in an impairment of the cooling function. The SAIR concluded that this event type required further assessments to confirm NOP trip effectiveness, which were performed and submitted for CNSC staff review.

Based on the review outcome of for Appendix 3 (NOP), CNSC staff concluded that the assessment for NOP trip effectiveness was sufficient for IPLs.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

<u>Safety Report Appendix 10: Shield Cooling System Failures</u>

Shield Cooling System Failures cover breaks and failures of the end shield cooling system that result in an impairment of the cooling function. The SAIR concluded that this event type did not require any additional analysis or assessment, and that the existing AoR is applicable to the IPL.

As a part of the review of the SAIR, CNSC staff accepted this conclusion.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Safety Report Appendix 11: Common Mode Events

Common mode events cover events that result in the failure of multiple structures, systems or components, caused by a single specific event, such as an earthquake, fire, or tornado. The SAIR concluded that this event type required both assessments and re-analysis and so, for both Bruce A and Bruce B, consolidated reports were submitted for review.

The CNSC staff review concluded that the outcome of the analyses and assessments results are sufficient to support a power increase to IPLs [55] [56].

The final review stage of Appendix 11 identified the need for additional information that needs to be addressed by Bruce Power in the short term. CNSC staff concluded that these remaining items are of low safety significance.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Safety Report Appendix 12: Beyond Design Basis Accidents

Beyond Design Basis Accidents cover events with a frequency threshold below the cutoff for the design basis (10^{-5} events/year). The SAIR concluded that this event type did not require any additional analysis or assessment, and that the existing AoR is applicable to the IPLs.

As a part of the review of the SAIR, CNSC staff agreed to this conclusion.

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with this Appendix.

Generic use of LOE and Coupled Analysis Methods

The CNSC staff review process identified two issues that are generic for the analysis of all event categories: the use of LOE methods without fully justified assumptions, and the use of a coupled analysis framework with unassessed weaknesses in the verification and validation basis.

The LOE methodology is an industry standard practice for performing deterministic safety analysis. The methodology has been used in many recent analysis submissions, and it is built upon practical, and generally sound, engineering assumptions and approximations. One fundamental assumption of this method is that the non-conservative effects of modelling uncertainties and/or limitations that are unaccounted for in the analysis can be reasonably offset by setting all key operating parameters to their conservative limits, to achieve an overall bounding result. CNSC staff have agreed with the premise of this argument, which has enabled the widespread use of this method, but the assumption is still untested and requires confirmation in specific applications.

The use of coupled analysis software is also an industry standard practice for deterministic safety analysis. Use of coupled analysis tools is also good practice, and detailed requirements exist to provide assurance that the individual analysis tools are fit for a given application. However, these requirements have been applied to the analysis software on an individual basis, and there is ambiguity on their applicability to the full analysis model. CNSC staff have indicated that there may be aspects related to information transfer and processing that affect the confidence in the analysis results. An investigation into these effects is complicated by a lack of applicable and available integral test data to benchmark coupled codes against.

In response to generic feedback from CNSC staff highlighting these issues, a whitepaper was submitted by Bruce Power to describe the issues, confirm the validity of the P2030 analysis for IPLs, and provide a high-level resolution strategy. CNSC staff reviewed the paper and concluded that the resolution of these two issues should not be an impediment to IPLs but recommended a comprehensive resolution plan be submitted to strengthen the safety case prior to IPLs [21].

Based on the review of this information and responses from Bruce Power, there are no fundamental barriers to IPLs associated with these issues.

A.6 : Role of Written Notification Documents in Regulatory Oversight

The written notification requirement is established in the general licence condition on change notification. As per section G.2 of LCH "*The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.*". This general provision ensures that important information is not missed, and CNSC staff maintain comprehensive oversight.

CNSC staff identify appropriate CVC for the proposed licence. Licensee documents are selected for inclusion into the CVC based on the relevant safety and control measures that they contain. The LCH assigns each licensee document to the most appropriate licence condition by listing relevant licensee documents in a table under CVC.

Licensee documents requiring WN form a key input to the CNSC's compliance verification. These written submissions give the CNSC a formal record to start its review, assess the change, and decide on any follow-up.

Appendix B: Indigenous Nations, communities and organizations that have traditional and/or treaty territories and/or interests within proximity to the licensed facility

Facility	Indigenous Nations, communities and/or organizations
Bruce A	Saugeen Ojibway Nation (Saugeen First Nation and the Chippewas of Nawash Unceded First Nation/Neyaashiinigmiing) Métis Nation of Ontario Region 7 Historic Saugeen Métis Chippewas of Kettle and Stony Point First Nation
Bruce B	Saugeen Ojibway Nation (Saugeen First Nation and the Chippewas of Nawash Unceded First Nation/Neyaashiinigmiing). Métis Nation of Ontario Region 7 Historic Saugeen Métis Chippewas of Kettle and Stony Point First Nation

Appendix C: Proposed Licence Changes

There are no proposed changes to the Bruce NGS A and B PROL 18.4/2028. There are proposed changes to the licensing basis that will be reflected in the Bruce NGS A and B LCH. Section C.1 provides the details of the changes.

C.1 : Overview

The Bruce NGS A and B LCH provides a table of limits for bundle, channel and reactor thermal power under Section 3.1 based on safety analysis limits. Power limit tables are the only change required to support operation at IPLs under the Operating Performance Section of the Bruce NGS A and B LCH. The following two tables provide the proposed changes in the power limits for the operation up to IPLs (Bruce A 95.5% FP and Bruce B 96% FP) in comparison with the existing power limits (Bruce A 92.5% FP and Bruce B 93% FP).

Table A. 5: Comparison between the existing reactor power limits and the proposed limits applicable at IPL for Bruce A

Power Limit Description	Current Limits		Proposed limits at IPLs	
	Inner Flow Zone	Outer Flow Zone	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 969 kilowatts	Shall not exceed 857 kilowatts	Shall not exceed 1000 kilowatts	Shall not exceed 885 kilowatts
Total power generated in any fuel channel	Shall not exceed 6.84 megawatts under normal steady-state operating conditions	Shall not exceed 6.25 megawatts under normal steady-state operating conditions	Shall not exceed 7.060 megawatts under normal steady-state operating conditions	Shall not exceed 6.450 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel (current)	Shall not exceed 2619.6 megawatts (92.5% full power) under steady-state operating conditions		Shall not exceed 2705 megawatts (95.5% full power) under steady-state operating conditions	

Table A. 6: Comparison between the existing reactor power limits and the proposed limits applicable at IPL for Bruce B

Power Limit Description	Current Limits		Proposed limits at IPLs	
	Inner Flow Zone	Outer Flow Zone	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 837 kilowatts under normal steady-state operating conditions		Shall not exceed 864 kilowatts under normal steady-state operating conditions	
Total power generated in any fuel channel	Shall not exceed 6.70 megawatts under normal steady-state operating conditions	Shall not exceed 6.23 megawatts under normal steady-state operating conditions	Shall not exceed 6.912 megawatts under normal steady-state operating conditions	Shall not exceed 6.432 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel (current)	Shall not exceed 2634 megawatts (93% full power) under steady-state operating conditions		Shall not exceed 2719 megawatts (96% full power) under steady-state operating conditions	

CNSC staff proposes an addition to LC 15.5 associated with proposed power uprate that require Bruce Power to obtain approval from the Commission (or a person authorized by the Commission) prior to increasing power beyond 92.5% full power for Bruce A units and 93% full power for Bruce B units.

C.2 : Licence Format

There are no licence format changes being recommended.

C.3 : Licence Period

There are no licence period changes being recommended.

C.4 : Current Licence

C.5 : Current Licence Conditions Handbook

C.6 : Draft Licence Conditions Handbook

PDF Ref.: e-Doc 7460808
Word Ref.: e-Doc 7460760
File / Dossier: 2.01

NUCLEAR POWER REACTOR OPERATING LICENCE

BRUCE NUCLEAR GENERATING STATIONS A AND B

I) LICENCE NUMBER: **PROL 18.04/2028**

II) LICENSEE: Pursuant to section 24 of the *Nuclear Safety and Control Act* this licence is issued to:

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

III) LICENCE PERIOD: This licence is valid from October 1, 2018 to September 30, 2028, unless suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

(i) operate the Bruce Nuclear Generating Stations A and B (hereinafter "Bruce A and B") comprised of reactor units 1 to 4 and 5 to 8 respectively, at the Bruce site located in the County of Bruce in the regional municipality of Kincardine, Province of Ontario; and,

- (1) possess, transfer, use, package, manage and store nuclear substances that are required for, associated with, or arise from the activities described in (i), except for booster fuel assemblies;
- (2) possess, transfer and use prescribed equipment that is required for, associated with, or arises from the activities described in (i);
- (3) possess and use prescribed information that is required for, associated with, or arises from the activities described in (i);

(ii) operate a Class II nuclear facility at the Bruce site; and,

- (1) possess, transfer, use, package, manage and store nuclear substances that are required for, associated with, or arise from the activities described in (ii);
- (2) possess, transfer and use prescribed equipment that is required for, associated with, or arises from the activities described in (ii);

(iii) possess, transfer, use, manage and store nuclear substances and prescribed equipment to perform industrial radiography throughout the Bruce site;

(iv) import and export nuclear substances and prescribed equipment, except controlled nuclear substances and controlled nuclear equipment, that are required for, associated with, or arise from the activities described in (i), (ii) and (iii);

(v) possess, manage and store booster fuel assemblies at Bruce A; and

(vi) produce Cobalt-60 and Lutetium-177; and

(1) possess, transfer, use, package, manage and store nuclear substances that are required for, associated with, or arise from the activities described in (vi). [Amended 2021-09]

V) EXPLANATORY NOTES:

(i) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.

(ii) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and associated Regulations.

(iii) The BRUCE NGS A AND B LICENCE CONDITIONS HANDBOOK (LCH) provides compliance verification criteria including the Canadian standards and regulatory documents used to verify compliance with the conditions in the licence. The LCH also provides information regarding delegation of authority, applicable versions of documents and non-mandatory recommendations and guidance on how to achieve compliance.

VI) CONDITIONS:

G. **General**

G.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

(i) the regulatory requirements set out in the applicable laws and regulations;

(ii) the conditions and safety control measures described in the facilities' licence and the documents directly referenced in that licence;

(iii) the safety and control measures described in the licence applications and the documents needed to support those licence applications;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC) (hereinafter "the Commission").

G.2 The licensee shall give written notification of changes to the facilities or their operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 The licensee shall control the use and occupation of any land within the exclusion zones.

G.4 The licensee shall provide, at the Bruce site and at no expense to the Commission, office space for employees of the Commission who customarily carry out their functions on the premises of Bruce A and B (onsite Commission staff).

G.5 The licensee shall implement and maintain a public information and disclosure program.

1. Management System

1.1 The licensee shall implement and maintain a management system.

2. Human Performance Management

2.1 The licensee shall implement and maintain a human performance program.

2.2 The licensee shall implement and maintain the minimum shift complement and control room staffing for Bruce A and B.

2.3 The licensee shall implement and maintain training programs for workers.

2.4 The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, PERSONNEL CERTIFICATION, VOLUME III: CERTIFICATION OF REACTOR FACILITY WORKERS, VERSION 2. Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030. [Amended 2025-02]

Persons appointed to the following positions require certification:

(i) authorized health physicist;

(ii) authorized nuclear operator;

(iii) control room shift supervisor;

(iv) Unit 0 control room operator; and

(v) shift manager.

3. Operating Performance

3.1 The licensee shall implement and maintain an operations program, which includes a set of operating limits.

3.2 The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or prior written consent of a person authorized by the Commission.

3.3 The licensee shall notify and report in accordance with CNSC regulatory document REGDOC-3.1.1 REPORTING REQUIREMENTS FOR NUCLEAR POWER PLANTS.

4. Safety Analysis

4.1 The licensee shall implement and maintain a safety analysis program.

5. Physical Design

5.1 The licensee shall implement and maintain a design program.

5.2 The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

5.3 The licensee shall implement and maintain an equipment and structure qualification program.

6. Fitness for Service

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

6.2 The licensee shall implement and maintain an enhanced fitness for service program for fuel channels in extended operation. [Amended 2023-10]

7. Radiation Protection

7.1 The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

8. Conventional Health and Safety

8.1 The licensee shall implement and maintain a conventional health and safety program.

9. Environmental Protection

9.1 The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

10. Emergency Management and Fire Protection

10.1 The licensee shall implement and maintain an emergency preparedness program.

10.2 The licensee shall implement and maintain a fire protection program.

11. Waste Management

11.1 The licensee shall implement and maintain a waste management program.

11.2 The licensee shall notify the Commission of any changes regarding the obligations of decommissioning and financial guarantees under the Lease Agreement with Ontario Power Generation Inc., as described in 15.1.

12. Security

12.1 The licensee shall implement and maintain a nuclear security program.

13. Safeguards and Non-Proliferation

13.1 The licensee shall implement and maintain a safeguards program.

14. Packaging and Transport

14.1 The licensee shall implement and maintain a packaging and transport program.

15. Nuclear Facility-Specific

15.1 The licensee shall inform the Commission in writing of any amendments to the Amended and Restated Lease Agreement between Ontario Power Generation Inc., Bruce Power L.P., OPG-Huron A Inc./OPG-Huron B Inc./OPG-Huron Common Facilities Inc., British Energy PLC, Cameco Corporation, TransCanada Pipelines Limited, BPC Generation Infrastructure Trust and Ontario Municipal Employees Retirement Board dated February 14, 2003.

15.2 The licensee shall implement the Integrated Implementation Plan.

15.3 (Removed) [Amended 2023-10]

15.4 The licensee shall implement a return-to-service plan for Major Component Replacement.

15.5 The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.

15.6 The licensee shall conduct and implement a periodic safety review.

15.7 The licensee shall inform the Commission of any reactor to be removed from commercial operations at Bruce A and B, and shall provide a plan describing the activities and timeline for transitioning from operations to safe storage.

15.8 The licensee shall store and manage booster fuel assemblies at Bruce A in a manner that ensures their physical security.

15.9 The licensee shall implement and maintain a nuclear criticality safety program.

15.10 The licensee shall implement and maintain a program for the production of the nuclear substances Cobalt-60 and Lutetium-177. [Amended 2021-09]

15.11 The licensee shall implement and maintain a program for the operation of the Class II nuclear facility.

15.12 The licensee shall implement and maintain a program for nuclear substances and prescribed equipment.

February 7, 2025

Pierre Tremblay, President
On behalf of the Canadian Nuclear Safety Commission

Date

Canada's Nuclear Regulator

e-Docs # 7161886 (Word)

e-Docs # 7474949 (PDF)

LICENCE CONDITIONS HANDBOOK

LCH-PR-18.04/2028-R005

BRUCE NUCLEAR GENERATING STATIONS A AND B NUCLEAR POWER REACTOR OPERATING LICENCE LICENCE # PROL 18.04/2028

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canada

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Licence Conditions Handbook

LCH-PR-18.04/2028-R005

**Bruce Nuclear Generating Stations A and B
Nuclear Power Reactor Operating Licence**

PROL 18.04/2028

**Effective:
March 04, 2025**

SIGNED at OTTAWA this 4th day of March 2025

Bruce NGS Licence
Conditions Handbook

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Alexandre Viktorov, Ph.D.

**Director General
Directorate of Power Reactor Regulation
CANADIAN NUCLEAR SAFETY COMMISSION**

Revision History

Effective Date	Revision	Word e-Docs # and Version	Description of the Changes	DCR List e-Docs #
October 1, 2018	0	5331057 v6	Original Document (Licence Renewal)	N/A
April 1, 2019	1	5653897 v2B	See DCR	5655484
May 25, 2020	2	5863808 v4	See DCR	5863777
September 28, 2021	3	6309625 v4	See DCR	6309683
November 3, 2023	4	6669165 v4	See DCR	6669223
March 4, 2025	5	7161886 v3	See DCR	7161877

TABLE OF CONTENTS

INTRODUCTION

The general purpose of the Licence Conditions Handbook (LCH) is to identify and clarify the relevant parts of the licensing basis for each licence condition (LC). This will help ensure that the licensee maintains facility operation in accordance with the licensing basis for the facility and the intent of the licence. The LCH should be read in conjunction with the licence.

The LCH typically has three parts under each LC: the Preamble, Compliance Verification Criteria (CVC), and Guidance. The Preamble explains, as needed, the regulatory context, background, and/or history related to the LC. CVC are criteria used by CNSC staff to verify and oversee compliance with the LC. Guidance is non-mandatory information including expectations on how to comply with the LC.

Most CNSC documents referenced in the LCH are available through the CNSC public website. Documents listed on the CNSC website may contain prescribed information as defined by the *General Nuclear Safety and Control Regulations*. Information in these documents will be made available only to stakeholders with appropriate security clearance and a valid need to know.

The licensee documents referenced in the LCH are not publicly available; they contain proprietary information or prescribed information as defined by the *General Nuclear Safety and Control Regulations.*

The documents referenced in the LCH by e-Access numbers are not publicly available. The links provided in the LCH are references to the internal CNSC electronic filing system, and those documents cannot be opened from outside of the CNSC network.

Throughout the licence, the statement "or consent of a person authorized by the Commission" reflects to whom the Commission may delegate certain authority (hence "consent") to CNSC staff. Unless otherwise indicated in the CVC of specific LCs in this LCH, the delegation of authority by the Commission to act as a "person authorized by the Commission" is only applied to the incumbents of the following positions [1]:

- Director, Bruce Regulatory Program Division
- Director General, Directorate of Power Reactor Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

Interaction between the licensee and CNSC staff that is described in this LCH is governed by the prevailing communication protocol [2] between the two.

Current versions of the licensee documents listed in this LCH are recorded in the document "Bruce PROL - Written Notification Documents in LCH" [3], which is controlled by the Bruce Regulatory Program Division (BRPD) and is available to the licensee upon request.

The content of this LCH is an input to the compliance program for this facility.

This LCH includes appendices A to D which contain acronyms, a glossary of terms and lists of LCH-related documents.

More information on the LCH is available in the CNSC document titled *How to: Write a Licence Conditions Handbook (LCH)* [4].

References:

[1] Record of Decision for "Application to renew the Power Reactor Operating Licence for Bruce A and Bruce B Nuclear Generating Stations – Public Hearing dates March 14, 2018 and May 28-31, 2018", issued September 2018, NK21-CORR-00531-14702, NK29-CORR-00531-15384/NK37-CORR-00531-03067, e-Docs # 5629974.

[2] CNSC Letter, A. Bulkan to M. Burton, "Bruce A and B: Notification of a change to the Communications Protocol", September 5, 2024, e-Doc 7357936, BP-CORR-00531-05813.

[3] CNSC Internal Document, "Bruce PROL - Written Notification Documents in LCH", e-Docs # 5356815.

[4] CNSC Internal Work Instruction Rev. 0, "How To: Write a Licence Conditions Handbook (LCH)", March 2017, e-Docs # 4967591.

GENERAL

G. GENERAL

G.1 Licensing Basis for the Licensed Activities

Licence Condition G.1:

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

(i) the regulatory requirements set out in the applicable laws and regulations;

(ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;

(iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC, hereinafter "the Commission").

Preamble:

Licensing Basis

The licensing basis is discussed in CNSC document REGDOC-3.5.3, *Regulatory Fundamentals*, Version 3 (2023).

Licensed Activities

Subsection 24 (1) of the Nuclear Safety and Control Act (NSCA) states "The Commission may establish classes of licences authorizing the licensee to carry on any activity described in any of paragraphs 26 (a) to (f) that is specified in the licence for the period that is specified in the licence."

Paragraph 26 (a) of the NSCA states "Subject to the regulations, no person shall, except in accordance with a licence,

(a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;
(b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;
(c) produce or service prescribed equipment;
(d) operate a dosimetry service for the purposes of this Act;
(e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility; or
(f) construct, operate, decommission or abandon a nuclear-powered vehicle or bring a nuclear-powered vehicle into Canada."

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce Power letter, Frank Saunders to Marc Leblanc, "Application for the Renewal of the Power Reactor Operating Licence for Bruce Nuclear Generating Stations A and B", June 30, 2017, e-Docs # 5291208	NK21-CORR-00531-13493	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for Renewal of the Power Reactor Operating Licence: Periodic Safety Review Reports (including revised Bruce A and B Global Assessment Report and Integrated Implementation Plan)", July 19, 2017, e-Docs # 5303331, 5303343 and 5303344	NK21-CORR-00531-13543	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Major Component Replacement Project Execution Plan and Bruce B Unit 6 Return to Service Plan", June 30, 2017, e-Docs # 5292343	NK21-CORR-00531-14175	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Updated Environmental Risk Assessment that includes Major Component Replacement", June 30, 2017, e-Docs # 5291221	NK21-CORR-00531-13620	N/A
Bruce Power letter, Frank Saunders to Ken Lafrenière, "Bruce A Environmental Assessment Follow-up Monitoring Report, 2015", November 21, 2016, e-Docs # 5128322	NK21-CORR-00531-13142	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Whitefish Research Review", June 30, 2017, e-Docs # 5291210	NK21-CORR-00531-13494	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: University Research Summary", June 30, 2017, e-Docs # 5291217	NK21-CORR-00531-13587	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Security Program Description", June 30, 2017, e-Docs # 5291200 **(PROTECTED)**	NK21-CORR-00531-13367 NK29-CORR-00531-13917	N/A

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Fitness-for-Service of Pressure Tubes", October 13, 2017, e-Docs # 5369131	NK21-CORR-00531-13854 NK29-CORR-00531-14517	N/A
Bruce Power letter, F. Saunders to M. Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Bruce Power Indigenous Community Interest Reports for Saugeen Ojibway Nation, Historic Saugeen Metis and Metis Nation of Ontario", January 24, 2018, e-Docs # 5442220 **(Protected-B-Restricted)**	NK21-CORR-00531-14156 NK29-CORR-00531-14842 NK37-CORR-00531-02912	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Bruce Power Application for the Renewal of the Power Reactor Operating Licence: Supplemental Requests", February 1, 2018, e-Docs # 5451672	NK21-CORR-00531-13890	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Supplemental Material", February 12, 2018, e-Docs # 5458711	NK21-CORR-00531-14126 NK29-CORR-00531-14817 NK37-CORR-00531-02906	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Community Interests", March 6, 2018, e-Docs # 5476968	NK21-CORR-00531-14245 NK29-CORR-00531-14932 NK37-CORR-00531-02941	N/A
Bruce Power letter, Frank Saunders to Luc Sigouin, "Bruce Power Application for the Renewal of the Power Reactor Operating Licence Supplemental Material: Probabilistic Safety Assessment", March 13, 2018, e-Docs # 5484062	NK21-CORR-00531-14261 NK29-CORR-00531-14950 NK37-CORR-00531-02944	N/A
Bruce Power letter, F. Saunders to M. Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Supplemental Material", May 16, 2018, e-Docs # 5536574	NK21-CORR-00531-14285 NK29-CORR-00531-14980 NK37-CORR-00531-02956	N/A
Bruce Power letter, F. Saunders to M. Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Supplemental Material", May 23, 2018, e-Docs # 5541447	NK21-CORR-00531-14428 NK29-CORR-00531-15130 NK37-CORR-00531-02989	N/A
Bruce Power letter, Maury Burton to Luc Sigouin, "Application for the Renewal of the Power Reactor Operating Licence: Licensing Basis Documents", June 29, 2018, e-Docs # 5575936	NK21-CORR-00531-14288 NK29-CORR-00531-14982 NK37-CORR-00531-02957	N/A
Bruce Power letter, M. Burton to M. Leblanc, "Request for Amendment of the Nuclear Power Reactor Operating	NK21-CORR-00531-15378 NK29-CORR-00531-16213	N/A

Licensee Documents		
Document Title	Document #	Prior Notification
Licence Bruce Nuclear Generating Stations A and B - PROL 18.00/2028", November 11, 2019, e-Docs # 6042771		
Bruce Power letter, M. Burton to M. Leblanc, "Application for the Amendment of the Power Reactor Operating Licence", November 25, 2020, e-Docs # 6430874	BP-CORR-00531-00982	N/A
Bruce Power letter, M. Burton to D. Saumure, "Application for the Amendment of the Power Reactor Operating Licence", October 11, 2022, e-Docs # 6889090.	BP-CORR-00531-01842	N/A

Part (i) of the licensing basis includes, but is not limited to, the following:

- *Nuclear Safety and Control Act;*
- *Impact Assessment Act;*
- *Canadian Environment Protection Act;*
- *Nuclear Liability and Compensation Act;*
- *Transportation of Dangerous Goods Act;*
- *Radiation Emitting Devices Act;*
- *Access to Information Act; and*
- *Canada/IAEA Safeguards Agreement.*

The safety and control measures mentioned in the LC under Parts (ii) and (iii) of the licensing basis include important aspects of analysis, design, operation, etc. They may be found in high-level, programmatic licensee documents but might also be found in lower-level, supporting documentation. They also include safety and control measures in licensing basis publications (e.g., CNSC regulatory documents or CSA standards) that are cited in the licence, the application, or in the licensee's supporting documentation.

Licensing basis publications are listed in tables in this LCH under the most relevant LC. All "shall" or normative statements in licensing basis publications are considered CVC unless stated otherwise. If any "should" or informative statements in licensing basis publications are also considered CVC, this is explained under the most relevant LC.

The licensee documents and relevant licensing basis publications may cite other documents that also contain safety and control measures (i.e., there may be safety and control measures in "nested" references). There is no predetermined limit to the degree of nesting at which relevant safety and control measures may be found.

LC G.1 requires the licensee to implement all the safety and control measures. However, not all details in referenced documents are necessarily considered to be safety and control measures, specifically:

- Details that are not directly relevant to safety and control measures for facilities or activities authorized by the licence are excluded from the licensing basis.
- Details that are relevant to a different safety and control area (i.e., not the one associated with the

main document) are only part of the licensing basis to the extent they are consistent with the main requirements for both safety and control areas.

In the event of any perceived or real conflict or inconsistency between two elements of the licensing basis, the licensee shall consult CNSC staff to determine the approach to resolve the issue.

In case of a conflict between CSA standards, CNSC will consult with CSA Group before reaching a conclusion on the resolution.

This LC is not intended to unduly inhibit the ongoing management and operation of the facility or the licensee's ability to adapt to changing circumstances and continuously improve, in accordance with its management system. Where the licensing basis refers to specific configurations, methods, solutions, designs, etc., the licensee is free to propose alternate approaches as long as they remain, overall, in accordance with the licensing basis and have a neutral or positive impact on health, safety, the environment, security, and safeguards. However, the licensee shall assess changes to confirm that operations remain in accordance with the licensing basis.

Changes to certain licensee documents require written notification to the CNSC, even if they are in accordance with the licensing basis. Further information on this topic is provided under LC G.2.

For unapproved operation that is not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation.

In the event that the Commission grants approval to operate in a manner that is not in accordance with existing licensing basis, this would effectively revise the licensing basis for the facility. The appropriate changes would be reflected in the CVC of the relevant LC.

Guidance:

When the licensee becomes aware that a proposed change or activity might not be in accordance with the licensing basis, it should first seek direction from CNSC staff regarding the potential acceptability of this change or activity. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them. Examples of these types of changes are discussed under various LCs in this LCH. Guidance for notifications to the CNSC related to licensee changes are discussed under LC G.2.

G.2 Notification of Changes

Licence Condition G.2:

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

Preamble:

CNSC staff records the version history of licensee documents that require notification of change (with the exception of security-related documents) [1].

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Document Management	BP-PROG-03.01	No
Management of Program, Procedure and Internal Standard Documents	BP-PROC-00166	No

Written notification is a physical or electronic communication from the licensee.

In general, the changes for which the licensee shall notify the CNSC are captured as changes to specific licensee documents. The LCH identifies them under the most relevant LC (see example above). However, the licensee documents identified in the LCH only represent the minimum subset of documents that require notification of change. For any change that is not captured as a change to a document listed in the LCH, the licensee shall provide written notification (WN) of the change if the change is a significant deviation that negatively impacts designs, operating conditions, policies, programs, methods, or other elements that are integral to the licensing basis. For example, if a licensee document in the CVC refers to another document, including a third-party document, without citing the revision # of that document, if that document changes and the licensee uses the revised version, the licensee shall determine if it is necessary to notify the CNSC of the change.

The documents needed to support the licence application may include documents produced by third parties (e.g., reports prepared by third party contractors). Changes to these documents require written notification to the CNSC only if the new version continues to form part of the licensing basis. That is, if the licensee implements a new version of a document prepared by a third party, it shall inform the CNSC of the change(s), per LC G.2. On the other hand, if a third party has updated a certain document, but the licensee has not adopted the new version as part of its safety and control measures, the licensee is not required to inform the CNSC that the third party has changed the document.

Licensee documents tabulated in the CVC of the LCH are subdivided into groups having different requirements for notification of change – ones that require prior written notification of changes and those that require written notification only. For the former type, the licensee shall submit the document to the CNSC prior to implementing changes. The licensee shall allow sufficient time for the CNSC to review the change proportionate to its complexity and the importance of the safety and control measures being affected. Typically, significant changes require submission a minimum of 30 days prior to planned implementation. For the latter type, the licensee need only submit the document at the time of implementing the change.

Written notifications shall include a summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis (e.g., an evaluation of the impact on health, safety, security, the environment and Canada's international obligations). A copy of the revised WN document shall accompany the notification.

The above also applies to a notice of change that requires CNSC staff acceptance, due to some other requirement in the licensing basis.

Changes that are not clearly in the safe direction require further assessment of impact to determine if Commission approval is required in accordance with LC G.1.

The licensee shall notify the CNSC in writing when it plans to implement a new licensing basis publication, including the date by which implementation of the publication will be complete. The notice shall indicate the corresponding changes to licensee documents listed in CVC of the LCH.

Guidance:

A list of criteria that could help determine if a change would be in accordance with the licensing basis is provided in Appendix A of [2]. Such criteria would also be used if the change requires CNSC staff acceptance, due to some other requirement in the licensing basis.

For proposed changes that would not be in accordance with the licensing basis, the Guidance for LC G.1 applies.

References:

[1] CNSC Internal Document, "Bruce PROL - Written Notification Documents in LCH", e-Docs # 5356815.

[2] CNSC Internal Process Document Rev 0, "Overview of: Assessing licensee changes to documents or operations", March 2017, e-Docs # 4055483.

G.3 Land Use and Occupation

Licence Condition G.3:

The licensee shall control the use and occupation of any land within the exclusion zone.

Preamble:

The siting guide used at the time of design of all Canadian NPPs stipulated an exclusion zone that extended at least 914 metres from the exterior of any reactor building [1]. The exclusion zone is an area, immediately surrounding a nuclear facility where no permanent habitation is allowed.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Site Facilities Plan of the Bruce Nuclear Power Development Lots 11 to 28 and Part of 29 and 30	NK37-DRAW-10200-10001	Yes
Bruce A Safety Report Part 1: Plant and Site Description	NK21-SR-01320-00001	Yes*
Bruce B Safety Report Part 1: Plant and Site Description	NK29-SR-01320-00001	Yes*

**The reporting requirements for updates to facility descriptions are given in REGDOC-3.1.1 (LC 3.3)*

Bruce Power shall ensure that the use and occupancy of land within the exclusion zones does not compromise the safety and control measures in the licensing basis. Specifically, the licensee shall consider emergency preparedness and ALARA with respect to land use within the exclusion zones. This applies to land that Bruce Power occupies as well as to land occupied by others.

The licensee shall not permit a permanent dwelling to be built within the exclusion zone. “Permanent dwelling” refers to housing that is meant to be fixed. The licensee may erect, for a short time without prior notification, a temporary structure (e.g., a trailer).

Bruce Power shall notify the CNSC of permanent changes to the use and occupation of any land within the exclusion zones. The notice shall be submitted prior to the change, with lead time in proportion to the expected impact of the change on the licensee’s safety and control measures.

The Bruce A nuclear facility is located on the shore of Lake Huron on parts of lots 28, 29 and 30, Lake Range, Municipality of Kincardine, County of Bruce, Province of Ontario. The Bruce B nuclear facility is located on the shore of Lake Huron on parts of lots 12, 13, 14 and 15, Lake Range, Municipality of Kincardine, County of Bruce, Province of Ontario. The location of the exclusion zones and any structures within those zones are found in Ontario Power Generation (OPG) Drawing, “Site Facilities Plan of the Bruce Nuclear Power Development Lots 11 to 28 and Part of 29 and 30”. This drawing is a plan of survey dated May 10, 1999, prepared by Marshall Macklin Monaghan Ontario Limited, Ontario Land Surveyors, and certified by Mr. Roy C. Mayo, O.L.S.

Guidance:

Not applicable to this LC.

Reference:

[1] D.G. Hurst and F.C. Boyd, "Reactor Licensing and Safety Requirements, AECB-1059", Paper 72-CNA-102, presented at the 12th Annual Conference of the Canadian Nuclear Association, Ottawa, Canada, 11-14 June 1972, e-Docs # 3000249.

G.4 Office for CNSC Onsite Inspectors

Licence Condition G.4:

The licensee shall provide, at the Bruce site and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of Bruce A and B (onsite Commission staff).

Preamble:

CNSC staff requires suitable office space and equipment at the nuclear facility in order to satisfactorily carry out its regulatory activities.

Compliance Verification Criteria:

Any changes of accommodation or equipment shall be made based on discussion and subsequent agreement between the CNSC and Bruce Power.

Bruce Power shall keep the office space of onsite Commission staff separate from the remainder of the building in which it is located by walls, partitions or other suitable structures.

Guidance:

Not applicable to this LC.

G.5 Public Information and Disclosure

Licence Condition G.5:

The licensee shall implement and maintain a public information and disclosure program.

Preamble:

A Public Information and Disclosure Program (PIDP) includes a disclosure program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects of the licensed facility and its activities on the environment, health and safety of persons, thereby generating an atmosphere of openness, transparency and trust.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Stakeholder Engagement	BP-PROG-09.02	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Public Information and Disclosure	REGDOC-3.2.1	2018	August 5, 2020

CNSC regulatory document REGDOC-3.2.1, PUBLIC INFORMATION AND DISCLOSURE outlines the requirements for a public information and disclosure program.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Indigenous Engagement, Version 1.2	REGDOC-3.2.2	2022

It is recommended that Bruce Power submit annually to CNSC staff a report summarizing the events and developments involving the Bruce nuclear facilities for the purposes of promoting compliance verification.

1 SCA – MANAGEMENT SYSTEM

1.1 Management System

Licence Condition 1.1:

The licensee shall implement and maintain a management system.

Preamble:

Safe and reliable operation requires a commitment and adherence to a set of management system principles and, consistent with those principles, the establishment and implementation of processes that achieve the expected results. CSA standard N286 contains the requirements for a management system throughout the life cycle of a nuclear power plant and extends to all safety and control areas.

The management system must satisfy the requirements set out in the *NSCA*, regulations made pursuant to the *NSCA*, the licence and the measures necessary to ensure that safety is of paramount consideration in implementation of the management system. An adequately established and implemented management system provides the evidence that the licensing basis remains valid.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Management System Manual	BP-MSM-1	Yes
Conduct of Business	BP-PROG-16.01	Yes
Supply Chain	BP-PROG-05.01	No
Compliance Internal Audit	BP-PROG-15.01	No

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Project Management and Construction	BP-PROG-14.01	No
Contractor Management	BP-PROG-14.02	No
Organization Structure Change	BP-PROC-00001	No
Quality Assurance Program	BP-PROG-17.01	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Management system requirements for nuclear facilities	N286	2012	Dec. 31, 2018
CNSC	Safety Culture	REGDOC-2.1.2	2018	Apr 1, 2020

Management System

The management and operation of Bruce Power are defined by the programs and their implementing documents, as described by Bruce Power's Management System Manual. Changes to the management system documents, including Bruce Power's programs and procedures listed in the LCH and the processes are to be made in accordance with BP-MSM-1, Management System Manual.

Organization

Bruce Power shall document the organizational structure for safe and reliable conduct of licensed activities and shall include all positions with responsibilities for the management and control of the licensed activity. Any changes to the nuclear organization shall be made in accordance with Bruce Power's "Organization Structure Change".

Safety Culture

Bruce Power shall ensure that management supports the safe conduct of licensed activities at the nuclear facilities.

The Bruce nuclear facilities' operations and performance must ensure that sound nuclear safety is the overriding priority in all activities performed in support of the licensee's nuclear facilities and has clear priority over schedule, cost and production. Bruce Power's Nuclear Oversight Management and Operating Experience Program contribute to the development of a healthy safety culture throughout the oversight of Bruce Power's programs and processes by using internal and external assessments and self-assessments in order to continuously improve performance.

A safety culture self-assessment methodology has been developed by Bruce Power. It is governed by its business assessment process which promotes continuous improvement.

Configuration management

Configuration management, the process that identifies, documents changes and ensure conformance is maintained between design requirements, physical configuration and facility configuration information, is discussed in section 5.1.

Management of Contractors

Bruce Power shall implement and maintain a management of contractors program that will ensure compliance with regulatory requirements.

Business Continuity

Business continuity planning ensures that essential functions can continue to operate safely when affected by adverse physical conditions or following interruptions to normal operation. Bruce Power shall maintain contingency plans to:

- ensure minimal disruptions in the event of a labour dispute or public protest; and
- provide for essential services through a sustained period with significant employee absenteeism (e.g., influenza outbreak).

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Management System	REGDOC-2.1.1	2019
CSA	Commentary on N286-12, Management system requirements for nuclear facilities	N286.0.1	2021
CSA	Configuration management for high energy reactor facilities	N286.10	2016 (R2021)

The management system should be used to promote and support a healthy safety culture. The CNSC recognizes the following characteristics that form the framework for a healthy safety culture:

- safety is a clearly recognized value;
- accountability for safety is clear;
- safety is integrated into all activities;
- a safety leadership process exists; and
- safety culture is learning-driven.

The licensee should conduct self-assessments of safety culture periodically. The assessment method should be documented and the framework should include links to the safety culture characteristics listed above.

CNSC staff encourages senior management at the Bruce nuclear facilities to continue fostering a healthy safety culture so licensee staff understands the influence that safety culture has over all other organizational processes and its role in maintaining and improving safety performance.

The management system documentation should contain sufficient directions for workers to comply with the regulatory requirements.

2 SCA – HUMAN PERFORMANCE MANAGEMENT

2.1 Human Performance Program

Licence Condition 2.1:

The licensee shall implement and maintain a human performance program.

Preamble:

Human performance relates to reducing the likelihood of human error in work activities. It refers to the outcome of human behaviour, functions and actions in a specified environment, reflecting the ability of workers and management to meet the system's defined performance under the conditions in which the system will be employed.

Human factors are factors that influence human performance as it relates to the safety of a nuclear facility or activity over all design and operations phases. These factors may include the characteristics of the person, task, equipment, organization, environment, and training. The consideration of human factors in issues such as interface design, training, procedures, and organization and job design may affect the reliability of humans performing tasks under various conditions.

CNSC regulatory document REGDOC-2.2.1, HUMAN FACTORS, describes how the CNSC will take human factors into account during its licensing, compliance and standards-development activities.

For clarification, CNSC regulatory oversight related to hours of work is for the purpose of "nuclear safety" not for the purpose of "worker protection". Worker protection is covered under the SCA "Conventional Health and Safety" (section 8.1).

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Limits to Hours of Work	BP-PROC-00005	Yes
Conduct of Business	BP-PROG-16.01	Yes
Human Resources Management	BP-PROG-02.01	No
Fitness For Duty	BP-PROC-00610	No
Fitness for Duty Considerations for Shift Complement Staff Held Over for More than 13 Hours	GRP-OPS-00055	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Fitness for Duty: Managing Worker Fatigue	REGDOC-2.2.4	2017	Dec. 31, 2018
CNSC	Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3	REGDOC-2.2.4	2021	July 22, 2021 (except random testing) Jan. 22, 2022 (complete document)*

* See details below under *Implementation strategy for REGDOC-2.2.4, Volume II, Version 3*

In order to establish, maintain and improve human performance, Bruce Power shall monitor and control the work hours and shift schedules of nuclear workers, in accordance with BP-PROC-00005, LIMITS TO HOURS OF WORK.

Bruce Power shall also monitor and control the fitness for duty of its workers at all times as per the provisions set out in BP-PROC-00610, FITNESS FOR DUTY. Fitness for duty considerations for shift complement staff held over from their regular shift are contained in GRP-OPS-00055.

Implementation strategy for REGDOC-2.2.4, Volume II: Managing Alcohol and Drug Use, Version 3

REGDOC-2.2.4 *Fitness for Duty, Volume II: Managing Alcohol and Drug Use*, Version 3, sets out requirements and guidance for managing fitness for duty of workers in relation to alcohol and drug use and abuse. Bruce Power shall implement all REGDOC-2.2.4 Vol II, Version 3 requirements except for random alcohol and drug testing provided in sections 5.1 and 5.5. In [1], Bruce Power was directed to implement all REGDOC-2.2.4 Vol II, Version 3 requirements by December 1, 2023. However, on October 27, 2023, the Federal Court of Appeal granted an injunction [2] staying the implementation of REGDOC-2.2.4 Vol II, Version 3 sections 5.1 and 5.5 until the appeal is heard. Hence, Bruce Power is no longer expected to implement these requirements by December 1, 2023 until the appeal is decided.

References:

[1] Letter, M. Hornof to L. Sigouin, “Bruce Nuclear Generating Stations A and B: Implementation of Sections 5.1 and 5.5 for REGDOC-2.2.4 Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3, New Action Item 2023-07-27890”, June 19, 2023, e-Docs # 7067208.

[2] Federal Court of Appeal Order between “Power Workers’ Union, Society of United Professionals, The Chalk River Nuclear Safety Officers Association, International Brotherhood of Electrical Workers Local 37, Chris Damant, Paul Catahno, Scott Lampman, Greg MacLeod, Matthew Stewart and Thomas Shields” and “Attorney General of Canada, Ontario Power Generation, Bruce Power, New Brunswick Power Corporation and Canadian Nuclear Laboratories”, M. Biringer, J.A., docket A-184-23, issued on October 27, 2023.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Human Factors	REGDOC-2.2.1	2019

The program should include elements that continuously monitor human performance, identify human performance weaknesses, improve human performance, and reduce the likelihood of human performance related causes and root causes of nuclear safety events.

In addition to those listed as requirements, the human performance program should address the range of human and organizational factors that influence human performance. Moreover, the human performance program should integrate all these factors. The range of factors includes, but is not limited to, the following:

- The provision of qualified staff
  - Certification and Training
  - Staffing
  - Minimum Shift Complement
  - Fitness for duty (hours of work, fatigue management)
- The reduction of human error
  - Procedures Development
  - Procedural Compliance
  - Work protection and Work Permit Systems
  - Shift Turnover
  - Pre and Post Job Briefings
  - Safe work strategies/practices
- Organizational support for safe work activities
  - Human Actions in Safety Analysis
  - Organizational Performance and Safety Culture
- The continuous improvement of human performance

2.2 Minimum Shift Complement and Control Room Staffing

Licence Condition 2.2:

The licensee shall implement and maintain the minimum shift complement and control room staffing for Bruce A and B.

Preamble:

The minimum shift complement specifies the numbers of qualified staff that are required to operate and maintain unit(s) safely under all operating states including normal operations, anticipated operational occurrences, design-basis accidents and emergencies.

This licence condition ensures the presence of a sufficient number of qualified workers who must be present at all times to ensure safe operation of the nuclear facility, and to ensure adequate emergency response capability.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce Power Shift Complement and Fitness for Duty Standard for any complement staff exceeding a 12-hour shift	BP-STND-00152	Yes

Minimum Shift Complement

Bruce Power's minimum shift complement procedures describe the minimum number of workers with specific qualifications required for the safe operation of the nuclear facilities under all operating states and the measures in place to mitigate the impact of any minimum shift complement violations until minimum complement requirements are restored.

Bruce Power shall operate the nuclear facilities in accordance with these documents and shall monitor and keep records of each shift's complement. The following tables (Tables A to D) summarize the number of workers located at Bruce A and Bruce B during one shift, as well as additional staff on site and available as call-ins. The tables in this section represent the minimum shift complement and control room staffing required for operational and emergency response purposes. These tables do not include minimum shift complement number for security on-site personnel. Security staffing requirements are managed separately under secure protocols.

Table A: Number of Workers Present at the Bruce A Nuclear Facility			
DESIGNATED POSITION	# of Staff	# of Staff with a Bruce A Unit in DFGSS[1]	EMERGENCY RESPONSE ORGANIZATION POSITION
Shift Manager	1	1	Shift Emergency Controller (SEC)
Control Room Shift Supervisor	1	1	Back-up SEC
Shift Assistant Technical Support	1	1	Emergency Shift Assistant
Field Shift Operating Supervisor	1	1	Field Team Coordinator for Bruce B
Authorized Nuclear Operator	6	5	
Supervising Nuclear Operator – Reactor Units	4	3	Shift Resource Coordinator
Nuclear Operator – Reactor Units	8	7	
Unit 0 Control Room Operator	2	2	
Supervising Nuclear Operator – Unit 0	1	1	
Nuclear Operator – Unit 0	3	3	
Fuel Handling Control Room Operator	1	1	Work Control Area Accounting Supervisor
Nuclear Operator – Fuel Handling	1	1	
Control Maintenance First Line Manager or Union Team Lead (UTL)	1	1	In-plant Coordinator
Control Technician	2	2	
Chemistry Technician	2	2	Chemistry Laboratory and Supervisor
Emergency Services Maintainer Union Team Lead – Bruce A	1	1	Emergency Response Team - Field Command (Bruce A), OSST Captain (Bruce B)
TOTAL	**36**	**33**	

1. With a Bruce A Unit in DFGSS, a reduced minimum shift complement may be applied in limited circumstances in accordance with BP-STND-00152.

Table B: Number of Workers Present at the Bruce B Nuclear Facility			
DESIGNATED POSITION	# of Staff	# of Staff with a Bruce B Unit in DFGSS[1]	EMERGENCY RESPONSE ORGANIZATION POSITION
Shift Manager	1	1	Shift Emergency Controller (SEC)
Control Room Shift Supervisor	1	1	Back-up SEC
Shift Assistant Technical Support	1	1	Emergency Shift Assistant
Field Shift Operating Supervisor	1	1	Field Team Coordinator for Bruce A
Authorized Nuclear Operator	6	5	
Supervising Nuclear Operator – Reactor Units	4	3	
Nuclear Operator – Reactor Units	8	7	
Unit 0 Control Room Operator	2	2	
Supervising Nuclear Operator – Unit 0	1	1	
Nuclear Operator – Unit 0	4	4	
Fuel Handling Control Room Operator	1	1	Shift Resource Coordinator
Nuclear Operator – Fuel Handling	1	1	Work Control Area Accounting Supervisor
Control Maintenance First Line Manager or Union Team Lead (UTL)	1	1	In-plant Coordinator
Control Technician	2	2	
Mechanical Maintainer	1	1	
Chemistry Technician	2	2	Chemistry Laboratory and Supervisor
Emergency Services Maintainer Union Team Lead – Bruce B	1	1	Emergency Response Team - Field Command (Bruce B), OSST Captain (Bruce A)
TOTAL	**38**	**35**	

1. With a Bruce B Unit in DFGSS, a reduced minimum shift complement may be applied in limited circumstances in accordance with BP-STND-00152.

Table C: Number of Additional Workers Present at Site in Support of the Bruce A and B Nuclear Facilities		
DESIGNATED POSITION	# of Staff	EMERGENCY RESPONSE ORGANIZATION POSITION
Staff Normally Based at Bruce A		
Control Technician	1	Emergency Entry/Repair Team
Emergency Services Maintainer - Bruce A	2	Emergency Response Team
Staff Normally Based at Bruce B		
Mechanical Maintainer	1	Emergency Entry/Repair Team
Stock Keeper	1	Stores
Emergency Services Maintainer - Bruce B	2	Emergency Response Team
Additional Staff Normally Based on Site		
Shift Emergency Response Manager	1	Emergency Response Coordinator
Emergency Services Maintainer – Union Team Lead - Site	1	Emergency Response Team
Emergency Services Maintainer - Site	3	Emergency Response Team
Emergency Services Maintainer - Site	2	In-plant Survey Team
Emergency Services Maintainer - Site	2	Source Term Survey Team
TOTAL[1]	**16**	

1. The ESM - Dispatcher position has been removed, reducing the minimum shift complement compared to what is stated in LCH-PR-18.03/2028-R004. The responsibilities of dispatcher have been transferred to an existing position in EPS Security and are now governed under Bruce Power's Security Program, and the minimum complement requirements associated with that program.

Table D: Number of Call-in Workers in Addition to Station and Site Personnel		
DESIGNATED POSITION	# of Staff	EMERGENCY RESPONSE ORGANIZATION POSITION
Call-in Staff		
Security	2	Offsite Survey Team Drivers
Radiation Technician	2	Offsite Survey Team Surveyors
TOTAL	**4**	

Control Room Staffing

Bruce Power shall comply with the minimum certified worker requirements for the nuclear facilities and for the main control rooms. The designated positions are listed in LC 2.4.

In conjunction with the minimum shift complement for the facility, Bruce Power shall maintain adequate control room staffing. The licensee shall, at all times, have the following certified workers:

- at least one shift manager, six authorized nuclear operators, one control room shift supervisor and two Unit 0 control room operators at each nuclear facility (Bruce A and B);
- an authorized nuclear operator in direct attendance at the control panels of each reactor unit in the main control rooms;

- a minimum of one Unit 0 control room operator in the main control room at each nuclear facility (Bruce A and B), except for brief absences to respond to security alerts or to determine the origin of fire alarms.

"In direct attendance" means the certified person is physically in the direct line of sight and in close proximity to the control room panels to continuously monitor, recognize and differentiate panel displays, alarms and indications.

The minimum certified worker requirements for the main control rooms that this condition imposes do not apply where this minimum cannot be met due to emergency conditions that could cause an unwarranted hazard to workers in the main control rooms, in which case Bruce Power shall place the reactor(s) in a safe shutdown state and the nuclear facilities in a safe condition.

A certified person shall be in a position to rapidly respond, in accordance with his/her role, to changing unit conditions, at all times.

Bruce Power shall provide a rolling 5-year staffing profile of certified operators on an annual basis.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Minimum Staff Complement	REGDOC-2.2.5	2019
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1	2019

The adequacy of the minimum shift complement should be determined through a systematic analysis of the most resource-intensive conditions under all operating states, design-basis accidents, and emergencies. The results of the analysis should then be validated to determine the degree to which the minimum shift complement facilitates the achievement of the overall safety goals.

Guidance for the development and validation of the minimum shift complement are provided in the following CNSC guidance documents:

- REGDOC-2.2.5, MINIMUM STAFF COMPLEMENT, describes the CNSC recommended approach for defining the minimum shift complement and sets out the key factors that CNSC staff will take into account when assessing whether the licensee has made, or the applicant will make, adequate provision for ensuring the presence of a sufficient number of qualified staff.
- REGDOC-2.5.1, GENERAL DESIGN CONSIDERATIONS: HUMAN FACTORS, describes the elements of effective human factors verification and validation planning, including a suggested format for documenting these elements.

2.3 Training Programs

Licence Condition 2.3:

The licensee shall implement and maintain training programs for workers.

Preamble:

This LC provides the regulatory requirements for the development and implementation of training programs for workers. It also provides the regulatory requirements for the development and implementation of training programs and processes to support responsibilities, qualifications, and requalification training of workers at the nuclear facility.

As defined by the *General Nuclear Safety and Control Regulations* a "worker means a person who performs work that is referred to in a licence". Workers include contractors and temporary employees who perform work that is referred to in the licence. Training requirements apply equally to these types of workers as to the licensees own employees.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Worker Learning and Qualification	BP-PROG-02.02	No
Systematic Approach to Training Process	BP-PROC-01071	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Personnel Training, Version 2	REGDOC-2.2.2	2016	October 1, 2018

Given that REGDOC-2.2.2 Version 2 has no material changes to it, where REGDOC-2.2.2 (i.e., initial version) is referenced in Bruce Power governing documents, it shall be taken to mean REGDOC-2.2.2 Version 2. Bruce Power will update the references in their governance on the regular document review cycle.

Training Programs for Workers

The licensee shall implement and maintain training programs, including initial and continuing training program elements, for workers in accordance with REGDOC-2.2.2, *Personnel Training*, Version 2, which defines the requirements regarding the development and implementation of a training system.

All training programs related to workers in positions where the consequence of human error poses a risk to the environment, the health and safety of persons, or to the security of the nuclear facilities and licensed activities, are evaluated against the criteria for a systematic approach to training (SAT).

Guidance:

Not applicable to this LC.

2.4 Certification Programs

Licence Condition 2.4:

The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, PERSONNEL CERTIFICATION, VOLUME III: CERTIFICATION OF REACTOR FACILITY WORKERS, VERSION 2. Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030.

Persons appointed to the following positions require certification:

(i) authorized health physicist;

(ii) authorized nuclear operator;

(iii) control room shift supervisor;

(iv) Unit 0 control room operator; and

(v) shift manager.

Preamble:

This LC provides the regulatory requirements for the programs and processes to be implemented in support of the certification and the renewal of the certification of workers employed in designated positions, including those related to initial and continuing training, certification examinations, and requalification testing.

The licensee's governance describes the roles and responsibilities of workers employed in designated positions.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce Power Shift Operations Role Descriptions and Certification Maintenance Requirements for Licence Related Positions	BP-STND-00153	Yes
Certification Training – Development and Administration of Comprehensive Written Oral Examinations for Certification Training Programs	BP-STND-00092	Yes
Certification Training Examinations – Standards for Development and Administration of Closed Reference Multiple Choice Questions for Initial General Certification Written Examinations EG1	BP-STND-00038	Yes

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Certification Testing & Examinations - Development and Administration of Comprehensive Simulator-Based Examinations for INITIAL Certification Training Programs	BP-STND-00093	No
Certifications Training Examinations - Standards for Initial Certification Comprehensive Simulator-Based Examinations (CTS, DTS, PCTS)	BP-STND-00085	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Certification of Reactor Facility Workers, Version 2	REGDOC-2.2.3, Vol. III, V2	2023	Jan. 31, 2025

Training and Certification of Workers Employed in Designated Positions

Bruce Power shall ensure that workers employed in designated positions at the nuclear facilities hold a valid certification duly issued by the CNSC for the position to which they have been appointed.

Bruce Power shall implement and maintain effective qualification and requalification programs in support of the certification, and the renewal of certification, of workers employed in the positions designated in the licence, in accordance with the requirements and guidance set out in REGDOC-2.2.3, Vol. III.

In addition, the initial and continuing training programs for workers employed in designated positions shall be implemented and maintained in accordance with the requirements and guidance set out in REGDOC-2.2.2, *Personnel Training*.

The roles and responsibilities of the designated positions listed above are considered safety and control measures. Any changes to them will be reviewed by CNSC staff to confirm they remain within the licensing basis, in consultation with the designated officer to certify and decertify workers referred to in sections 9 and 12 of the *Class I Nuclear Facilities Regulations* and the Director of the Personnel Certification Division. The general criteria for reviewing changes include those described in LC G.1 and LC G.2. Any changes outside the licensing basis would require prior written approval of the Commission, per LC G.1.

The roles and responsibilities of an authorized health physicist, a designated position are found in the Bruce Power document BP-PROG-12.05 listed in section 7.1 as a licensee document requiring prior notification of change.

Certification Examinations and Requalification Tests

Currently, the following three CNSC documents specify the requirements and guidance for administering the certification examinations and requalification tests required by REGDOC-2.2.3, Vol. III:

- CNSC document: EXAMINATION GUIDE CNSC-EG1, REV.0: REQUIREMENTS AND GUIDELINES FOR WRITTEN AND ORAL CERTIFICATION EXAMINATIONS FOR SHIFT PERSONNEL AT NUCLEAR POWER PLANTS,
- CNSC document: EXAMINATION GUIDE CNSC-EG2, REV.0: REQUIREMENTS AND GUIDELINES FOR SIMULATOR-BASED CERTIFICATION EXAMINATIONS FOR SHIFT PERSONNEL AT NUCLEAR POWER PLANTS, and
- CNSC document: REQUIREMENTS FOR THE REQUALIFICATION TESTING OF CERTIFIED SHIFT PERSONNEL AT NUCLEAR POWER PLANTS, REVISION 2

As per the CNSC letter [1] for the General certification examinations specified in CNSC document EG1, Bruce Power may choose to administer General certification examinations using a Multiple Choice Question (MCQ) format on a pilot basis. During this pilot period, the development, conduct and marking of MCQ general certification examinations shall be in accordance with the following Bruce Power documents (updated in January 2022 [2]):

- BP-STND-00092, and
- BP-STND-00038

References:

[1] CNSC Letter, L. Sigouin to F. Saunders, “Bruce NGS: CNSC Assessment of Bruce Power’s Pilot Multiple Choice Question Format for General Certification Examinations”, December 19, 2017, NK21-CORR-00531-14087/NK29-CORR-00531-14785, e-Docs # 5340379.

[2] Email, J. Thompson to L. Sigouin, “Notification of a Revision to an LCH Document: Revision 000 of BP-STND-00038 supersedes B-HBK-09510-00012 and Revision 000 of BP-STND-00092 supersedes BP-PROC-00568”, January 13, 2022, BP-CORR-00531-02406, e-Docs # 6717444.

Guidance:

Not applicable to this LC.

3 SCA – OPERATING PERFORMANCE

3.1 Operations Program

Licence Condition 3.1:

The licensee shall implement and maintain an operations program, which includes a set of operating limits.

Preamble:

The operations program establishes safe operating practices within the nuclear facility, under all operating conditions (routine and non-routine), and provides the ability to ensure the facility is operated in such a manner that:

- applicable regulations, LCs, and standards are followed;
- the requirements of the operating policies and principles are implemented; and
- limits established in accordance with a safe operating envelope (SOE) are not exceeded.

The Operating Policies and Principles (OP&Ps):

- outline the operating rules consistent with the safety analyses and other licensing support documentation within which the station will be operated, maintained and modified, all of which should ensure nuclear safety;
- specify the authorities of the station staff positions to make decisions within the defined boundaries; and
- identify and differentiate between actions where discretion may be applied and where jurisdictional authorization is required.

The safe operating limits are derived from the safety analysis limits as well as design requirements. The SOE parameters are currently identified in various station documents, including Operational Safety Requirements (OSRs) and Instrument Uncertainty Calculations (IUCs). These limits are monitored through compliance documents such as the Impairments Manual and surveillance documentation.

Power limit specifications set limits on parameters that affect reactor core, channel, and fuel bundle powers, to ensure compliance with limits imposed by the design and safety analysis assumptions. The magnitude of the initial reactor power, channel powers and bundle powers in the reactor prior to an accident are the fundamental parameters governing whether fuel or fuel channel failure will occur during anticipated transients and the postulated Design-Basis Accidents (DBAs).

Accident management provisions address defences against radiological hazards resulting from DBAs and Beyond-Design-Basis Accidents (BDBAs). The fundamental premise underlying accident management is that overlapping measures for accident prevention and accident response are in place to:

- Prevent the escalation of the accident;
- Mitigate the consequences of the accident; and
- Achieve a long-term safe stable state after the accident.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operating Policies and Principles – Bruce B	BP-OPP-00001	Yes
Operating Policies and Principles – Bruce A	BP-OPP-00002	Yes
Operating Policies and Principles – Central Maintenance and Laundry Facility	BP-OPP-00003	Yes
Conduct of Plant Operations	BP-PROG-12.01	No
Operational Safety Requirements for Bruce A Fuel and Reactor Physics	NK21-OSR-31000-00001	No
Operational Safety Requirements for Bruce A Moderator System	NK21-OSR-32000-00001	No
Bruce A NGS: Operational Safety Requirements for Heat Transport System	NK21-OSR-33100-00001	No
Operational Safety Requirements for Bruce A End Shield Cooling System	NK21-OSR-34110-00001	No
Operational Safety Requirements for Bruce A Containment System	NK21-OSR-34200-00004	No
Operational Safety Requirements for Bruce A Emergency Coolant Injection System	NK21-OSR-34340-00003	No
Operational Safety Requirements for Bruce A Powerhouse Emergency Venting System	NK21-OSR-34360-00001	No
Operational Safety Requirements for Bruce A Shutdown and Maintenance Cooling Systems	NK21-OSR-34700-00001	No
Operational Safety Requirements for Bruce A Annulus Gas System	NK21-OSR-34980-00001	No
Operational Safety Requirements for Bruce A Fuel Handling	NK21-OSR-35000-00001	No
Operational Safety Requirements for Bruce A Main Steam Supply System	NK21-OSR-36100-00001	No
Operational Safety Requirements for Bruce A Confinement	NK21-OSR-38330/21175-00001	No
Operational Safety Requirements for Bruce A Feedwater and Condensate System	NK21-OSR-43200-00001	No
Operational Safety Requirements for Bruce A Electrical System	NK21-OSR-53000/55000-00001	No

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operational Safety Requirements for Bruce A Qualified Power Supply System	NK21-OSR-54400-00001	No
Operational Safety Requirements for Bruce A Critical Safety Parameter Monitoring	NK21-OSR-60060-00001	No
Operational Safety Requirements for Bruce A Reactor Regulating System	NK21-OSR-63710-00001	No
Operational Safety Requirements for Bruce A Shutdown Systems	NK21-OSR-63720-63730-00001	No
Operational Safety Requirements for Bruce A Service Water Systems	NK21-OSR-71310-00001	No
Operational Safety Requirements for Bruce A Emergency Boiler Cooling System	NK21-OSR-71910-00001	No
Operational Safety Requirements for Bruce B Fuel and Reactor Physics	NK29-OSR-31000-00001	No
Operational Safety Requirements for Bruce B Moderator System	NK29-OSR-32000-00001	No
Operational Safety Requirements for Bruce B Heat Transport System	NK29-OSR-33000-00001	No
Operational Safety Requirements for Bruce B End Shield Cooling System	NK29-OSR-34110-00001	No
Operational Safety Requirements for Bruce B Containment System	NK29-OSR-34200-00001	No
Operational Safety Requirements for Bruce B Emergency Coolant Injection System	NK29-OSR-34340-00001	No
Operational Safety Requirements for Bruce B Powerhouse Emergency Venting System	NK29-OSR-34360-00001	No
Operational Safety Requirements for Bruce B Shutdown and Maintenance Cooling Systems	NK29-OSR-34700-00001	No
Operational Safety Requirements for Bruce B Annulus Gas System	NK29-OSR-34980-00001	No
Operational Safety Requirements for Bruce B Fuel Handling	NK29-OSR-35000-00001	No
Operational Safety Requirements for Bruce B Main Steam Supply System	NK29-OSR-36100-00001	No
Operational Safety Requirements for Bruce B Confinement	NK29-OSR-38330-21190-00001	No

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operational Safety Requirements for Bruce B Feedwater and Condensate System	NK29-OSR-43200-00001	No
Operational Safety Requirements for Bruce B Electrical System	NK29-OSR-53000/55000-00001	No
Operational Safety Requirements for Bruce B Emergency Power Supply System	NK29-OSR-54300-00001	No
Operational Safety Requirements for Bruce B Critical Safety Parameter Monitoring	NK29-OSR-60060-00001	No
Operational Safety Requirements for Bruce B Reactor Regulating System	NK29-OSR-63710-00001	No
Operational Safety Requirements for Bruce B Shutdown Systems	NK29-OSR-63720-63730-00001	No
Operational Safety Requirements for Bruce B Service Water Systems	NK29-OSR-71310-00001	No
Operational Safety Requirements for Bruce B Emergency Water System	NK29-OSR-71380-00001	No
Bruce Power Safeguards Site Plan 2015	NK37-CORR-00531-02784	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Requirements for the safe operating envelope for nuclear power plants	N290.15	2010 Update No. 1 (2016)	Oct. 1, 2018
CNSC	Accident Management: Severe Accident Management Programs for Nuclear Reactors	REGDOC-2.3.2	V2, Updated September 2015	July 25, 2023

The licensee shall implement and maintain operations programs. These programs shall consist of, at a minimum, a safe operating envelope, a set of operating policies and principles, and accident management procedures and/or guides for design-basis and beyond-design-basis accidents, including overall strategies for recovery.

Bruce Power employs a number of programs and other governance to fulfill the objective of this LC. Operation in states not considered in, or not bounded by, the safety analyses is not permitted.

Power Limits

Bruce Power shall operate the reactor within the following limits:

Bruce A		
	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 969 kilowatts	Shall not exceed 857 kilowatts
Total power generated in any fuel channel	Shall not exceed 6.84 megawatts under normal steady-state operating conditions	Shall not exceed 6.25 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel	Shall not exceed 2619.6 megawatts (92.5% full power) under steady-state operating conditions	

Bruce B		
	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 837 kilowatts under normal steady-state operating conditions	
Total power generated in any fuel channel	Shall not exceed 6.70 megawatts in the inner flow zone of the reactor core under normal steady-state operating conditions	Shall not exceed 6.23 megawatts in the outer flow zone of the reactor core under normal steady-state operating conditions
Total thermal power from the reactor fuel	Shall not exceed 2634 megawatts (93% full power) under steady-state operating conditions	

The reactor, channel and bundle power limits are considered safety and control measures. Any changes to them, or planned operations outside of these limits, would require prior written approval by the Commission, per LC G.1 and LC G.2.

Operating Policies and Principles

The OP&Ps shall provide direction for operating the nuclear facilities safely and, as a minimum, reflect the safety analyses that have been previously submitted to the Commission, or a person authorized by the Commission.

Bruce Power shall, at all times, maintain and operate the nuclear facilities within the principles of the OP&Ps and the limits of the SOE. If operation outside the operating boundaries specified by the OP&Ps and SOE is discovered, the licensee shall take immediate action to return the facility within the boundaries of safety analyses, in a safe manner as per Bruce Power procedures.

Safe Operating Envelope

CSA standard N290.15, REQUIREMENTS FOR THE SAFE OPERATING ENVELOPE FOR NUCLEAR POWER PLANTS outlines the requirements for a safe operating envelope.

Bruce Power's safe operating limits, conditions and surveillance requirements as well as their bases are documented in station and system specific Operational Safety Requirements (OSRs) documents along with any associated Instrument Uncertainty Calculations (IUCs). The limits and conditions documented in the OSRs, including any requirements for corrective or mitigating actions and action times, are specified in the applicable operations and maintenance tests, procedures and processes to ensure compliance with the SOE.

Bruce Power shall, at all times, maintain and operate the nuclear facilities within the limits of the SOE.

The SOE is considered part of the licensing basis. Changes to the SOE documentation are subject to LC G.1 and LC G.2. Changes that may reduce safety margins would require prior notification of CNSC staff, per LC G.2.

Accident Management and Recovery

CNSC regulatory document REGDOC-2.3.2, ACCIDENT MANAGEMENT: SEVERE ACCIDENT MANAGEMENT PROGRAMS FOR NUCLEAR REACTORS, VERSION 2 outlines the requirements related to severe accident management programs, which provide additional defence against the consequences of those accidents that fall beyond the scope of events considered in the reactor design basis.

Bruce Power shall implement and maintain operational procedures for operation in all states analyzed in the design basis, including abnormal and emergency states.

Bruce Power's operational procedures ensure that the operation of the facility can be returned to a safe and controlled state should operation deviate from normal operation. Bruce Power shall ensure all abnormal operational scenarios analyzed in the design basis are accounted for in the operational procedures with the purpose of mitigating situations that may arise which cause a deviation from the expected state. These documents are conceived to return the plant to a safe and controlled state and to prevent the further escalation of the abnormal incident into a more serious deviation.

In addition to the operational guidance for abnormal and emergency states, Bruce Power shall implement and maintain a severe accident management program to address residual risks posed by severe accidents. Bruce Power shall also ensure clear instruction is provided directing operations in abnormal scenarios to the appropriate set of procedures or guides, including severe accident management guidelines (SAMGs), if a severe accident is detected.

Other Requirements

As described in [1, 2], Bruce Power shall inform CNSC staff of any changes to the RBGSS operating manuals, safety system tests and chemistry procedures that impact RBGSS. Proposed changes are subject to LC G.2. CNSC staff will review and confirm that the changes remain within the licensing basis; changes outside of the licensing basis require written approval by the Commission, per LC G.1.

References:

[1] CNSC Letter, L. Sigouin to M. Burton, "Bruce B: Concurrence for Rod Based Guaranteed Shutdown State, Closed Action Item 2021-14-22724", June 15, 2022, BP-CORR-00531-02932, e-Docs # 6812209.

[2] Bruce Power letter, M. Burton to M. Hornof, “Bruce B: Rod Based Guaranteed Shutdown State, Closed Action Item 2021-14-22724”, November 30, 2022, BP-CORR-00531-03064, e-Docs # 6933259.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Requirements for reactor heat removal capability during outage of nuclear power plants	N290.11	2013
CSA	Requirements for beyond design basis accidents	N290.16	2016

The licensee should manage all outage heat sink work activities in accordance with CSA standard N290.11, REQUIREMENTS FOR REACTOR HEAT REMOVAL CAPABILITY DURING OUTAGE OF NUCLEAR POWER PLANTS.

3.2 Approval to Restart after a Serious Process Failure

Licence Condition 3.2:

The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or the prior written consent of a person authorized by the Commission.

Preamble:

A serious process failure and its related definitions are defined, as follows:

- Serious process failure: With respect to CANDU reactor facilities, a failure that leads or that could lead, in the absence of action by any special safety system, to significant fuel damage or a significant release from the CANDU reactor facility.
- Significant fuel damage: An event or situation that brought the fuel (>1%) outside of its fitness for service limits.
- Significant release: A release of radioactive material that results in an effective dose, received by or committed to a typical member of the critical group, in excess of 0.5 millisievert.

The definition of serious process failure can also be found in CNSC regulatory document REGDOC-3.6, *Glossary of CNSC Terminology*. The reporting requirements are also provided in CNSC regulatory document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.

Person(s) authorized by the Commission, see LCH introduction for more information, have the authority to give the consent to Bruce Power to proceed with the restart of the reactor if there is sufficient assurance that the:

- Cause of the serious process failure has been resolved;
- Bruce Power is within the licensing basis;
- Fuel is fit for service; and
- the serious process failure did not exceed a frequency of greater than one per three year rolling period.

Otherwise, approval to restart must be granted by the Commission.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operating Policies and Principles – Bruce B	BP-OPP-00001	Yes
Operating Policies and Principles – Bruce A	BP-OPP-00002	Yes

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Station Transient Operations	BP-STND-00222	Yes
Operational Decision Making	BP-PROC-01139	No
Engineering Evaluation	DIV-ENG-00004	No

Serious process failures are reportable in accordance with REGDOC-3.1.1, see LC 3.3. When an event is found to be a serious process failure or where the determination as to the cause and/or extent of condition has proved inconclusive (i.e., a serious process failure cannot be ruled out), a request for restart of the reactor shall be submitted in writing to the CNSC. In accordance with the licence condition, to restart the reactor, Bruce Power shall obtain approval of the Commission, or the prior written consent of a person authorized by the Commission, depending on the criteria.

The written request for restart of the reactor is to include the following information:

- a description of the event;
- the causes of the event;
- the consequences and safety significance of the event;
- a recovery plan including corrective actions, and fitness for service assessment on the systems/components impacted from the failure if applicable. This shall be completed prior to reactor restart;
- a statement regarding plant readiness to resume safe operation. This shall include any conditions that the licensee proposes to impose upon reactor restart and/or subsequent reactor operation to ensure safe operation of the nuclear facilities; and
- an extent of completion of the conditions mentioned in the statement regarding plant readiness to resume safe operation.

As specified for LC G.1, for unapproved operation that is not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation.

For minor deviations outside the licensing basis, the licensee may use their internal procedures to return to a state consistent with the licensing basis and report the incident to the CNSC through REGDOC-3.1.1 [LC 3.3].

For more significant situations, serious process failures, approval or consent is required before returning to service in accordance with LC 3.2. In such cases systematic and systemic damage to a barrier to the release of radioactivity has or could have occurred.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Nuclear Fuel Safety and Qualification	REGDOC-2.4.5	April 2024
COG	Principles & Guidelines For Deterministic Safety Analysis, CANDU Owners Group, Safety Analysis Improvement Task Team	COG-09-9030	R03
COG	Fuel and Pressure Tube Fitness-For-Service Criteria for LOF, SBLOCA and Slow LORC	COG-12-2049	R02

In addition to the requirements listed above, the written request to restart a reactor after a serious process failure should also include the following information:

- the documentation and communication to licensee staff addressing the root cause analysis, corrective actions, and plant readiness to resume operation (including additional training, if necessary); and
- applicable historical operating experience (OPEX) review for comparable events (OPEX is further described in LC 1.1).

As the fuel sheath is the barrier that contains the vast majority of the fission products during normal operations, this barrier was selected, with its fitness for service limits as the criteria. Specifically: Sheath Temperatures less than or equal to 450°C; and Sheath Strains less than or equal to 0.5%.

In order to screen out insignificant events, such as individual fuel failure due to debris fretting, a threshold criteria was established of at least 1% of the core or about 50 bundles in the definition for significant fuel damage. If a single component of a bundle is not fit for service (e.g., one pin) then the entire bundle is not fit for service.

A review of the applicable criteria should be performed to ensure the continued operations will remain within the licensing basis, in accordance with Appendix A of CNSC internal document "Overview of assessing licensee changes to documents or operations", e-Doc 4055483 including results of Serious Process Failure Tool screening, e-Doc 7046698.

3.3 Reporting Requirements

Licence Condition 3.3:

The licensee shall notify and report in accordance with CNSC regulatory document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.

Preamble:

CNSC regulatory document REGDOC-3.1.1 has comprehensive reporting requirements (scheduled and unscheduled) for licensees of NPPs. It describes information that the CNSC needs to evaluate the performance of the facilities it regulates. This document is complementary to the reporting requirements in the *Nuclear Safety and Control Act* and the associated regulations.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Regulatory Affairs	BP-PROG-06.01	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Reporting Requirements for Nuclear Power Plants, Version 3	REGDOC-3.1.1	2024	Jan. 1, 2025

The licensee shall adjust its reporting to meet the requirements of REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants* based on the clarifications and interpretations provided in the CNSC staff interpretation document, *Interpretation of REGDOC-3.1.1, Reporting Requirements for Nuclear Power Plants.* In addition,

1. **For REGDOC-3.1.1 Section 3.1, Quarterly report on safety performance indicators:**
   Bruce Power's quarterly report on Safety Performance Indicators (SPIs) is to include contributions from the licensed support activities at Bruce Power Center of Site locations for SPI 1, Collective Radiation Exposure and SPI 5, Environmental Releases – Radiological.

2. **For REGDOC-3.1.1 Section 3.5, Annual report on environmental protection:**
   Bruce Power is to provide the reporting data with respect to sewage plant radioactivity monitoring in the annual report on environmental protection.

Guidance:

Not applicable to this LC.

4 SCA – SAFETY ANALYSIS

4.1 Safety Analysis Program

Licence Condition 4.1:

The licensee shall implement and maintain a safety analysis program.

Preamble:

A deterministic safety analysis evaluates the NPP responses to events by using predetermined rules and assumptions. The objectives of the deterministic safety analysis are stated in REGDOC-2.4.1, DETERMINISTIC SAFETY ANALYSIS.

Probabilistic safety assessment (PSA) is a comprehensive and integrated assessment of the safety of the NPP that, by considering the initial plant state and the probability, progression, and consequences of equipment failures and operator response, derives numerical estimates of a consistent measure of the safety of the design. Such assessments are most useful in assessing the relative level of safety. The objectives of the PSA are stated in REGDOC-2.4.2, PROBABILISTIC SAFETY ASSESSMENT (PSA) FOR NUCLEAR POWER PLANTS.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce A Safety Report Part 2: Plant Components and Systems	NK21-SR-01320-00002, Part 2	Yes*
Bruce B Safety Report Part 2: Plant Components and Systems	NK29-SR-01320-00001, Part 2	Yes*
Bruce A Safety Report Part 3: Safety Analysis	NK21-SR-01320-00003, Part 3	Yes*
Bruce B Safety Report Part 3: Safety Analysis	NK29-SR-01320-00002, Part 3	Yes*
Severe Accident Management	BP-PROC-00659	No

**The reporting requirements for updates to safety reports are given in REGDOC-3.1.1 (LC 3.3)*

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Deterministic Safety Analysis	REGDOC-2.4.1	2014	Dec. 31, 2017
CNSC	Probabilistic Safety Assessment (PSA) for Nuclear Power Plants	REGDOC-2.4.2	2014	June 30, 2019
CSA	Quality assurance of analytical, scientific, and design computer programs	N286.7	2016	Dec 31, 2016

Deterministic Safety Analysis

CNSC regulatory document REGDOC-2.4.1 outlines the requirements related to safety analysis events, operating modes, acceptance criteria, methods, documentation and review.

COG document COG-13-9035-R02, *Derived Acceptance Criteria for Deterministic Safety Analysis* shall be used by Bruce Power when conducting deterministic safety analysis for the associated accident scenarios.

Bruce Power shall conduct and maintain a deterministic safety analysis in accordance with applicable requirements and reflecting the actual plant design and conditions. The deterministic safety analysis shall demonstrate that the radiological consequences of the postulated initiating events involving a single process failure and events involving a single process failure in conjunction with failure of one of the special safety systems do not exceed the accident-dependent reference public dose limits specified in the siting guide [see reference in G.3] and reproduced in the following table:

	Individual Dose Limit		Population Dose Limit	
	Thyroid Dose (mSv)	Whole Body Dose (mSv)	Thyroid Dose (Person mSv)	Whole Body Dose (Person mSv)
Single Failure	30	5	10^5	10^5
Dual Failure	2500	250	10^7	10^7

The Bruce A and B Nuclear Power Plants are designed to earlier standards and regulatory requirements. Where compliance with the requirements (e.g., the single failure criterion (SFC)) cannot be demonstrated by the existing design, the REGDOC-2.4.1 requirements should be applied commensurate with risk, such as permitted in CSA N286-12, recognizing the existing design basis.

These include:

- When demonstrating Level 3 Defence-in-Depth (DiD) for DBAs
  - Apply the SFC by selecting the SFC from the active components that are required to change state for each acceptance criterion

  - For system availability, sensitivity cases instead of the SFC applying the minimum allowable performance, which accounts for the withdrawal from service of components for limited periods for maintenance, testing, inspection, or repair (MTIR) by selecting components unavailable as assessed in the operational limits and conditions
- For Anticipated Operating Occurrences (AOOs)
  - Assess operating experience to establish whether the facility had a consequential radioactive release and remain operable
  - Assess Level 2 system actions, if necessary, using realistic operating conditions
- For each hazard Postulated Initiating Events, classify credible external events into the AOO, DBA and Design Extension Conditions classes using event-specific standards and guidelines that are consistent with the existing design basis of the plant

Bruce Power shall submit the deterministic safety analysis to the CNSC every five (5) years (the next due date is in 2027).

Probabilistic Safety Assessment

CNSC regulatory document REGDOC-2.4.2 outlines the requirements related to PSA. REGDOC-2.4.2, which was published in 2014 includes amendments to reflect the lessons learned from the Fukushima accident.

Overall, Bruce Power has met the requirements of REGDOC-2.4.2. CNSC staff will continue monitoring the compliance of the next updates of PSA reports.

Bruce Power shall update, and submit to CNSC, PSA models and reports every five (5) years (the next due date is June 30, 2029) or sooner if there are significant changes in the plant design or operation.

In addition, Bruce Power shall implement internal policy to address if the PSA results are in between the safety limit and the target.

Beyond-Design-Basis Accidents/Severe Accident Analysis

REGDOC-2.4.1 provides the requirements for the performance of a safety analysis for beyond-design-basis accidents (BDBAs), including severe accidents. Severe accidents represent the set of accidents under beyond-design-basis accidents that involve significant fuel degradation, either in-core or in fuel storage.

Beyond-design-basis analysis is performed to ensure that prevention and mitigation measures are identified. The analysis can identify challenges to the plant presented by such events and identify equipment that can be included in the severe accident management guidelines.

Design and Analysis Computer Codes and Software

CSA N286.7, QUALITY ASSURANCE OF ANALYTICAL, SCIENTIFIC, AND DESIGN COMPUTER PROGRAMS provides the specific requirements related to the development, modification, maintenance and use of computer programs used in analytical, scientific and design applications.

Bruce Power shall comply with CSA N286.7 for computer programs used in design and safety analysis.

The safety and control measures are implemented through BP-PROG-10.01, “Configuration Management”, which is cited in section 5.1.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Probabilistic safety assessment for nuclear power plants	N290.17	2017
CSA	Wet storage of irradiated fuel and other radioactive materials	N292.1	2016
CSA	Interim dry storage of irradiated fuel	N292.2	2013

Detailed methodologies and derived acceptance criteria for the conduct of deterministic safety analysis are described in the following COG documents:

COG Documents		
Document Title	Document #	Revision #
Principles & Guidelines For Deterministic Safety Analysis	COG-09-9030	Rev 3
Guidelines for Application of the Limit of the LOE/ROE Methodologies to Deterministic Safety Analysis	COG-11-9023	Rev 1
Guidelines for Application of the Best Estimate Analysis and Uncertainty (BEAU) Methodology to Licensing Analysis	COG-06-9012	Rev 1
Principles and Guidelines for NOP/ROP Trip Setpoint Analysis for CANDU Reactors	COG-08-2078	Rev 1

Updates to deterministic safety analysis should contain a revision summary sheet highlighting the key differences between the existing analyses and updated analysis; if the updated deterministic safety analysis has been reformatted in accordance with REGDOC-2.4.1, a mapping of new-section to old-section numbers should be considered. The revision summary should include:

- Summary of changes (key differences) such as:
    - in acceptance criteria
    - In event characterization
    - In safety analysis assumptions
    - In methodology, or in elements of a methodology
    - In plant models
    - In use of computer codes and embedded models
    - In trip coverage
- Reasons for updating the analysis and for updating models, assumptions, initial conditions or boundary conditions;
- Significance of changes, and their justification;
- Significant changes in results that may affect the conclusions of the analysis for the design; operational or emergency safety requirements for a particular situation or event; and
- Impact on operating and safety margins.

The licensee should maintain a Safety Report Basis consisting of a listing of Analysis of Record Items and auxiliary documents. The licensee should continue to provide CNSC staff with regular updates of the list indicating the submissions to be included in the next Safety Report, Part 3 update.

When the deterministic safety analysis methodology is modified as a result of improved knowledge, or to address emerging issues, the licensee should assess the impact of such a modification on the operating limits, as well as procedural and administrative rules.

The licensee should not credit results obtained with a modified safety analysis methodology to relax operating conditions and/or change safety margins until the modification of the methodology has been reviewed by CNSC staff. If CNSC staff indicate that the modified methodology is appropriate, the licensee must still fulfill any other requirements or criteria associated with the changes to the operating conditions or safety margins, as documented under other LCs such as those in Section 3.

In addition to industry standards, CNSC staff will refer to the applicable industry verification and validation process practices related to computer codes and software used to support the safe plant operation.

Beyond-Design-Basis Accidents/Severe Accident Analysis

The following can be considered as analysis of BDBA:

- Analysis of low-probability ($<10^{-5}$) dual-failure events included in the current Safety Reports;
- Recent assessments that consider the conditions beyond the plant original design basis (e.g., sensitivity cases recently performed for low-probability CME);
- MAAP-CANDU severe accident analyses as part of Level 1 and Level 2 PSA;
- MAAP-CANDU severe accident analyses to support the severe accident management technical basis; and
- BDBA/severe accident assessments (e.g., for in-vessel retention, hydrogen control and mitigation, containment performance, etc.) to address post-Fukushima questions and demonstrate the effectiveness of the design complementary features, including post-Fukushima enhancements for severe accident prevention, mitigation, and management.

Documentation of severe accident (also referred to as beyond-design-basis accident) analyses and assessments is currently not consolidated and centralized. REGDOC-2.4.1 section 4.5 provides the requirements for safety analysis documentation; however, the licensee should consider consolidating the existing and new analyses to improve the integration, maintenance, control and further updates to facilitate the regulatory review and verification.

5 SCA – PHYSICAL DESIGN

5.1 Design Program

Licence Condition 5.1:

The licensee shall implement and maintain a design program.

Preamble:

A design program ensures that the plant design is managed using a well-defined systematic approach. Implementing and maintaining a design program confirms that safety-related systems, structures and components (SSCs) and any modifications to them, continue to meet their design bases given new information arising over time and taking changes in the external environment into account. It also confirms that SSCs continue to be able to perform their safety functions under all plant states. An important cross-cutting element of a design program is design basis management.

A design program includes, but is not limited to: pressure boundary design, civil structure design, seismic design, mechanical design, fuel design, core nuclear design, core thermal-hydraulic design, safety system design, fire protection design, electrical power system design, as well as instrumentation and control system design.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Configuration Management	BP-PROG-10.01	Yes
Engineering Change Control	BP-PROC-01081	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Human factors in design for nuclear power plants	N290.12	2014	Mar. 31, 2021
CSA	Qualification of digital hardware and software for use in instrumentation and control applications for nuclear power plants	N290.14	2015	Oct. 1, 2018
CSA	Requirements for safety-related structures for nuclear power plants	N291	2015	Oct. 1, 2018

Bruce Power shall ensure that all SSCs important to safety are designed to perform their required functions under all plant states for which the system must remain available.

CSA N291-15, REQUIREMENTS FOR SAFETY-RELATED STRUCTURES FOR NUCLEAR POWER PLANTS

Any gaps identified with respect to N291-15 are subject to the disposition and/or corrective actions described in the Bruce A and B Global Assessment Report and Integrated Implementation Plan. Specifically, with respect to Clause 4.3(f), Ontario Power Generation (not Bruce Power) is responsible for decommissioning.

Design Basis Management

Bruce Power shall ensure that design modifications are controlled such that the plant is maintained and modified within the limits prescribed by the licensing basis. Aspects of design are considered safety and control measures if changes to them could

- invalidate the limits documented in the operating policies and principles or safe operating envelope referred to in LC 3.1;
- introduce hazards different in nature or greater in probability or consequence than those considered by the safety analyses and probabilistic safety assessment; and/or
- adversely impact other important safety and control measures, such as those related to operations, radiation protection, emergency preparedness, etc.

Bruce Power shall ensure that changes to those aspects of design remain within the licensing basis and shall notify the CNSC when such changes are planned. Changes outside the licensing basis would require prior written approval by the Commission, per LC G.1.

Bruce Power shall ensure that plant design and changes to plant design are accurately reflected in the safety analysis (see section 4.1 for licensee documents that contain the facilities descriptions and the final safety analysis reports).

Design Program Elements

See LC 5.2 for compliance verification criteria on pressure boundary design and LC 5.3 for information on equipment and structure qualification.

Bruce Power shall have design program elements that address the modification of the special safety systems (Shutdown System 1, Shutdown System 2, Emergency Core Cooling System and Containment). Significant changes to the special safety systems or systems connected to the special safety systems (e.g., change that would impact safety margins) would require prior notification of CNSC, per LC G.2. Changes outside the licensing basis would require prior written approval by the Commission, per LC G.1. Prior notification is not required for changes to items that serve the same functional characteristics of the originally designed item and does not result in a change to operating procedures or safety system testing.

Bruce Power shall have design program elements that address the design and modification of concrete containment structures and safety-related structures.

Any changes that have the potential to impact fire protection are assessed for compliance with CSA standard N293 or CSA N393 for applicable Centre of Site (CoS) facilities containing radioactive materials and as listed in BP-STND-00166. See LC 10.2 for version control of CSA N293 and CSA N393.

The plant electrical power system design shall include the safety classifications of the systems. Its design shall be adequate for all modes of operation under steady-state, voltage and frequency excursion, and transient conditions, as confirmed by electrical analysis. The electrical power systems shall be monitored and tested to demonstrate they comply with the design requirements and to verify the operability for AC systems and DC systems.

Bruce Power shall ensure that the plant overall instrumentation and control (I&C) system is designed to satisfy the following:

- the safety classification of the I&C system is in compliance with plant level system classification and is justified by analysis;
- I&C system meets separation requirements between the groups and channels;
- safety features for enhancing I&C system reliability and integrity are identified and implemented in the design, for example, fail-safe design, redundancy, independence and testing capability;
- I&C system is not vulnerable to common-cause failures;
- I&C of safety system meets the requirements of single-failure criteria.

Prior to making use of a new fuel bundle/fuel bundle string or fuel assembly design in the reactor, Bruce Power shall perform design verification activities, analyses and testing to demonstrate that design requirements are met. The length and complexities of those activities depend on the novelty of the design.

Bruce Power shall update and maintain the reactor core nuclear design information found in Bruce A and B Safety Reports, Part 2 (WN documents in section 4.1) and supporting design manuals. Core surveillance activities shall be implemented to ensure compliance with reactor core nuclear design and operation within the design envelope. Significant changes to core nuclear design would require prior notification of CNSC, per LC G.2. Changes outside the reactor core nuclear design basis that would impact the licensing basis would require prior written approval by the Commission, per LC G.1.

Modification to the design of existing safety-related structures and components shall include adequate consideration for human factors in accordance with CSA N290.12, HUMAN FACTORS IN DESIGN FOR NUCLEAR POWER PLANTS.

Bruce Power shall ensure configuration management is aligned with the design and safety analysis and incorporated into purchasing, construction, commissioning, operating and maintenance documentation. Conformance is to be maintained between design requirements, physical configuration and facility configuration information. Bruce Power shall establish a design authority function with the authority to review, verify, approve (or reject), document the design changes and maintain design configuration control.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1	2019
CNSC	Design of Reactor Facilities: Nuclear Power Plants	REGDOC-2.5.2	2014
CSA	General requirements for concrete containment structures for CANDU nuclear power plants	N287.1	2014
CSA	Material requirements for concrete containment structures for CANDU nuclear power plants	N287.2	2008
CSA	Design requirements for concrete containment structures for CANDU nuclear power plants	N287.3	2014
CSA	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants	N287.4	2009
CSA	Examination and testing requirements for Concrete Containment Structures for CANDU Nuclear Power Plants	N287.5	2011
CSA	Pre-operational proof and leakage rate testing requirements for concrete containment structures for CANDU nuclear power plants	N287.6	2011
CSA	General requirements for safety systems of nuclear power plants	N290.0	2011
CSA	Requirements for the shutdown systems of CANDU nuclear power plants	N290.1	2013
CSA	Requirements for emergency core cooling systems of nuclear power plants	N290.2	2011
CSA	Requirements for the containment system of nuclear power plants	N290.3	2016
CSA	Requirements for reactor control systems of nuclear power plants	N290.4	2011
CSA	Requirements for electrical power and instrument air systems of CANDU nuclear power plants	N290.5	2016
CSA	Requirements for monitoring and display of nuclear power plant safety functions in the event of an accident	N290.6	2009 (R2014)
US NRC	Unified Facilities Criteria – Structures to Resist the Effects of Accidental Explosions	UFC 3-340-02	2008

Since Bruce Power's design program spans many other programs and processes not included as a written notification document, a table or roadmap that identifies relevant design basis documents, design sub-programs and processes should be maintained by Bruce Power and made available to CNSC staff.

With regard to modifications, the design basis for the plant should be documented and maintained to reflect design changes to ensure adequate configuration management. The design basis should be maintained to reflect new information, operating experience, safety analyses, and resolution of safety issues or correction of deficiencies. The impacts of the design changes should be fully assessed, addressed and accurately reflected in the safety analyses prior to implementation.

The licensee should demonstrate survivability of the I&C systems and component that are critical to the management of BDBAs, and the availability of power supply to necessary equipment and associated I&C for BDBAs.

For proposed modifications to the design of existing safety-related structures and components, modern requirements, that are consistent with the current licensing basis of the plant, should be applied to the extent practicable.

The design program should minimize the potential for human error and promote safe and reliable system performance through the consideration of human factors in the design of facilities, systems, and equipment. Guidance for considering human factors in design programs is provided in CNSC regulatory document REGDOC-2.5.1, GENERAL DESIGN CONSIDERATIONS: HUMAN FACTORS.

5.2 Pressure Boundary Program

Licence Condition 5.2:

The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

Preamble:

This LC provides regulatory oversight with regards to the licensee's implementation of a pressure boundary program and holds the licensee responsible for all aspects of pressure boundary registration and inspections.

A pressure boundary program is comprised of the many programs, processes and procedures and associated controls that are required to ensure compliance with CSA standard N285.0, GENERAL REQUIREMENTS FOR PRESSURE RETAINING SYSTEMS AND COMPONENTS IN CANDU NUCLEAR POWER PLANTS which defines the technical requirements for the design, procurement, fabrication, installation, modification, repair, replacement, testing, examination and inspection of pressure-retaining and containment systems, including their components and supports.

This LC also ensures that an Authorized Inspection Agency (AIA) will be subcontracted directly by the licensee. An AIA is an organization recognized by the CNSC as authorized to register designs and procedures, and perform inspections and other functions and activities as defined by CSA N285.0 and its applicable referenced publications (e.g., CSA standard B51 and the NATIONAL BOARD INSPECTION CODE). The AIA is accredited by the American Society of Mechanical Engineers (ASME) as stipulated by NCA-5121 of the ASME Boiler and Pressure Vessel Code.

The licensee is also responsible for all aspects of pressure boundary registration and inspections.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Pressure Boundary Quality Assurance (PBQA) Manual	BP-QMAN-00002	No
Index to Pressure Boundary Program Elements (CSA N285.0-12 Table N.1)	B-LIST-01900-00001	No
System and Item Classification	DIV-ENG-00017	Yes
Design Registration and Reconciliation	DIV-ENG-00018	No

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce A and B: Authorized Inspection Agency Services Agreement for Bruce Power (May 1, 2020 - April 30, 2025), e-Docs # 6297491	BP-CORR-00531-00291	N/A
Authorized Inspection Agency Services Agreement for Bruce Power L. P., (January 1, 2015 - April 30, 2020), e-Docs # 4810289	NK21-CORR-00531-12247 NK29-CORR-00531-12671	N/A
Bruce A and Bruce B: Notification of Changes to the Authorized Inspection Agency Agreement, June 20, 2018, e-Docs # 5573071	NK21-CORR-00531-14395 NK29-CORR-00531-15087	N/A

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	General requirements for pressure-retaining systems and components in CANDU nuclear power plants	N285.0	2012 Update No. 1 (Sep. 2013) & Update No. 2 (Nov. 2014)	August 31, 2015

Note: Annex L is accepted to be used as a “Normative” Annex.

General

CSA standard N285.0 outlines the requirements for a pressure boundary program. Bruce Power shall maintain an index of the processes and procedures of the pressure boundary program (governing and implementing documents).

The licensee shall operate vessels, boilers, systems, piping, fittings, parts, components, and supports safely and keep them in a safe condition. Bruce Power shall:

- follow accepted work plans and procedures to test, maintain, or alter over-pressure protection devices;
- comply with operating limits specified in certificates, orders, designs, overpressure protection reports, and applicable codes and standards; and
- have any certified boiler or vessel that is in operation or use inspected and certified by an authorized inspector according to an accepted schedule.

Personnel conducting non-destructive examinations shall be certified in accordance with the edition of CAN/CGSB 48.9712/ISO 9712 currently adopted for use by the National Certification Body (NCB) of Natural Resources Canada for the appropriate examination method. If the NCB does not offer certification for a specific inspection method, the relevant alternate requirements of Clause 11.3 of CSA N285.0 shall apply to ensure that personnel are appropriately trained and qualified.

Bruce Power shall obtain acceptance from CNSC staff for use of ASME Code cases on a case-by-case basis with the exception of code cases in Annex K of CSA N285.0-17.

Classification, Registration and Reconciliation Procedures

Licensee procedures describing the classification, registration and reconciliation processes and the associated controls must form a part of the pressure boundary program. Bruce Power shall provide prior notification of any changes to these procedures.

Overpressure Protection Reports

Bruce Power shall provide written notification to CNSC staff, of new or revised overpressure protection reports after the final registration of the system.

Classification and Registration of Fire Protection Systems

Fire protection systems and associated fittings and components are to be classified at least as Code Class 6, designed to ASME B31.1 and registered, unless the exemption criteria noted below are met. The requirements of CSA standard N285.0 apply for components higher than Code Class 6.

The following fittings and components may be exempt from requiring a Canadian Registration Number provided they meet the following exemption criteria:

- fittings and components that are Underwriters Laboratory (UL) or Underwriters Laboratory of Canada (cUL/ULC) listed, or Factory Mutual (FM) approved as per accreditation by the Standards Council of Canada (SCC) and are suitable for the expected environmental conditions and maximum pressures; or
- pressurized cylinders and tubes, such as extinguishers, inert gas and foam tanks, which bear Transport Canada approvals, and are suitable for the expected environmental conditions and maximum pressures; or
- buried fire protection piping when in compliance with NFPA-24.

Buried fire protection piping may be exempt from the ASME testing requirements if testing is performed to NFPA-24.

Formal Agreement with an Authorized Inspection Agency

The licensee shall always have in place a formal agreement with an AIA to provide services for the pressure boundaries of the nuclear facilities as defined by CSA N285.0 and its applicable referenced publications.

Design registration services for pressure boundary shall be provided by an AIA legally entitled under the provincial boilers and pressure vessels acts and regulations to register designs. Registration of piping systems shall be done by the AIA, who is legally entitled to register designs in Ontario.

A copy of the signed agreement shall be provided to the CNSC. During the licence period, Bruce Power shall notify the CNSC in writing of any change to the terms and conditions of the agreement, including termination of the agreement. This correspondence shall be addressed to the Director of the Bruce Regulatory Program Division.

The licensee shall arrange for the AIA inspectors to have access to all areas of the facility and records, and to the facilities and records of the licensee's pressure boundary contractors and material organizations, as necessary for the purposes of performing inspections and other activities required by the standards. Inspectors of the AIA shall be provided with information, reasonably in advance with notice and time necessary to plan and perform inspections and other activities required by the standards.

For a variance or deviation from the requirements of CSA N285.0, except as noted below, the licensee must first submit the proposed resolution to the AIA for evaluation, and then to the CNSC for consent. The licensee must demonstrate that meeting the code requirement is impracticable and the proposed resolution will provide adequate safety. Per the agreement with the AIA, the evaluated resolution shall not be implemented without the prior written consent of CNSC staff. A variance or deviation related to Code Edition, Code Classification, and Legacy Registration issues may be submitted directly to the CNSC without prior AIA evaluation. General criteria for obtaining prior written consent/approval for a proposed resolution from the CNSC can be found in LC G.1 and LC G.2.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
ASME	Boiler and Pressure Vessel Code – Code Cases	N/A	2010 Edition with 2011 Addendum
ASME	Power Piping	B31.1	2010
ASME	Process Piping	B31.3	2010
ASME	Refrigeration Piping and Heat Transfer Components	B31.5	2010
CSA	Boiler, Pressure Vessel and Piping Code	B51	2014
CSA	General requirements for pressure-retaining systems and components in CANDU nuclear power plants	N285.0	2017

Note: Where these standards/codes or portions thereof are required for compliance with a governing standard referenced in the CVC of the LCH, compliance to the referenced standards/codes or portions thereof is required for compliance with the governing standard and the LC.

The AIA, and its authorized inspectors, should be familiar with and capable of applying the CSA N285.0 provisions to perform their activities as defined by the standard.

5.3 Equipment and Structure Qualification Program

Licence Condition 5.3:

The licensee shall implement and maintain an equipment and structure qualification program.

Preamble:

Environmental qualification (EQ) ensures that all required equipment in a nuclear facility is qualified to perform its safety functions if exposed to harsh environmental conditions resulting from credited Design-Basis Accidents (DBAs) and that this capability is preserved for the life of the plant.

Seismic qualification (SQ) ensures that all seismically credited safety-related SSCs in a nuclear power plant are designed, installed and maintained to perform their safety function during and/or after (as needed and pre-defined) a design basis earthquake or site design earthquake and also ensures an adequate margin against review level earthquakes.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Environmental Qualification Program Requirements	BP-STND-00126	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	General requirements for seismic design and qualification of CANDU nuclear power plants	N289.1	2008	October 1, 2018
CSA	Ground motion determination for seismic qualification of CANDU nuclear power plants	N289.2	2010	October 1, 2018
CSA	Design procedures for seismic qualification of CANDU nuclear power plants	N289.3	2010	October 1, 2018
CSA	Testing procedures for seismic qualification of nuclear power plant structures, systems, and components	N289.4	2012	October 1, 2018
CSA	Seismic instrumentation requirements for nuclear power plants and nuclear facilities	N289.5	2012	October 1, 2018
CSA	Environmental qualification of equipment for CANDU nuclear power plants	N290.13	2018	July 25, 2022

Any gaps identified with respect to N289.1-08, N289.2-10, N289.3-10, N289.4-12, and N289.5-12 are subject to the disposition and/or corrective actions described in the Bruce A and B Global Assessment Report and Integrated Implementation Plan. Specifically with respect to Clause 4.1.1.3 of N289.5-12, Bruce Power is not required to install an onsite seismic instrumentation system and Bruce Power complies with the intent of Clause 6.5.2(c) of N289.1-08 through offsite monitoring within 20 km of the Bruce site.

CSA standard N290.13, ENVIRONMENTAL QUALIFICATION OF EQUIPMENT FOR CANDU NUCLEAR POWER PLANTS outlines the requirements for an EQ program.

In addition to the criteria set out in CSA N290.13, Bruce Power's EQ program shall include a monitoring program consisting of condition monitoring and environmental monitoring, to measure degradation and failures of qualified equipment, including cables.

Guidance:

The processes and procedures related to the EQ program should meet the requirements of recognized industrial standards.

6 SCA – FITNESS FOR SERVICE

6.1 Fitness for Service Program

Licence Condition 6.1:

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

Preamble:

A fitness for service program includes the following elements:

- Maintenance program defining the policies, processes and procedures that provide direction for maintaining structures, systems and components (SSCs) of the plant;
- An effective control of plant chemistry to ensure critical plant equipment performs safely and reliably;
- aging management activities to ensure the availability of required safety functions of SSCs;
- periodic and in-service inspection programs to ensure that pressure-boundary components, containment structures and components, continue to meet their design requirements;
- in-service inspection of balance of plant to ensure safety significant pressure retaining systems, components and safety-related structures are monitored for degradation; and
- proper reliability program and implementation to ensure that SSCs important to safety continue to meet their performance requirements.

Compliance Verification Criteria:

<table>
<tr><th colspan="4">Licensee Documents that Require Notification of Change</th></tr>
<tr><th colspan="2">Document Title</th><th>Document #</th><th>Prior Notification</th></tr>
<tr><td colspan="2">Plant Maintenance</td><td>BP-PROG-11.04</td><td>No</td></tr>
<tr><td colspan="2">Equipment Reliability</td><td>BP-PROG-11.01</td><td>No</td></tr>
<tr><td rowspan="5">N287.7</td><td>CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)</td><td>NK21-PIP-21100-00001</td><td>Yes</td></tr>
<tr><td>CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Vacuum Building</td><td>NK21-PIP-25100-00001</td><td>Yes</td></tr>
<tr><td>CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)</td><td>NK29-PIP-21100-00001</td><td>Yes</td></tr>
<tr><td>CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Vacuum Building</td><td>NK29-PIP-25100-00001</td><td>Yes</td></tr>
<tr><td>Visual Inspection of Containment Boundary Components</td><td>BP-PROC-00815</td><td>Yes</td></tr>
</table>

Licensee Documents that Require Notification of Change			
Document Title		Document #	Prior Notification
N285.4	Bruce A Periodic Inspection Plan Units 1, 2, 3 and 4	NK21-PIP-03641.2-00001	Yes
	Bruce B Periodic Inspection Plan Units 5, 6, 7 and 8	NK29-PIP-03641.2-00001	Yes
	Bruce Nuclear Generating Station Fuel Channel Periodic Inspection Program	B-PIP-31100-00002	Yes
N285.5	Bruce A NGS N285.5 Periodic Inspection Plan for Unit 0 and Units 1 to 4 Containment Components	NK21-PIP-03642-00001	Yes
	Bruce B Periodic Inspection Plan for Unit 0 and Units 5 to 8 Containment Components	NK29-PIP-03642-00001	Yes
Life Cycle Management Plan for Safety Related Civil Structures		B-LCM-20000-00001	Yes
Fuel Channel Life Cycle Management Plan		B-LCM-31100-00001	Yes
Steam Generator and Preheater Periodic Inspection Plan		B-PIP-33110-00001	Yes
PHT Feeder Piping Periodic Inspection Plan		B-PIP-33126-00001	Yes
On-Line Work Management Program		BP-PROG-11.02	No
Outage Work Management		BP-PROG-11.03	No
Chemistry Management		BP-PROG-12.02	No
Evaluation Process of Pressure Tube Fitness-for-Service Using CSA N285.8		B-REP-31100-00010	Yes

Licensee Documents		
Document Title	Document #	Prior Notification
Systems Important to Safety List, e-Docs # 6028118[1]	B-REP-09034-00002	N/A

1. The Systems Important to Safety List, B-REP-09034-00002, was revised based on S-294, Probabilistic Safety Assessment compliant models on June 1, 2018.

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Reliability Programs for Nuclear Power Plants	REGDOC-2.6.1	2017	Oct. 1, 2018
CNSC	Maintenance Programs for Nuclear Power Plants	REGDOC-2.6.2	2017	Oct. 1, 2018
CNSC	Aging Management	REGDOC-2.6.3	2014	Dec. 31, 2016

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Periodic inspection of CANDU nuclear power plant components (see Note)	N285.4	2014	Aug. 17, 2020
CSA	Periodic inspection of CANDU nuclear power plant containment components	N285.5	2018	Jan. 1, 2023
CSA	Periodic inspection of CANDU nuclear power plant balance of plant systems and components	N285.7	2015	Program documents to be submitted for CNSC staff acceptance by Oct. 1, 2028
CSA	Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors	N285.8	2021	Feb. 3, 2023 [1]
CSA	In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants	N287.7	2008	Jun. 1, 2015
CSA	Requirements for safety-related structures for nuclear power plants	N291	2015	Oct. 1, 2018

References:
[1] CNSC letter, M. Hornof to M. Burton, "Bruce NGS A and B: Compliance Plan to CSA N285.8", February 3, 2023, e-Doc 6962455.

CSA N291-15, Requirements For Safety-related Structures for Nuclear Power Plants

Any gaps identified with respect to N291-15 are subject to the disposition and/or corrective actions described in the Bruce A and B Global Assessment Report and Integrated Implementation Plan. Specifically, with respect to Clause 4.3(f), Ontario Power Generation (not Bruce Power) is responsible for decommissioning.

Reliability of Systems Important to Safety

REGDOC-2.6.1, Reliability Program for Nuclear Power Plants outlines the requirements for a reliability program. This document has replaced RD/GD-98 in the regulatory framework in 2017.

Given that REGDOC-2.6.1 has no material changes to it, where RD/GD-98 is referenced in Bruce Power governing documents, it shall be taken to mean REGDOC-2.6.1. Bruce Power will update the references in their governance on the regular document review cycle.

Maintenance

A NPP maintenance program consists of policies, processes and procedures that provide direction for maintaining SSCs of the plant. The intent of a maintenance program is to ensure that the SSCs remain capable of performing their function as described in the safety analysis. A maintenance program uses organized activities, both administrative and technical, to keep SSCs in good operating condition, and to ensure that they function as per design.

CNSC regulatory document REGDOC-2.6.2, MAINTENANCE PROGRAMS FOR NUCLEAR POWER PLANTS outlines the requirements for a maintenance program. This document has replaced RD/GD-210 in the regulatory framework in 2017.

Given that REGDOC-2.6.2 has no material changes to it, where RD/GD-210 is referenced in Bruce Power governing documents, it shall be taken to mean REGDOC-2.6.2. Bruce Power will update the references in their governance on the regular document review cycle.

Management of Planned Outages

The maintenance program shall include provisions for the management of planned outages. Bruce Power's program related to management of planned outages is documented in the licensee's procedure BP-PROC-00342, "Planned Outage Management".

Accordingly, Bruce Power shall make outage-related information (including Levels 1 and 2 Outage Plans, detailing all major work on safety related SSCs to be carried out during the planned outage) available to CNSC staff. Levels 1 and 2 outage plans are defined in Appendix A – Acronyms and Definitions.

Planned outages represent a key activity that has a high regulatory significance. Therefore, a review is required to ensure proper scoping (of safety-related commitments), planning and execution of the commitments (e.g., for heat sinks, dose control, etc.).

Chemistry Control

The chemistry control program shall specify processes, specifications, overall requirements, parameter monitoring, data trending and evaluation to ensure effective control of plant chemistry during operational and lay-up conditions. Bruce Power shall maintain the implementing documents referenced in their chemistry management program that describe the design basis for chemistry control.

Aging Management

CNSC regulatory document REGDOC-2.6.3, AGING MANAGEMENT outlines the requirements related to aging management. SSC-specific aging management programs (also, in some cases, referred to as Life Cycle Management Plans (LCMPs)), shall be implemented in accordance with the overall integrated aging management program framework, and address the attributes of an effective aging management program as listed in REGDOC-2.6.3. The SSC-specific aging management programs (AMPs) or LCMPs are to include structured, forward looking inspection and maintenance schedules, requirements to monitor and trend aging effects, and any preventative actions necessary to minimize and control aging degradation of the SSCs.

Pressure Tube Fracture Toughness Models

Bruce Power submits evaluations for fuel channel components to support safe operation and satisfy compliance verification criteria in CSA N285.4-14 and CSA N285.8-21. These pressure tube core assessments for flaws rely on the fracture toughness models for axial through-wall flaws to assess risk of pressure tube failure from postulated flaws in uninspected pressure tubes. The fracture toughness is impacted by aging effects, most notably the increase in hydrogen equivalent concentration (Heq) and is the subject of ongoing research.

The Revision 2 fracture toughness model has been accepted for use subject to the conditions established in [1].

Bruce Power shall report, on a semi-annual basis, the following:

- status updates on the validation of the fracture toughness model
- updates to the fracture toughness test plan, which includes:
    - status of findings and outcomes from fracture toughness tests
    - additions and changes to the test plan i.e., schedule of fracture toughness tests
    - changes to the test strategy
    - results of fracture toughness tests including, as a minimum, material tested, test conditions, the results with comparisons to model predictions, whether the test objective has been met, and the tests planned for the next six months

Bruce Power shall submit an impact assessment for CSA N285.8-21 Clause 7 evaluations using fracture toughness as an input parameter, whenever a fracture toughness test result challenges the model's lower prediction bound.

Since the fracture toughness model requires further development, Bruce Power shall report the following information for each of the probabilistic pressure tube evaluations [2]:

a) For PCAs, the five tubes with the highest estimated number of through wall cracks and the five tubes with the highest estimated number of ruptures.
b) For Probabilistic Leak-Before-Break evaluations, the five tubes with the highest estimated conditional probability of Break Before Leak (BBL).
c) For Probabilistic Fracture Protection (PFP) evaluations, the five tubes with the highest estimated number of ruptures for each Service Level.

Along with this information, Bruce Power shall identify which of those pressure tubes have undergone full-length volumetric inspection. The disposition of inspection findings from higher risk tubes will further support the conclusions of the probabilistic evaluations.

References:

[1] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B: CNSC review of the revision 2 engineering fracture toughness model for pressure tubes", May 12, 2022, BP-CORR-00531-02808, e-Docs # 6795110.

[2] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B: CNSC Observations Regarding Revision 1 of the Cohesive Zone Model for Pressure Tube Fracture Toughness – New Action Item 2021-07-23141", June 3, 2021, BP-CORR-00531-01727, e-Docs # 6576383.

Operation of Fuel Channels Beyond the Specified Limits of Validity of Fitness for Service Evaluation Models

Bruce Power shall obtain approval from the Commission to operate any pressure tube beyond the established limits of validity of the fitness for service evaluation models specified in the CVC for LC 6.1. An approval request shall be accompanied by an evaluation of the impact of the exceedance of the validity limit on the safe operation of the reactor addressing the potential impact on the five Levels of Defence-in-Depth described in REGDOC-2.4.1.

For specific compliance verification criteria related to the operation of pressure tubes beyond 210,000 Effective Full Power Hour (EFPH) with the potential elevated hydrogen equivalent near the inlet and outlet rolled joint burnish marks, refer to Section 6.2.

Periodic Inspection and Testing

The purpose of a periodic inspection program (PIP) or an in-service inspection (ISI) program is to provide assurance that the likelihood of a failure that could endanger the environment and/or radiological health and safety of persons has not increased significantly since the plant was put into service. Periodic inspection and in-service inspection requirements include:

- General Nuclear Pressure Boundaries (CSA N285.4)
- Fuel Channel Pressure Tubes (CSA N285.4)
- Fuel Channel Feeder Pipes (CSA N285.4)
- Steam Generator Tubes (CSA N285.4)
- Containment Components (CSA N285.5)
- Concrete Containment Structures (CSA N287.7)
- Safety-related Structures (CSA N291)
- Balance of Plant Systems and Components

Periodic and in-service inspection programs are established to confirm that pressure-boundary components; containment structures and components, continue to meet their design requirements. The condition of safety significant balance of plant pressure retaining systems and components, as well as safety-related structures are monitored for degradation through in-service inspection programs.

Bruce Power shall carry out periodic inspections in accordance with CNSC-accepted PIP documents. If a deviation from the accepted PIP program is anticipated during inspection planning activities, Bruce Power shall obtain CNSC acceptance prior to conducting the affected inspection. However, for any findings, discoveries or deviations from the accepted PIP that are identified during an inspection, Bruce Power shall inform the CNSC and provide justification in the corresponding inspection report submission based on OPEX and Best Industry Practices. For permanently required exemptions to the requirements of CSA PIP standards, the licensee shall document these exemptions in a revised PIP document and submit to the CNSC for acceptance.

Periodic Inspection

CSA standards N285.4, PERIODIC INSPECTION OF CANDU NUCLEAR POWER PLANT COMPONENTS and N285.5, PERIODIC INSPECTION OF CANDU NUCLEAR POWER PLANT CONTAINMENT COMPONENTS outline the requirements related to periodic inspections for nuclear pressure retaining and containment systems and components. CSA standard N287.7, IN-SERVICE EXAMINATION AND TESTING REQUIREMENTS FOR CONCRETE CONTAINMENT STRUCTURES FOR CANDU NUCLEAR POWER PLANTS outlines the requirements for in-service examination and testing.

When the hydrogen equivalent concentration at a point along the length of a pressure tube is measured or predicted to exceed the limits specified in Clause 8.2(a) of CSA N285.8-21 during the evaluation period, the periodic inspection program shall include a selection of pressure tubes with the highest expected Heq and highest potential for crack initiation due to service induced flaws for volumetric examination and hydrogen measurement. Inspection of the selected tubes should include locations where Heq has exceeded or is expected to exceed the specified limits during the evaluation period. The justification for the selection of tubes and the scope and schedule of the inspections shall be submitted to CNSC staff for acceptance.

When PIP requirements are addressed exclusively within an aging management or LCMP document, only those elements of the document which directly address the PIP requirements of the governing CSA standard require acceptance from CNSC staff prior to implementation.

As indicated in the Bruce Design Manuals, the fuel channels were designed to meet the intent of Section III of ASME Boiler and Pressure Vessel Code. As a planning assumption, the fuel channels were designed and assembled to satisfy function and economic life requirements for at least the equivalent of 210,000 hours of full power operation (i.e., 30 years at a capacity factor of 80%). Demonstration that fuel channels continue to meet the intent of Section III of ASME Boiler and Pressure Vessel Code is part of the design basis, which in turn is part of the licensing basis. For operation beyond 210,000 EFPH, the licensee shall provide evidence to demonstrate that the predicted condition of pressure tubes continues to be sufficient to support safe operation.

In 2017, Bruce Power requested in its licence renewal application operation of Bruce NGS A and B up to 300,000 EFPH. As a result of the 2018 licence renewal hearing proceedings, the Commission authorized operation of Bruce NGS A and B up to a maximum of 300,000 EFPH as stated in the CNSC's *Record of Decision*, in the matter of "Bruce Power Inc.: Application to Renew the Power Reactor Operating Licence for Bruce A and Bruce B Nuclear Generating Stations", September 27, 2018. Operation of Bruce NGS A and B beyond 300,000 EFPH is not permitted unless approved by the Commission in accordance with LC G.1.

With respect to CSA N285.4 Clause 12.2.5.1.3, CNSC staff have reviewed and accepted in [1] Bruce Power's 2021 Compliance Plan submitted in [2] for the use of CSA N285.8-21 to evaluate inspection results. Bruce Power shall use the updated failure frequency for Probabilistic Core Assessments for flaws and Probabilistic Pressure Tube to Calandria Tube (PT-CT) core assessments. Furthermore, Bruce Power is expected to address the conditions in [3] concerning:

- Updates to PT-CT contact assessments when new Heq data is available
- Increases to the PT-CT contact/blister susceptibility assessment operating limit from two to three hot years

With respect to CSA N285.8 Clause C.3.3.4, CNSC staff restricted the use of the combined failure frequency approach for pressure tube core assessments [3, 4] in January 2020.

References:

[1] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B Compliance Plan to CSA N285.8", May 29, 2020, BP-CORR-00531-00607, e-Doc 6307648.
[2] Bruce Power letter, M. Burton to M. Hornof, "Bruce A and B: Compliance Plan to CSA N285.8", November 22, 2022, BP-CORR-00531-03438, e-Doc 6925055.
[3] CNSC letter, M. Hornof to M. Burton, "Bruce NGS A and B Compliance Plan to CNSC N285.8", February 3, 2023, e-Doc 6962455.
[4] CNSC letter, L. Sigouin to M. Burton, "Bruce A Unit 3: Component Disposition of Pressure Tube to Calandria Tube Contact", January 31, 2020, BP-CORR-00531-00233, e-Doc 6105457.

Selection Criteria for Pressure Tube Inspection

In reference to inspected pressure tubes, and to resolve probabilistic core assessment flaw removal assumptions, Bruce Power is to provide evidence that a sample of the pressure tubes with the highest cumulative probability of developing through-wall cracking determined from probabilistic core assessments is included in their pressure tube volumetric inspection program [1]. To validate probabilistic core assessment predictions, Bruce Power is to include consideration for higher risk tubes from the probabilistic core assessments in the selection criteria for fuel channel inspection campaigns.

Reference:

[1] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B: Technical Basis for Safety Factors on Pressure for Probabilistic Fracture Protection Evaluation and Guidelines for Validating Probabilistic Computer Codes for Pressure Tube Integrity Evaluation", January 28, 2021, BP-CORR-00531-01338, e-Docs # 6475465.

PT Flaw Assessments (hydrided region overload)

With respect to CSA N285.8-21 Clause 5.4.3.1 (g), regarding the evaluation of the initiation of delayed hydride cracking of detected flaws during Service Level B transients due to fracture of hydrided region, Bruce Power has submitted a short term and long term plan. Bruce Power submitted the most recent Hydride Region Overload semi-annual R&D Update [1] which was assessed and found acceptable by CNSC staff.

Reference:

[1] Bruce Power letter, M. Burton to L. Sigouin, "Bruce A and B: Hydride Region Overload Semi-Annual Research and Development Update", March 1, 2021, BP-CORR-00531-01301, e-Docs # 6502390.

Feeders

With respect to CSA N285.4 Clause 8.2.1(d) and Clause 13.2.5.1.3, CNSC staff have accepted Bruce Power's request to use COG report COG-JP-4107-V06-R03, "Fitness-for-Service Guidelines for Feeders in CANDU Reactors" [1, 2, 3].

References:

[1] Bruce Power letter, F. Saunders to R. Lojk, "Bruce A and Bruce B: Request for Use of Feeder Fitness-for-Service Guidelines COG-JP-4107-V06 Rev 03", December 6, 2012, NK21-CORR-00531-09887 | NK29-CORR-00531-10343, e-Docs # 4050031.
[2] CNSC letter, R. Lojk to F. Saunders, "Bruce A and Bruce B: Request for Use of Feeder Fitness-for-Service Guidelines COG-JP-4107-V06 Rev.03", March 11, 2013, NK21-CORR-00531-10334/NK29-CORR-00531-10740, e-Docs # 4103896.
[3] COG Report, "COG-JP-4107-V06-R03, Fitness-for-Service Guidelines for Feeders in CANDU Reactors", March 2012, e-Docs # 3922170.

Steam Generators

With respect to CSA N285.4 Clause 14.2.5.1.3, CNSC staff have accepted the use of Bruce Power Procedure B-REP-33110-00001 R00, "Fitness-for-Service Guidelines for Steam Generators and Preheaters Tubes in CANDU Nuclear Power Plants" [1, 2].

References:

[1] Bruce Power letter, F. Saunders to K. Lafrenière, "Bruce A and B: Steam Generator and Preheater Aging Management Program", May 4, 2017, NK21-CORR-00531-13475 | NK29-CORR-00531-14052, e-Docs # 5245670.
[2] CNSC letter, K. Lafrenière to F. Saunders, "Bruce NGS A and B: Steam Generator and Preheater Aging Management Program", December 14, 2017, NK21-CORR-00531-14079/NK29-CORR-00531-14763, e-Docs # 5414771.

Inspection Personnel

Personnel conducting non-destructive examinations shall be certified in accordance with the edition of CAN/CGSB 48.9712/ISO 9712 currently adopted for use by the National Certification Body (NCB) of Natural Resources Canada for the appropriate examination method. For Steam Generator tube inspection, the use of personnel certified according to ASNT CP-189 for eddy current inspections is permitted provided they have received additional training, evaluation and qualification, in accordance with [1]. The final review and reporting of all significant indications is provided by CGSB certified personnel. Otherwise, if the NCB does not offer certification for a specific inspection method, the relevant alternate requirements of Clause 5 of CSA N285.4 or Clause 6 of CSA N285.5 shall apply to ensure that personnel are appropriately trained and qualified.

Reference:

[1] CNSC letter from J.D. Harvie to G.C. Andognini, "Use of ASNT Certified Eddy Current Inspection Personnel for OHN Steam Generator Inspections", February 12, 1999, N-CORR-00531-00263, e-Docs #s 404126.

Fuel channel annulus spacer surveillance

For the purposes of Clause 12.5 of CSA N285.4-14, Bruce Power is not required to remove fuel channels for specific purposes of fuel channel annulus space surveillance. Bruce Power shall recover spacers for material surveillance anytime a single fuel channel is replaced for pressure tube material surveillance in accordance with Clause 12.4 of CSA N285.4-14. If fuel channels are replaced for any other reason, Bruce Power should make reasonable effort to recover spacers for material surveillance.

Inspection of Balance of Plant

Bruce Power shall have adequate knowledge of the current state of balance-of-plant (BOP) pressure retaining systems, components and safety-related structures to ensure that they are capable of operating within their design intent and perform required safety functions if called upon. Bruce Power shall implement and maintain inspection program(s) and LCMPs for these systems in keeping with industry best practices.

Specifically, Bruce Power shall develop:

- an inspection program and LCMPs for safety-significant BOP pressure retaining systems and components; and
- an inspection program and LCMPs for BOP safety-related structures.

Implementation plan for CSA N285.7

CNSC staff accepted Bruce Power's March 28, 2019 Implementation Plan [1] for CSA standard N285.7, PERIODIC INSPECTION OF CANDU NUCLEAR POWER PLANT BALANCE OF PLANT SYSTEMS AND COMPONENTS. This standard will become effective on October 1, 2028. The next status update on the implementation plan will be submitted by March 31, 2022. As previously committed to in [1], Bruce Power submitted an update on the N285.7-15 implementation plan on March 14, 2022. The next status update on the implementation plan will be submitted by March 31, 2025. [2]

References:

[1] Bruce Power letter, M. Burton to L. Sigouin, "Bruce A and Bruce B: Implementation Plan Update for Incorporating CSA N285.7-15 into the Licensing Basis", March 28, 2019, NK21-CORR-00531-14905/NK29-CORR-00531-15649, e-Docs # 5868019.

[2] Bruce Power letter, M. Burton to L. Sigouin, "Bruce A and Bruce B: Implementation Plan for CSA N285.7-15," March 14, 2022, BP-CORR-00531-02439, e-Docs # 6755302.

Implementation of CSA N285.8-21, Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors

Probabilistic Fracture Protection (PFP) evaluations completed for pressure tubes in accordance with CSA N285.8 Clause 4.3.2.2 shall use the acceptance criteria and evaluation process documented in [1].

Reference:

[1] Bruce Power letter, M. Burton to M. Hornof, "Bruce A and B: Supplementary work to support application of the Probabilistic Fracture Protection Methodology and Response to CNSC Review of the Acceptance Criteria for Probabilistic Fracture Protection Evaluations, Action Item 2022-07-26513", August 17, 2023, BP-CORR-00531-04243, e-Docs # 7109112.

Station Containment Outage and Vacuum Building Outage

Vacuum Building (VB)

Station	Previous VB Outage	Next VB Outage	Extension Approval
Bruce A	May 2022	May 2034	N/A
Bruce B	May 2024	May 2036	N/A

VB Positive Pressure Test

Under the licensee's periodic inspection program for CSA N287.7, Bruce Power shall either:
1. carry out a test to measure the leakage rate at full design pressure of the Vacuum Building (VB) and inspect the VB concrete structure and components once every twelve (12) years; or
2. develop and carry out the test in accordance with a CNSC-accepted performance-based methodology.

Bruce Power submitted an industry performance-based methodology, developed by Bruce Power and Ontario Power Generation, in July 2010 [1]. CNSC staff reviewed and subsequently accepted the proposed methodology [2].

Station	Previous VB Positive Pressure Test	Next VB Positive Pressure Test	Extension Approval
Bruce A	August 2002	May 2034	[3]
Bruce B	April 2015	May 2036	[4]

Station Containment (SC)

In accordance with CSA N287.7, Bruce Power is to carry out a test to measure the leakage rate at full design pressure of station containment and inspect the associated concrete structures and components once every six (6) years.

Station	Previous SC Outage	Next SC Outage	Extension Approval
Bruce A	May 2022	May 2028	N/A
Bruce B	May 2024	May 2030	N/A

References:

[1] Attachment 2 of Bruce Power letter, F. Saunders to K. Lafrenière, "Action Item 090708: Testing and Inspection for Bruce A 2009 Station Containment Outage", NK21-CORR-00531-07994/NK29-CORR-00531-08849", July 13, 2010, e-Doc 3578173.
[2] CNSC letter, R. Lojk to F. Saunders, "Action Item 090708: Testing and Inspection for Bruce A 2009 Station Containment Outage", April 13, 2012, NK21-CORR-00531-09426, e-Doc 3916294.
[3] CNSC letter, L. Sigouin to M. Burton, "Bruce A: Performance-Based Vacuum Building Positive Pressure Leakage Rate Test Interval", January 24, 2022, e-Doc 6721410.
[4] CNSC letter, M. Hornof to M. Burton, "Bruce B: Performance-Based Vacuum Building Positive Pressure Leakage Rate Test and Dousing Test Extension", August 16, 2023, e-Doc 7107920.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Aging management for concrete containment structures for nuclear power plants	N287.8	2015
CSA	Reliability and maintenance programs for nuclear power plants	N290.9	2019
COG	Interim Implementation Guidelines for CANDU Nuclear Plant Reliability Programs	COG-05-9011	2006
COG	Fuel Channel Life Management – Third Party Review of Probabilistic Fracture Protection Evaluation Methodology Acceptance Criteria	COG-JP-4491-V197	2017

Reliability of Systems Important to Safety

The licensee should consider CSA N290.9, *Reliability and maintenance programs for nuclear power plants* for guidance when updating B-REP-09034-00002, "Systems Important to Safety List" or when issuing a subsequent report.

Outage Management

The outage program should have designated criteria that the licensee will follow to confirm that planned and discovery work has been satisfactorily completed during the planned outage, and that all safety-significant SSCs are available to ensure the continued safe operation of the facilities.

CNSC staff located at licensees' site offices should be invited to the restart meetings in order to verify that all appropriate sign-offs for restart of the reactor have occurred.

Aging Management

Bruce Power should maintain a roadmap outlining the programs and procedures that ensure a well-documented overall integrated aging management framework exists.

The licensee should have an adequate knowledge of the current state of the SSCs and should document the knowledge in the SSC-specific AMP or LCMPs. The AMPs and/or LCMPs may include in-service inspections and preventative actions to minimize and limit the effects of aging on the operational reliability and the fitness for service of the SSCs and to effectively manage and maintain the SSCs to meet its intended design function until the end of life.

Whenever a revision to the AMP, SSC-specific AMP or LCMP is submitted to CNSC for review, the licensee should identify whether the revision(s), affects the previously planned inspection and maintenance activities, with supporting technical basis for the change.

The quantitative assessment of uncertainties in Revision 1 of the Cohesive Zone Model should utilize the approach in sections A.1, A.2 and A.5 of Appendix A to COG-JP-4491-V197, "Fuel Channel Life Management: Third Party Review of Probabilistic Fracture Protection Evaluation Methodology and Acceptance Criteria".

Periodic Inspection and Testing

To satisfy the compliance verification criteria for the inclusion of high Heq pressure tubes in the periodic inspection program it may be necessary to increase the number of pressure tubes selected for inspection in the current periodic inspection program accepted by CNSC staff. Any substitutions of high Heq tubes for tubes previously selected for inspection during the periodic inspection interval will require technical justification. The inclusion of volumetric inspections for high Heq tubes in the periodic inspection program will not preclude the requirement to disposition the results of Heq measurements in accordance with the requirements of Clause 12.3.5 of CSA N285.4.

Inspection Programs for Balance of Plant

The licensee may document the inspection requirements for the safety-significant BOP pressure-retaining components and safety-related structures within AMPs or LCMPs, linking inspection requirements to potential degradation mechanisms of concern. For SSCs that do not have AMPs or LCMPs the licensee may develop SSC specific or degradation mechanism specific inspection programs. The licensee should apply a systematic and integrated approach to establish, implement and improve programs in keeping with industry best practices until full implementation of CSA N285.7 and CSA N291 programs is achieved.

6.2 Fitness for Service Program for Fuel Channels in Extended Operation

Licence Condition 6.2:

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

Preamble:

The fitness for service program requirements in Section 6.1 have been demonstrated to be effective for operation of pressure tubes for the original target operating life of 210,000 EFPH. However, many of the model and evaluation processes used to assess pressure tube fitness for service in CSA Standard N285.8 require further development for levels of Heq that may be experienced when extending the operation of pressure tubes beyond 210,000 EFPH.

Heq is a key input parameter to the models used to assess crack initiation, crack growth, fracture toughness and fracture initiation toughness. Recent operational experience has indicated that the Heq in regions of the pressure tube near the inlet and outlet rolled joints (referred to as regions of interest or ROIs) in some Bruce Power pressure tubes in extended operation have exceeded the values that were estimated prior to 2021 for the end-of-life conditions. Furthermore, the validity of the existing crack initiation, crack growth and fracture toughness models requires confirmation for the Heq levels in the regions of interest. Bruce Power has undertaken a R&D program to extend the Heq limits for the models used to demonstrate pressure tube fitness for service.

The enhanced fitness for service program incorporates alternate criteria to evaluate the impact of pressure tube aging on safe operation, modified reporting criteria and focused R&D activities to expand pressure tube fitness for service models to higher Heq limits.

Compliance Verification Criteria:

Applicable Heq Limits

The limits of applicability for Heq for the relevant fitness for service models addressed by this licence condition are:

- Fracture toughness: 100 ppm within 1.5 meters of the front end of a pressure tube and 140 ppm for the remainder of the length of the tube
- Delayed hydride cracking, hydrided region overload and fatigue crack initiation models: 120 ppm
- Delayed hydride cracking growth rate models: 120 ppm
- Fracture initiation toughness: 120 ppm

For regions of pressure tubes with Heq levels below these values, the CVC in Section 6.1 shall apply for fitness for service evaluations. The CVC in this section apply on an interim basis for the ROIs where these Heq values may be exceeded.

Based upon available information, the ROIs adopted for the interim evaluations of safe operability of pressure tubes are defined 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.

The definitions of the regions of interest may be modified as supported by results of the R&D program, subject to confirmation by CNSC staff. To modify the definitions, conservative bounds of the regions interest shall be established for the expected end of operational life of pressure tubes, accounting for the sensitivity of the defined regions to the influential parameters identified under the R&D program.

Research and Development Program

The licensee shall implement the R&D program described in [1] subject to the conditions in [2]. Progress report on the R&D program including modifications to the scope and schedule of the R&D program shall be submitted to CNSC staff on a semi-annual basis.

Interim Approach for Assessments of the Safe Operation of Pressure Tubes

In the progress reports for the R&D program, Bruce Power shall confirm that Levels 3 and 4 Defence-in-Depth (DiD) continue to be maintained. This confirmation should be supported by qualitative arguments that demonstrate the robustness of the systems required to mitigate the consequences of pressure tube failures.

For the OROI, Bruce Power shall continue to demonstrate a low likelihood of the existence of flaws that would lead to crack initiation in the inspection reports submitted in accordance with Clause 12.2.6 of CSA Standard N285.4-14.

These interim approaches to assess the safe operability of pressure tubes expire on December 31, 2025. By that time, it is expected that Bruce Power will return to the use of the CVC established in Section 6.1 based on the results of the R&D program specified in [1].

References:

[1] Bruce Power letter, M. Burton to A. Viktorov and D. Saumure, “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, e-Docs # 6844485.

[2] CNSC letter, M. Burton to M. Hornof, “Bruce NGS A and B: Detailed Plan to further Evaluate the Effect of Elevated Hydrogen Equivalent Concentration on Pressure Tube Fitness for Service – New Action Item 2023-07-27173”, March 10, 2023, BP-CORR-00531-03929, e-Docs # 6959554.

Guidance:

Not applicable to this LC.

7 SCA – RADIATION PROTECTION

7.1 Radiation Protection Program and Action Levels

Licence Condition 7.1:

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

Preamble:

The *Radiation Protection Regulations* require that the licensee implement a radiation protection program and also ascertain and record doses for each person who perform any duties in connection with any activity that is authorized by the NSCA or is present at a place where that activity is carried on. This program must ensure that doses to workers do not exceed prescribed dose limits and are kept As Low As Reasonably Achievable (the ALARA principle), social and economic factors being taken into account. Also, the program shall ensure that occupational exposures are ascertained and recorded in accordance with the *Radiation Protection Regulations* through the establishment of dosimetry requirements.

Note that the regulatory dose limits to workers and the general public are explicitly provided in the *Radiation Protection Regulations*.

Action Levels (Als) relate to the parameters of dose to workers and surface contamination levels. Als are designed to alert licensees before regulatory dose limits are reached. By definition, if an AL referred to in a licence is reached, a loss of control of some part of the associated radiation protection program may have occurred, and specific action is required, as defined in the *Radiation Protection Regulations* and the licence. Als are not intended to be static and are to reflect operating conditions in the station.

Administrative Dose Limits (ADLs) are the licensee's internal dose limits designed to ensure individuals do not exceed regulatory dose limits. ADLs that are exceeded without prior approval from the designated licensee authority are reported as AL exceedances in accordance with the *Radiation Protection Regulations*.

The *Radiation Protection Regulations* specify the requirements related to Als and indicate that the licence will be used to identify their notification timeframes. For this licence, the Als are provided in the CVC below.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Radiation Protection Program	BP-PROG-12.05*	Yes
ALARA Program	BP-RPP-00044	No
Dosimetry Requirements	BP-PROC-00280	Yes
Dose Limits and Exposure Control	BP-RPP-00009	Yes

* As this document provides the roles and responsibilities for an authorized health physicist, a designated position, as stated in section 2.4, any change to the roles and responsibilities of the authorized health physicist will be reviewed by CNSC staff to confirm they remain within the licensing basis, in consultation with the designated officer to certify and decertify workers referred to in sections 9 and 12 of the *Class I Nuclear Facilities Regulations* and the Director of the Personnel Certification Division.

The current ALs and ADLs for Bruce A and B (including the Central Storage Facility (CSF) and Central Maintenance Facility (CMF) are summarized in the tables below for convenience.

The Als shown in table 7.1 are taken from the "Actions Levels" appendix of Bruce Power's document "Radiation Protection Program":

Table 7.1: Bruce Power Action Levels					
Description	Bruce A and B	CSF	CMLF and Class II Nuclear Facility	Nuclear Substances and Radiation Devices	Notes
Unplanned External Exposure	2 mSv (200 mrem) or more above planned dose	0.5 mSv (50 mrem) or more above planned dose	250μSv (25 mrem) or more above planned dose	2 mSv (200 mrem) or more above planned dose	Unplanned external exposure is per shift and above the value of the Dose Control Device back-out level. For an individual that is not working on a Radiation Exposure Permit (i.e., a back-out limit has not been established), the back-out level is considered to be 0 millisievert (0 millirem).
Unplanned Internal Exposure – Tritium	Unplanned committed effective dose* of 2 mSv	Unplanned committed effective dose* of 0.5 mSv	N/A	N/A	Unplanned internal exposure from Tritium is per shift and above the planned tritium dose level. For an individual that is not working on a Radiation Exposure Permit, the planned

Table 7.1: Bruce Power Action Levels

Description	Bruce A and B	CSF	CMLF and Class II Nuclear Facility	Nuclear Substances and Radiation Devices	Notes
	(200 mrem) or more	(50 mrem) or more			dose level is considered to be 0 millisievert (0 millirem).
Unplanned Internal Exposure – Non-Tritium	Unplanned committed effective dose* of 2 mSv (200 mrem) or more	Unplanned committed effective dose* of 0.5 mSv (50 mrem) or more	N/A	N/A	Internal exposure – Non-Tritium encompasses all other nuclear substances (e.g., fission products, activation products, transuranics) taken into the body that result in committed effective doses above the recordable level. Unplanned internal exposure – Non-Tritium is the total dose above an approved planned level during a 1 year dosimetry period. If a planned dose is not established in an approved Radiation Exposure Permit, then the back-out level is considered to be 0 millisievert (0 millirem). Both unplanned acute and unplanned chronic low level uptakes that exceed 2 mSv/y (0.5mSv/y for CSF) above an approved planned level are considered AL exceedances (e.g., four unplanned exceedances within a calendar year with a committed effective dose assignment 0.5 mSv/each would be considered an AL exceedance).
Accumulated Dose	Exceeding an ADL without prior approval				Accumulated doses that are to be compared with the ADLs include doses received at all places of employment during the dose period as defined in the table below. ADLs are defined in the Bruce Power document BP-RPP-00009, Dose Limits and Exposure Control.
Beta-Gamma surface Contamination in Zone 1	Total: Greater than 3.7 Bq/cm^2		N/A	N/A	Beta-gamma contamination that exceeds 3.7 Bq/cm^2 normally calculated over a 100 cm^2 reference area on any surface in

Table 7.1: Bruce Power Action Levels					
Description	Bruce A and B	CSF	CMLF and Class II Nuclear Facility	Nuclear Substances and Radiation Devices	Notes
					those areas deemed equivalent to the public domain (e.g., Zone 1) within the licensed facility.
Beta–Gamma Discrete Radioactive Particle in Public Domain	Greater than 100 nCi (3700 Bq)		N/A	N/A	Detected by portal monitors with alarm setpoint ≤ 100 nCi (3700 Bq) Cs-137 Action Level for Discrete Radioactive Particles (DRP) are defined in [1].
Alpha Surface Contamination in Zone 1	Total: Greater than 0.05 Bq/cm^2		N/A	N/A	Alpha contamination that exceeds 0.05 Bq/cm^2 (300 dpm/100 cm^2) normally calculated over a 100 cm^2 reference area on any surface in those areas deemed equivalent to the public domain (e.g., Zone 1) within the licensed facility.

**Committed Effective Dose is calculated from the time of intake.*

Reference:

[1] Bruce Power report, B-REP-09071-01APR2019, "Defining an Action Level for Discrete Radioactive Particles", April 1, 2019, e-Docs # 6242072.

The ADLs shown in table 7.2 are taken from the Bruce Power document BP-RPP-00009, Dose Limits and Exposure Control.

Table 7.2: Administrative Dose Levels (ADLs)			
Category of Worker	Dose Period	Employees	Contractors
Nuclear Energy Worker (NEW)	One-year dosimetry period	20 mSv	40 mSv
	Five-year dosimetry period	50 mSv	90 mSv
Pregnant NEW	Balance of pregnancy	0.5 mSv	0.5 mSv
Non-NEW	One calendar year	0.5 mSv	0.5 mSv

Estimated Dose to the Public

The *Radiation Protection Regulations* prescribe the radiation dose limits for the general public of 1 mSv per calendar year. The licensee reports the estimated dose to the public from the Bruce site annually, in accordance with REGDOC-3.1.1, REPORTING REQUIREMENTS FOR NUCLEAR POWER PLANTS (See LC 3.3), in the Environmental Protection report.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Radiation Protection	REGDOC-2.7.1	2021
CNSC	Ascertaining Occupational Dose, Volume I	REGDOC-2.7.2	2021

The licensee should conduct a documented review and, if necessary, revise the AIs specified above at least once per licence period in order to validate their effectiveness. The results of such reviews should be provided to CNSC staff.

8 SCA – CONVENTIONAL HEALTH AND SAFETY

8.1 Conventional Health and Safety Program

Licence Condition 8.1:

The licensee shall implement and maintain a conventional health and safety program.

Preamble:

The conventional health and safety program is used to manage workplace safety hazards and protect personnel and environment.

NPPs in Ontario are regulated by the *Ontario Occupational Health and Safety Act* and the *Labour Relations Act*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Health and Safety Management	BP-PROG-00.06	No

Bruce Power's "Health and Safety Management Program", a licensee document listed in the notification of change table, describes the occupational health and safety practices at the Bruce site. The *Ontario Occupational Health and Safety Act* contains the detailed regulatory requirements for workplace health and safety in Ontario.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Conventional Health and Safety	REGDOC-2.8.1	2019

Regulatory document REGDOC-2.8.1, CONVENTIONAL HEALTH AND SAFETY, sets out information regarding conventional health and safety (CHS) and the implementation and maintenance of a CHS program. This document applies to all CNSC-licensed activities. This document does not include any requirements, but is a source of CHS-related information for all applicants and licensees.

9 SCA – ENVIRONMENTAL PROTECTION

9.1 Environmental Protection Program

Licence Condition 9.1:

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

Preamble:

The *Radiation Protection Regulations* prescribe radiation dose limits for the general public of 1 mSv per calendar year.

Derived Release Limits (DRLs) are calculated or derived using environmental transfer modeling that describes transfer of radioactive materials through environmental pathways to humans. DRLs are required for the purpose of protecting members of the public from unreasonable risk resulting from releases of radionuclides into the environment from the normal operation of the licensed facility.

Licensees set Environmental Action Levels (EALs) and related parameters, so as to provide early warnings of any actual or potential losses of control of the Environmental Protection Program. EALs are precautionary levels and are set far below the actual DRLs. EALs are designed to alert licensees before DRLs are reached. They are required by regulations to be specific doses of radiation or other parameter that, if reached, may indicate a loss of control of the licensee's Environmental Protection Program.

The *Radiation Protection Regulations* specify requirements related to "Action Levels" and indicate that the licence will be used to identify the action levels and the notification timeframes.

The release of hazardous substances is regulated by both the Ministry of Environment, Conservation and Parks (MECP) and Environment Canada and Climate Change (ECCC) through various acts and regulations, as well as the CNSC.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Environmental Management	BP-PROG-00.02	Yes
Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station A	NK21-REP-03482-00002	Yes
Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station B	NK29-REP-03482-00003	Yes
Derived Release Limits and Environmental Action Levels for Central Maintenance and Laundry Facility	NK37-REP-03482-00001	Yes

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Derived Release Limits and Environmental Action Levels for Central Storage Facility (CSF)	NK37-REP-03482-00002	Yes
Radiological Emissions and Effluent Monitoring	BP-STND-00049	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	REGDOC-2.9.1	2020	Apr. 1, 2021
CSA	Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities	N288.1	2020	January 31, 2024
CSA	Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills	N288.4	2010	Dec. 31, 2018
CSA	Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills	N288.5	2011	Dec. 31, 2018
CSA	Environmental risk assessment at Class I nuclear facilities and uranium mines and mills	N288.6	2012	Dec. 31, 2018
CSA	Groundwater protection programs at Class I nuclear facilities and uranium mines and mills	N288.7	2015	Dec. 31, 2020
CSA	Establishing and implementing action levels for releases to the environment from nuclear facilities	N288.8	2017	Dec. 31, 2021

Environmental Management System (EMS)

The objective of the environmental protection policies, programs and procedures is to establish adequate provision for protection of the environment at Class I nuclear facilities and uranium mines and mills. This shall be accomplished through an integrated set of documented activities that are typical of an environmental management system (EMS).

Bruce Power has established and implemented an environmental management program to assess environmental risks associated with its nuclear activities, and to ensure these activities are conducted in such a way that adverse environmental effects are prevented or mitigated.

CNSC regulatory document REGDOC-2.9.1, ENVIRONMENTAL PROTECTION: ENVIRONMENTAL PRINCIPLES, ASSESSMENTS AND PROTECTIVE MEASURES outlines the requirements related for an environmental protection program. Bruce Power's governing document "Environmental Management" is the key document of the environmental protection program.

Bruce Power is in compliance with all requirements of REGDOC-2.9.1, Version 1.2.

Assessment and Monitoring

CSA standard N288.4, ENVIRONMENTAL MONITORING PROGRAMS AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS outlines the requirements for an environmental monitoring program. This document was revised in May 2010 to include radioactive and hazardous substances, physical stressors, potential biological effects, and pathways for both human and non-human biota. Note: CSA guidance N288.9, GUIDELINE FOR DESIGN OF FISH IMPINGEMENT AND ENTRAINMENT PROGRAMS AT NUCLEAR FACILITIES was issued in May 2018 and provides guidance for monitoring and assessment of fish impingement and entrainment which is a physical stressor.

An Environmental Monitoring Program (EMP) consists of a risk-informed set of integrated and documented activities to sample, measure, analyze, interpret, and report the following:

- the concentration of hazardous and/or nuclear substances in environmental media to assess one or both of
    - exposure of receptors to those substances; and
    - the potential effects on human health, safety, and the environment;
- the intensity of physical stressors and/or their potential effect on human health and the environment; and
- the physical, chemical, and biological parameters of the environment normally considered in design of the EMP.

CSA standard N288.7, GROUNDWATER PROTECTION PROGRAMS AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS provides requirements and guidance which facilitate groundwater protection at Class I nuclear facilities and uranium mines and mills. Compliance with N288.7 will allow facilities to demonstrate that they will not pose an unreasonable risk to the environment or the health and safety of humans and non-human biota from groundwater. N288.7 addresses the design, implementation, and management of a groundwater protection program that incorporates best practices in Canada and internationally.

Effluent and Emissions Control (Releases)

The licensee shall ensure effluent monitoring for nuclear and hazardous substances is designed, implemented and managed to respect applicable laws and to incorporate best practices. The effluent monitoring program shall incorporate airborne and waterborne effluents.

CSA standard N288.5, EFFLUENT MONITORING PROGRAMS AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS outlines the requirements for an effluent monitoring program. Bruce Power shall ensure effluent monitoring sub-program for nuclear and hazardous substances is designed, implemented and managed to respect applicable laws and to incorporate best practices. The effluent monitoring program shall incorporate airborne and waterborne effluents. Effluent monitoring is a risk-informed activity that is to quantify or estimate the nuclear and hazardous substances being released into the environment.

Bruce Power's Effluent Monitoring Program shall ensure compliance with CSA N288.5 in accordance with the implementation plan below.

Nuclear Substances – Derived Release Limits (DRLs)

Bruce Power shall control radiological emissions to ALARA, within the Derived Release Limits (DRLs), and take action to investigate cause(s) and correct the cause(s) of increased emissions.

CSA standard N288.1, GUIDELINES FOR MODELLING RADIONUCLIDE ENVIRONMENTAL TRANSPORT, FATE AND EXPOSURE ASSOCIATED WITH THE NORMAL OPERATION OF NUCLEAR FACILITIES outlines the requirements related to DRLs. Bruce Power shall ensure compliance with CSA N288.1-20.

The DRLs are considered part of the licensing basis. Changes to these limits are subject to LC G.1 and LC G.2. The DRLs for Bruce A and Bruce B nuclear facilities, the Central Maintenance Facility (CMF) and the Central Storage Facility (CSF) are summarized in table 9.1.

Table 9.1: Derived Release Limits

		Bruce A	Bruce B	CMLF	CSF
Release Category	Radionuclide/Radionuclide Group[1]	DRL (Becquerel/year)			
Air	Tritium	3.34E+17	7.84E+17	3.05E+17	4.22E+17
	Carbon-14	2.26E+15	4.09E+15	N/A	2.20E+15
	Iodine (mixed fission products)	3.50E+12	3.87E+12	1.96E+12	N/A
	Noble Gases[2]	1.54E+17	3.77E+17	N/A	N/A
	Particulate (Alpha)	2.60E+11	7.12E+11	3.49E+11	4.11E+11
	Particulate (Beta/Gamma)	6.45E+11	1.37E+12	7.51E+11	9.03E+11
Water	Tritium	8.57E+17	7.50E+17	N/A	N/A
	Carbon-14	1.00E+14	2.12E+14	N/A	N/A
	Gross Alpha	1.55E+12	3.29E+12	N/A	N/A
	Gross Beta/Gamma	2.94E+12	6.38E+12	N/A	N/A

Notes:
[1] Individual DRLs are calculated for about 102 radionuclides and isotopes. Only the significant radionuclide groups which are given in the table are monitored and reported to the CNSC.
[2] The unit for Noble Gases DRLs is Bq-MeV/year.

These DRLs for radionuclides and radionuclide groups account for the most significant releases and are the focus of monitoring and reporting requirements.

Hazardous Substances

Bruce Power shall control hazardous substances releases according to the limits defined in the licensing basis in accordance with the applicable environmental compliance approvals and take action to investigate and correct the cause(s) of increased emissions. Under the jurisdiction of MECP and ECCC, Bruce Power prepares routine environmental reports at different frequencies.

Environmental Action Levels

Environmental Action Levels (EALs) are considered part of the licensing basis. Changes to these limits are subject to LC G.1 and LC G.2.

Bruce Power shall ensure compliance with CSA N288.8, ESTABLISHING AND IMPLEMENTING ACTION LEVELS FOR RELEASES TO THE ENVIRONMENT FROM NUCLEAR FACILITIES.

The EALs for Bruce A and Bruce B nuclear facilities, the Central Maintenance Facility (CMF) and the Central Storage Facility (CSF) once N288.8-17 is implemented are summarized in table 9.2.

Table 9.2: Environmental Action Levels (EALs)

Facility	Release Category	Radionuclide/ Radionuclide Group	Monitoring Points[1]	EAL (Bq/Week)[2,3]
Bruce A	Air	Tritium	CSA	1.97E+13
			U1-4 C	7.74E+13
			ASB	1.21E+13
			U1-4 NC	2.22E+13
		Carbon-14	CSA	1.45E+11
			U1-4 C	2.30E+11
		Iodine	CSA	1.00E+08
			U1-4 C	1.15E+06
		Noble Gases[2]	CSA	4.73E+12
			U1-4 C	5.23E+12
			U1-4 NC	5.83E+12
		Gamma	U1-4 C	1.59E+05
			ASB	1.38E+05
			CRB	1.64E+05
	Water[3]	Carbon-14	ALW	2.80E+09
Bruce B	Air	Tritium	CSA	2.01E+13
			U5-8 C	7.58E+13
			ASB	1.00E+13
			U5-8 NC	2.21E+13
		Carbon-14	CSA	8.51E+10
			U5-8 C	1.18E+11
		Iodine	CSA	4.76E+06
			U5-8 C	6.45E+05
		Noble Gases[2]	CSA	1.17E+12
			U5-8 C	3.19E+12
		Gamma	U5-8 C	1.67E+05
	Water[3]	Carbon-14	ALW	1.35E+10
CSF	Air	Beta-Gamma	Exhaust Stack	2.21E+05

Notes:

1. EALs are only presented for those radionuclide monitoring pairs that require an EAL based on the methodology in NK21-REP-03482-00002, NK29-REP-03482-00003, NK37-REP-03482-00001 and NK37-REP-03482-00002, which is based on CSA Standard N288.8-17. The following are acronyms for monitoring points:

    - CSA: Central Services Area Contaminated Exhaust Stack

- U1-4 C: Unit 1 to Unit 4 Contaminated Exhaust Stack
- U1-4 NC: Unit 1 to Unit 4 Non Contaminated Exhaust Stack
- U5-8 C: Unit 5 to Unit 8 Contaminated Exhaust Stack
- U5-8 NC: Unit 5 to Unit 8 Non Contaminated Exhaust Stack
- ASB: Ancillary Services Building Contaminated Exhaust Stack
- CRB: Construction Re Tube Building Contaminated Exhaust Stack
- ALW: Active Liquid Waste
- CSF: Central Storage Facility

2. The unit for Noble Gases EALs is Bq-MeV/week.
3. The unit for waterborne EALs is Bq/month.

Environmental Risk Assessment

CSA standard N288.6, ENVIRONMENTAL RISK ASSESSMENT AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS outlines the requirements for an environmental risk assessment. This specific area provides assessment of environmental risks associated with contaminants and physical stressors in the environment relevant to nuclear facilities, and to the short-term and long-term safety of human health and the environment.

The ERA provides the basis for the environmental monitoring program (CSA standard N288.4) and also the effluent monitoring program (CSA standard N288.5), including Radiological Environmental Monitoring Programs. The ERA shall be updated periodically with the results from the environmental and effluent monitoring programs in order to confirm the effectiveness of any additional mitigation measures needed.

Bruce Power submitted an updated ERA in June 2022, in accordance with the 5-year frequency requirement outlined in CSA N288.6. Bruce Power is expected to review the 2022 ERA findings and implement any revisions required to ensure continuous compliance with CSA N288.4 and N288.5. The next iteration of the Bruce Power ERA will occur in 2027 and it is expected to be in compliance with CSA N288.6:22.

Protection of the Public

See LCH Section 7.1, Radiation Protection under the sub-title Estimated Dose to the Public.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Performance testing of nuclear air-cleaning systems at nuclear facilities	N288.3.4	2013
CSA	Guideline for design of fish impingement and entrainment programs at nuclear facilities	N288.9	2018

10 SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

Licence Condition 10.1:

The licensee shall implement and maintain an emergency preparedness program.

Preamble:

Emergency preparedness allows preparation and management of resources for responding to emergencies, with the aim to reduce the harmful effects of emergency. Specific provisions for dealing with emergencies are required because normal processes are disrupted, and a different set of resources is needed to respond to and recover from the disruption.

In addition to the nuclear emergency plan, the licensee maintains a set of emergency operating procedures and abnormal plant operating procedures. This aspect is covered under LC 3.1.

A security response to malevolent acts is governed by a separate plan under the licensee's Nuclear Security program (LC 12.1) but provisions of the licensee's site security report apply to any associated potential threat of release of radioactive material – for example, the need for offsite notification, situation updates and confirmation of any radioactive releases.

Liquid emission response and radioactive materials transportation emergency response are also governed by separate plans (LCs 9.1 and 14.1).

CNSC regulatory document REGDOC-2.10.1, NUCLEAR EMERGENCY PREPAREDNESS AND RESPONSE replaced CNSC regulatory document RD-353, TESTING AND IMPLEMENTATION OF EMERGENCY MEASURES and CNSC regulatory guide G-225, EMERGENCY PLANNING AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES in October 2014.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce Power Nuclear Emergency Response Plan	BP-STND-00001	Yes
Radioactive Material Transportation Emergency Response Plan	BP-PLAN-00005	No
Emergency Management and Fire Protection	BP-PROG-08.01	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Nuclear Emergency Preparedness and Response, Version 2	REGDOC-2.10.1	2016	Sep. 24, 2021

CNSC regulatory document REGDOC-2.10.1 outlines the requirements for an emergency preparedness program.

Clause 2.2.6(4) of REGDOC-2.10.1 is satisfied by the current location of Bruce Power's Emergency Management Centre with supporting procedures on security and communications arrangements as described in the clause.

The emergency preparedness program is documented in Bruce Power's Nuclear Emergency Response Plan. Bruce Power shall maintain equipment, procedures and staff to support offsite response activities for an accidental release. Infrastructures defined within may be used in planning and response to virtually all emergencies. Bruce Power's Nuclear Emergency Response Plan also represents a basis for controlling changes and modifications to the emergency preparedness program.

In accordance with section 2.3.3 of REGDOC-2.10.1, the licensee shall test all requirements listed in this regulatory document over a five-year period, with a full-scale integrated emergency testing exercise at least once every three years involving, at a minimum, regional and provincial offsite authorities. To meet this requirement, Bruce Power shall conduct emergency exercises and drills as described in their Nuclear Emergency Response Plan. In most areas, drills and/or exercises are required at least annually. A corporate exercise is held annually at either the Bruce A or B nuclear facility. A "site evacuation" is held every three years. Annual exercises are also conducted at other facilities, such as hospitals and offsite centres by mutual agreement. Participation by municipal and provincial emergency response groups is also scheduled by mutual agreement.

In accordance with section 2.1 of REGDOC-2.10.1, the licensee is required to provide regional and provincial offsite authorities with the necessary information to allow for effective emergency planning policies and procedures to be established and modified, if needed or on a periodic basis. This information to include an estimate of the associated radiological consequences, including isotopic release quantities (source term), possible release start time and duration and the geographical area potentially affected. See LCH Section 4.1 for more information on severe accident analysis.

The CNSC will inform federal authorities of updates to the licensee's Emergency Planning Technical Basis.

NPP Automatic Data Transfer

In order to align with international best practices, CNSC staff have determined in [1] that it is vital to have automated data sharing during a nuclear emergency. CNSC plans to incorporate these requirements in the next revision of REGDOC-2.10.1.

Based on this, Bruce Power shall implement and maintain an automated (collected and posted without human intervention) data sharing system for the CNSC EOC, with near real-time (at 15-minute intervals or less). Such data-sharing system shall allow posting of a set of pre-determined plant data, with web-based access for viewing and trending, to support the CNSC emergency response mandate.

The Bruce Power system is described in [2] and was implemented by the end of 2019. CNSC staff have accepted this solution [3] and Bruce Power continues to investigate and implement improvements to the solution.

References:

[1] CNSC letter, "Request pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations*: Bruce NGS – Nuclear Power Plant (NPP) Automatic Data Sharing Requirement during a Nuclear Emergency", August 18, 2017, NK21-CORR-00531-13784 / NK29-CORR-00531-14444 / NK37-CORR-00531-02827, e-Docs # 5240682.
[2] Bruce Power letter, "Nuclear Power Plant Automatic Data Sharing during a Nuclear Emergency", NK21-CORR-00531-15108 | NK29-CORR-00531-15869, August 1, 2019, e-Docs # 5963671.
[3] CNSC letter, L. Sigouin to M. Burton, "Automatic Data Sharing During Nuclear Emergencies", December 9, 2019, BP-CORR-00531-00062, e-Docs # 6066527.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	General requirements for nuclear emergency management programs	N1600	2016

The licensee should provide emergency communications outlining what surrounding community residents need to know and do before, during and after a nuclear emergency. Information should be in plain language, readily accessible and include the following:

- how the public is notified of an emergency;
- what protective actions may be required during an emergency;
- what the public is expected to do, and why, when directed to take protective actions;
- what the public can do now to be better prepared for an emergency;
- where can the public get more information on emergency plans.

10.2 Fire Protection Program

Licence Condition 10.2:

The licensee shall implement and maintain a fire protection program.

Preamble:

Licensees require a comprehensive fire protection program (the set of planned, coordinated, controlled and documented activities) to ensure the licensed activities do not result in unreasonable risk to the health and safety of persons and to the environment due to fire, and to ensure that the licensee is able to efficiently and effectively respond to emergency fire situations.

Fire protection provisions are applicable to all work related to the design, construction, operation, and maintenance of the nuclear facility, including systems, structures and components (SSCs) that directly support the plant and the protected area, and Centre of Site (CoS) facilities containing radioactive materials and as listed in BP-STND-00166. External events such as an aircraft crash or threats are dealt under LC 12.1.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Fire Safety Management	BP-STND-00166	No
Conventional Emergency Plan	BP-PLAN-00006	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Fire protection for nuclear power plants	N293	2012 (R2017)	June 30, 2023
CSA	Fire Protection for facilities that process, handle, or store nuclear substances	N393	2022	April 1, 2025

References:

[1] CNSC letter, A. Bulkan to M. Burton, “Bruce Site: Implementation of CSA N393-2022”, October 15, 2024, e-Doc 7377321.

[2] Bruce Power letter, M. Burton to A. Bulkan, “Implementation of CSA N393-2022”, June 13, 2024, BP-CORR-00531-05035, e-Doc 7300698.

CSA standard N293, FIRE PROTECTION FOR NUCLEAR POWER PLANTS outlines the requirements for a fire protection program for nuclear power plants, while CSA standard N393, FIRE PROTECTION FOR FACILITIES THAT PROCESS, HANDLE, OR STORE NUCLEAR SUBSTANCES outlines the requirements for relevant supporting buildings. The application of N393 is described in Reference 2.

Bruce Power shall arrange for third party audits of one industrial fire brigade fire drill once every two years, alternating between stations on an annual cycle. The purpose of a Third Party Audit is to provide an in-depth analysis of the Industrial Fire Brigade's (IFB) fire response performance against applicable regulatory criteria. A fire response is a planned, coordinated and controlled activity to provide emergency response to a fire. The audit is to analyze and ensure competencies of the IFB against CSA standard N293. The resulting audit report shall be submitted to CNSC staff for review.

An independent third party auditor is required to be an expert in their discipline, normally fire-fighting and qualified through specific education and relevant experience. The third party auditor is required to be independent or at "arm's length" from the facility to ensure total impartiality. The review shall be of sufficient depth and detail that the reviewer can attest with reasonable confidence on the competencies of the IFB at the facility.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
NEI	Guidance for Post Fire Safe Shutdown Circuit Analysis	NEI 00-01	Rev. 2 (2009)

Guidance Publications Pending Implementation				
Org	Document Title	Document #	Implementation Plan Submission Date	Version
CSA	Fire protection for facilities that process, handle, or store nuclear substances	N393	June 13, 2024	2022

Note: Bruce Power's current plan [2] is to implement CSA N393-22 by April 1, 2025.

The Nuclear Energy Institute NEI 00-01, GUIDANCE FOR POST FIRE SAFE SHUTDOWN CIRCUIT ANALYSIS is used by CNSC staff to help determine the adequacy of safe shutdown electrical circuit analysis.

Expectation for the Third Party Audit Report

The results of the audits will typically consist of reports that compare the requirements of the applicable codes and standards with the implementation of the Fire Protection Program and the Fire Response exercised. The report should identify any non-compliance and formulate a conclusion if the licensee's program and IFB meet the requirements of the standards referenced in the facilities licence. The format of the submission is not specified and can be tailored to the facility. However, as a guideline the following suggestions for the content and format of the written report are provided as follows:

1. Cover page with the name of the facility, date and signature of the authors;
2. Name, address, phone number, of the preparing agency or organization;
3. Names of review team members, including brief descriptions of experience and education;
4. Name, address, and phone number of licensee;
5. Title of report, date, and document number;
6. Introduction briefly describing the area of interest that is audited;
7. Statement of review scope specifically listing any exclusions;

8. Objectives of the review;
9. A list of applicable codes and standards;
10. Summary of the review methodology, including areas and documents reviewed;
11. Detailed observations with relation to standard requirements against the observed response;
12. Conclusions, including a statement that the program or the IFB response meet the requirements of the applicable standards, achieves their objectives, and a summary of any non-compliances;
13. Recommendations (if any); and
14. An issues tracking table.

Fire Protection Authority Having Jurisdiction

CNSC has, for an interim period, assumed the role of fire protection AHJ with respect to the application of the National Building Code of Canada (NBCC) and National Fire Code of Canada (NFCC) to Bruce Power-controlled Centre of Site buildings. The details of this agreement can be found in references 1 and 2.

References:
[1] Bruce Power Letter, M. Burton to M. Hornof, "Authority Having Jurisdiction for National Building and Fire Codes of Canada for Bruce Site Fire Protection", December 14, 2023, BP-CORR-00531-04935, e-Docs # 7187974.
[2] CNSC Letter, A. Bulkan to M. Burton, "Authority Having Jurisdiction for National Building and Fire Codes of Canada for Bruce Site Fire Protection", June 4, 2024, e-Docs # 7282711.

11 SCA – WASTE MANAGEMENT

11.1 Waste Management Program

Licence Condition 11.1:

The licensee shall implement and maintain a waste management program.

Preamble:

This LC covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. Topics include waste management, waste characterization, waste minimization and waste management practices.

CNSC Regulatory Document REGDOC-2.11, FRAMEWORK FOR RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING IN CANADA defines radioactive waste as any material (liquid, gaseous or solid) that contains a radioactive nuclear substance, as defined in section 2 of the *Nuclear Safety and Control Act*, and which the owner has declared to be waste. In addition to containing nuclear substances, radioactive waste may also contain non-radioactive hazardous substances, as defined in section 1 of the *General Nuclear Safety and Control Regulations*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Fuel Management	BP-PROG-12.03	No
Radiation Protection Program	BP-PROG-12.05	Yes

Licensing Basis Publications

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Management of low- and intermediate-level radioactive waste	N292.3	2014	October 1, 2018

The licensee shall implement and maintain a program for waste management that includes strategies for waste minimization, waste characterization and waste management practices. Low- and intermediate-level waste shall be managed in accordance with CSA N292.3, MANAGEMENT OF LOW AND INTERMEDIATE-LEVEL RADIOACTIVE WASTE.

Bruce Power shall:

- characterize its waste streams and minimize the production of all wastes taking into consideration the health and safety of workers and the environment;
- integrate waste management programs as a key element of the facility's safety culture; and
- audit on a regular basis its program to maximize its effectiveness and per the governance given in BP-PROG-15.01,*Compliance Internal Audit*.

In its 2018 licence renewal decision for Bruce A and B, the Commission directed that Bruce Power make available for public review in a single document all the information regarding the anticipated volume of waste that will be produced during the MCR outages of the six units at Bruce A and B.

<u>Guidance:</u>

Guidance Publications			
Org	Document Title	Document #	Version
CSA	General principles for the management of radioactive waste and irradiated fuel	N292.0	2014
CSA	Wet storage of irradiated fuel and other radioactive materials	N292.1	2016
CSA	Interim dry storage of irradiated fuel	N292.2	2013
CSA	Guideline for the exemption of clearance from regulatory control of materials that contain, or potentially contain, nuclear substances	N292.5	2011 (R2021)
CSA	Long-term management of radioactive waste and irradiated fuel	N292.6	2018

With respect to the storage and management of spent nuclear fuel, it should reflect the fundamental safety concerns related to criticality, exposure, heat control, containment and retrievability. Namely, the systems that are designed and operated should assure subcriticality, control of radiation exposure, assure heat removal, assure containment and allow retrievability.

11.2 Decommissioning and Financial Guarantees

Licence Condition 11.2:

The licensee shall notify the Commission of any changes regarding the obligations of decommissioning and financial guarantees under the Lease Agreement with Ontario Power Generation Inc. as described in 15.1.

Preamble:

Paragraph 3(k) of the *Class I Nuclear Facility Regulations* requires that a licence application contain the proposed plan for decommissioning of the nuclear facility.

This licence condition requires that the licensee maintain a preliminary decommissioning plan (PDP). A PDP provides an overview of the proposed decommissioning approach that is sufficiently detailed to assure that the proposed approach is, in the light of existing knowledge, technically and financially feasible, and appropriate in the interests of health, safety, security and the protection of the environment. The PDP defines areas to be decommissioned and the general structure and sequence of the principle work packages. The PDP forms the basis for developing credible cost estimates for decommissioning and establishing and maintaining an adequate financial guarantee. It is expected that the PDP will be revised as the conditions at the facility change.

The PDP includes strategies for the management of low and intermediate level waste, reactor and waste storage facility decommissioning, and the used fuel arising from the operation of the nuclear facility.

The *General Nuclear Safety and Control Regulations* requires under paragraph 3(1)(l) that a licence application contain a description of any proposed financial guarantee relating to the activity to be licensed.

Financial guarantees for decommissioning show that sufficient financial resources are available to fund all approved decommissioning activities.

Ontario Power Generation Inc. (OPG) maintains a consolidated financial guarantee to cover the future decommissioning of all OPG- and Bruce Power-operated nuclear facilities in Ontario. The financial guarantee is based upon the most up-to-date preliminary decommissioning plans and cost estimates for decommissioning prepared by OPG for each facility. The financial guarantee must cover all costs of decommissioning including the long-term management of used fuel and low- and intermediate-level radioactive waste. The licensee is responsible for providing an adequate financial guarantee that is acceptable to the Commission.

OPG is required to revise the financial guarantee and the associated decommissioning plans at least every 5 years or when requested by the Commission. The most recent OPG consolidated financial guarantee covering the 2023-27 period was accepted by the Commission on December 6, 2022.

Compliance Verification Criteria:

The financial guarantee for decommissioning the nuclear facility shall be reviewed and revised every five years or when the Commission requires or following a revision of the preliminary decommissioning plan that significantly impacts the financial guarantee.

Ontario Power Generation Inc. (OPG) is responsible for preparing the decommissioning plan [1] and strategies of the Bruce nuclear facilities to the latest versions of CSA Standard N294, DECOMMISSIONING OF FACILITIES CONTAINING NUCLEAR SUBSTANCES and REGDOC-2.11.2, DECOMMISSIONING; however, Bruce Power shall provide a status update with the licence renewal application confirming that the preliminary decommissioning plan is current to the appropriate versions of the standards and REGDOCs. OPG is also responsible for all costs of decommissioning of the Bruce nuclear facilities following the requirements of REGDOC-3.3.1, FINANCIAL GUARANTES FOR DECOMMISSIONING OF NUCLEAR FACILITIES AND TERMINATION OF LICENSED ACTIVITIES. All such costs are included in the Decommissioning Cost Estimates and are covered by OPG’s consolidated financial guarantee for decommissioning.

In terms of operational financial guarantees, Bruce Power Limited Partnership maintains an Investment Grade Credit Rating for the operation of the Bruce nuclear facilities. Bruce Power shall inform CNSC staff in writing **within forty-five days** of any changes to this credit rating.

Reference:

[1] C. Carmichael to N. Greencorn, K. Campbell, J. Burta and L. Sigouin, "Submission of Preliminary Decommissioning Plans", Jan. 25, 2022, N-CORR-00531-23047, e-Docs # 6726631.

Guidance:

Not applicable to this LC.

12 SCA – SECURITY

12.1 Nuclear Security Program

Licence Condition 12.1:

The licensee shall implement and maintain a security program.

Preamble:

The *Nuclear Security Regulations* require that a licence application contain specific information related to nuclear security, stipulates the requirements for high-security sites, and contains specific requirements pertaining to the transportation of Category I, II or III nuclear material.

The *Nuclear Security Regulations* require that a licensee of a high security site:

- maintain at all times a qualified onsite nuclear response force;
- obtain the applicable certifications, before issuing an authorization to a nuclear security officer;
- prevent and detect unauthorized entry into a protected area or inner area; and
- prevent unauthorized entry of weapons and explosive substances into a protected area or inner area.

The *Nuclear Security Regulations* require every licensee to: conduct, at least once every 12 months, a threat and risk assessment specific to a facility where it carries on licensed activities in order to determine the adequacy of its physical protection system; make modifications to its physical protection system, as necessary, to counter any credible threat identified as a result of the threat and risk assessment; keep a written record of each threat and risk assessment that it conducts and provide a copy of the written record, together with a statement of actions taken as a result of the threat and risk assessment, to the Commission upon request (within 60 days) after completion of the assessment.

CNSC regulatory document REGDOC-2.12.1 (Vol. I), NUCLEAR RESPONSE FORCE, Version 2 describes how, when required by a CNSC licence or order, a trained and equipped onsite nuclear response force shall be established and deployed at a nuclear facility.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Security	BP-PROG-08.02	Yes
Cyber Security	BP-PROC-00784	No
Site Security Plan	B-REP-08160-00001	Yes
Tactical Response Plan	N/A	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness	REGDOC-2.2.4	2018	July 1, 2020
CNSC	High-Security Facilities, Vol. I: Nuclear Response Force, Version 2	REGDOC-2.12.1	2018	July 1, 2020
CNSC	High-Security Facilities, Vol. II: Criteria for Nuclear Security Systems and Devices	REGDOC-2.12.1	2018	Sep. 1, 2018
CNSC	Site Access Security Clearance	REGDOC-2.12.2	2013	June 1, 2015

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Security of Nuclear Substances: Sealed Sources	REGDOC-2.12.3	2013	Oct. 1, 2018
CSA	Cyber security for nuclear power plants and small reactor facilities	N290.7	2014	Dec. 31, 2020

Nuclear Security Program

CNSC regulatory documents REGDOC-2.2.4 (Vol. III), REGDOC-2.12.1 (Vol. I version 2) and REGDOC-2.12.1 (Vol. II) outline the requirements related to a nuclear security program.

Bruce Power shall ensure the identified vital areas within the nuclear facilities are protected against design basis threats and any other credible threat identified in their Threat and Risk Assessment documentation. The prime functions that must be maintained to prevent unacceptable radiological consequences are those of control, cool, and contain.

Bruce Power shall maintain the operation, design and analysis provisions credited in the above assessments required to ensure adequate engineered safety barriers for the protection against malevolent acts. The provisions for the protection against malevolent acts shall be documented as part of a managed program or process within the management system. Bruce Power shall summarize changes in design, analysis or operational procedures which are credited for the protection against malevolent acts in the annual threat and risk assessment, and submit a copy to the Commission 60 days after completion of the assessment.

Bruce Power shall implement measures for the purpose of preventing and detecting unauthorized entry into a protected area or inner area at a high-security site, including:

- vehicle barriers and vehicle access control points;
- intrusion detection systems and devices;
- closed-circuit video systems/devices for applications in a protected area or inner area;
- the design and functioning of security monitoring rooms; and
- the security monitoring room systems and devices.

CNSC staff will assess the changes to the site security program to determine if a recommendation to update the Station Security Reports would be required.

The licensee shall meet the security measures for sealed sources as set out in Regulatory Document REGDOC-2.12.3, SECURITY OF NUCLEAR SUBSTANCES: SEALED SOURCES. CNSC staff expect for high-security nuclear sites that the licensee would provide the required details as to how they meet the applicable requirements of this regulatory document within the protected area. CNSC staff accepted in [1] Bruce Power's Site Security Plan, dated January 30, 2018 (e-Docs # 5449717) and found that it meets the requirements of REGDOC-2.12.3.

Reference:

[1] CNSC letter, M. Beaudette to N. Contartese, "Technical Assessment of Bruce Power Inc. Site Security Plan", Mar. 22, 2018, NK21-CORR-00531-14317 / NK29-CORR-00531-15007 / NK37-CORR-00531-02961, e-Docs # 5483719.

Cyber Security Program

Bruce Power's cyber security program shall be implemented and maintained to protect the cyber-essential assets for nuclear safety, physical protection, emergency preparedness and safeguards functions from cyber-attacks. CSA standard N290.7, CYBER SECURITY FOR NUCLEAR POWER PLANTS AND SMALL REACTOR FACILITIES outlines the requirements for a cyber security program.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	REGDOC-2.12.3	2020
Treasury Board of Canada Secretariat (TBS)	TBS Standard on Security Screening	N/A	2014
IAEA	Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage	IAEA Nuclear Security Series No. 4 Technical Guidance	2007
IAEA	Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)	IAEA Nuclear Security Series No. 13	2011
IAEA	Computer Security at Nuclear Facilities	IAEA Nuclear Security Series No. 17 Technical Guidance	2011
IAEA	Computer Security of Instrumentation and Control Systems at Nuclear Facilities	IAEA Nuclear Security Series No 33-T Technical Guidance	2018

REGDOC-2.12.3, Part B provides guidance for preparing, submitting and revising the Station Security Report and on how to prepare and submit a "written transportation security plan".

Guidance may be obtained in the IAEA Nuclear Security Series No. 4, Technical Guidance "Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage" and IAEA Nuclear Security Series No. 13 "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)" for developing and maintaining a security program.

Guidance may be obtained in the IAEA Nuclear Security Series No. 17, Technical Guidance "Computer Security at Nuclear Facilities" for developing and maintaining a cyber security program.

Guidance may be obtained in the IAEA Nuclear Security Series No. 33-T, Technical Guidance, "Computer Security of Instrumentation and Control Systems at Nuclear Facilities" for developing and maintaining a cyber security program.

13 SCA – SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

Licence Condition 13.1:

The licensee shall implement and maintain a safeguards program.

Preamble:

Safeguards is a system of inspection and other verification activities undertaken by the International Atomic Energy Agency (IAEA) in order to evaluate a Member State's compliance with its obligations pursuant to its safeguards agreements with the IAEA.

Canada has entered into a Safeguards Agreement and an Additional Protocol (hereinafter referred to as "safeguards agreements") with the IAEA pursuant to its obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons* (INFCIRC/140). The objective of the Canada-IAEA Safeguards Agreement is for the IAEA to provide assurance on an annual basis to Canada and to the international community that all declared nuclear materials are in peaceful, non-explosive uses and that there is no indication of undeclared nuclear materials or activities. This conclusion confirms that Canada is in compliance with its obligations under the following Canada-IAEA safeguards agreements:

- *Agreement Between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons; and*
- *Protocol Additional to the Agreement Between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.*

These are reproduced in information circulars INFCIRC/164, and INFCIRC/164/Add. 1.

The scope of the non-proliferation program for the PROL is limited to the tracking and reporting of foreign obligations and origins of nuclear material. In addition, the import and export of controlled nuclear substances, equipment and information identified in the *Nuclear Non-proliferation Import and Export Control Regulations* require separate authorization from the CNSC, consistent with section 3(2) of the *General Nuclear Safety and Control Regulations*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Safeguards Operating Manual (Bruce A) U0 F/H	NK21-OM-35370	No
Safeguards Operating Manual (Bruce B) U0 F/H	NK29-OM-35370	No

Licensing Basis Publications

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Safeguards and Nuclear Material Accountancy	REGDOC-2.13.1	2018	December 31, 2019

CNSC regulatory document REGDOC-2.13.1 sets out CNSC requirements and guidance for the establishment and maintenance of a safeguards program.

To avoid a potential non-compliance with REGDOC-2.13.1, section 8.1.1, when the Nuclear Material Accountancy Reporting (NMAR) e-business system is not available, Bruce Power is to contact the CNSC International Safeguards Division (safeguardsofficial-garantiesofficiel@cnsc-ccsn.gc.ca) to inform them of the issue and to seek guidance on how to fulfill reporting requirements. When Bruce Power inventory change documents and physical-key measurement point inventory summaries are submitted using an alternative method, Bruce Power will still be required to re-submit using the NMAR e-business system once the NMAR system becomes available. For additional information see CNSC letter [1].

Reference:

[1] CNSC letter, G. Frappier to M. Burton, "Submission of Nuclear Material Accountancy Reports Using the CNSC NMAR e-Business System", November 28, 2019, BP-CORR-00531-00078, e-Docs # 6032599.

Bruce Power shall not make changes to operation, equipment or procedures that would affect the implementation of safeguards measures, except with the prior written approval of the Commission or CNSC staff as follows:

- Director, International Safeguards Division
- Director General, Directorate of Security and Safeguards
- Vice-President, Technical Support Branch

With respect to the implementation of safeguards measures, changes made by the licensee to the operation, equipment or procedures as a result of the agreement between Bruce Power, the CNSC and the IAEA are considered routine.

If a requested change would adversely impact Canada's compliance with the agreement, CNSC staff do not have the authority to give the approval, as this would violate the obligations arising from the Canada-IAEA safeguards agreement.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Import and Export, Version 2	REGDOC-2.13.2	2018

14 SCA – PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

Licence Condition 14.1:

The licensee shall implement and maintain a packaging and transport program.

Preamble:

Every person who transports radioactive material, or requires it to be transported, shall act in accordance with the requirements of the *Transportation of Dangerous Goods Regulations* (TDGR) and the *Packaging and Transport of Nuclear Substances Regulations, 2015* (PTNSR 2015).

The TDGR and PTNSR 2015 provide specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Radioactive Material Transportation	BP-PROC-00188	No

Bruce Power shall implement and maintain a packaging and transport program that will ensure compliance with the requirements set out in the TDGR and PTNSR 2015 for all shipments of nuclear substances to and from the Bruce site. Shipments of nuclear substances within the nuclear facility where access to the property is controlled are exempted from the application of TDGR and PTNSR 2015.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Packaging and Transport: Information Incorporated by Reference in Canada's *Packaging and Transport of Nuclear Substances Regulations*, 2015, Volume I, Version 2	REGDOC-2.14.1	2021

15 NUCLEAR FACILITY-SPECIFIC

15.1 Lease Agreement

Licence Condition 15.1:

The licensee shall inform the Commission in writing of any amendments to the Amended and Restated Lease Agreement between Ontario Power Generation Inc., Bruce Power L.P., OPG-Huron A Inc./OPG-Huron B Inc./OPG-Huron Common Facilities Inc., British Energy PLC, Cameco Corporation, TransCanada Pipelines Limited, BPC Generation Infrastructure Trust and Ontario Municipal Employees Retirement Board dated February 14, 2003.

Preamble:

Bruce Power leases the Bruce A and B nuclear facilities from Ontario Power Generation Inc. (OPG).

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Renewal Notice for a renewal period of two years under the Second Amended and Restated Lease Agreement dated as of October 11, 2016, for the two- year period, Jan. 1, 2024 to Dec. 31, 2025.	BP-CORR-00531-02601 e-Docs # 6760954 Document dated February 28, 2022	N/A
Renewal Notice for a renewal period of two years under the Second Amended and Restated Lease Agreement dated as of October 11, 2016, for the two- year period, Jan. 1, 2026 to Dec. 31, 2027.	BP-CORR-00531-05032 e-Docs # 7206455 Document dated January 9, 2024	N/A

Bruce Power is responsible for informing the Commission of any change in the lease agreement with OPG. Bruce Power shall inform the Commission in writing no **later than 30 days** after the execution of any such amendments.

Bruce Power and OPG have consolidated and superseded all prior amendments to the lease into a Second Amended (February 14, 2003) and Restated Lease Agreement dated October 11, 2016 [1]. A Second Amendment to the Second Amended and Restated Lease Agreement was provided by Bruce Power, dated March 1, 2024 [2].

References:

[1] Bruce Power letter, F. Saunders to K. Lafrenière, “Bruce A and Bruce B: Notification of a Change to the Amended and Restated Lease Agreement”, October 20, 2016, NK21-CORR-00531-13144/NK29-CORR-00531-13629/NK37-CORR-00531-02633, e-Docs # 5109064.
[2] Bruce Power letter, J. Thompson to K. Lun, “Notification of Second Amendment to the Second Amended and Restated Lease Agreement with OPG”, March 13, 2024, BP-CORR-00531-05220, e-Docs # 7241587.

Guidance:

Not applicable to this LC.

15.2 Integrated Implementation Plan

Licence Condition 15.2:

The licensee shall implement the Integrated Implementation Plan.

Preamble:

The Integrated Implementation Plan (IIP) contains commitments, including the timeframes for implementation, from the Bruce A and B Periodic Safety Reviews (PSRs).

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce A and B Global Assessment Report and Integrated Implementation Plan	B-GAR-09701-00001 R002 e-Docs # 5303331	N/A
Bruce A and B Integrated Implementation Plan Management	NK21-CORR-00531-14012 | NK29-CORR-00531-14693 e-Docs # 5435884	N/A

In implementing the commitments identified in the IIP (Bruce A and B Global Assessment Report and Integrated Implementation Plan, B-GAR-09701-00001 R002), Bruce Power committed to submitting to CNSC staff formal progress reports on the status of all IIP commitments on an annual basis by March 31st of each year during the licence period. All changes to the IIP will be managed in accordance with the IIP Communications Plan in [1].

Reference:

[1] Bruce Power letter, F. Saunders to L. Sigouin, "Bruce A and B Integrated Implementation Plan Management", January 18, 2018, NK21-CORR-00531-14012 / NK29-CORR-00531-14693, e-Docs # 5435884.

Guidance:

Not applicable to this LC.

15.3 (Removed)

15.4 Return-to-Service Plan

Licence Condition 15.4:

The licensee shall implement a return-to-service plan for Major Component Replacement.

Preamble:

Return to service (RTS) involves returning the reactor and associated nuclear and non-nuclear systems to commercial operation. The licensee must demonstrate that all regulatory requirements have been met and that the associated work has been done to the satisfaction of the CNSC.

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Major Component Replacement Return to Service Program Management Plan	MCR-RTSMP-001	N/A

Bruce Power has notified CNSC of its intention to extend the operational lives of Bruce A Units 3 and 4 and Bruce B Units 5-8 including the replacement of major components [1].

Bruce Power shall develop and implement a project execution plan and a return-to-service plan for any refurbishment activities.

Reference:

[1] Bruce Power letter, F. Saunders to K. Lafrenière, "Bruce Power plans for Major Component Replacement, Units 3-8", January 8, 2016, NK21-CORR-00531-12549/NK29-CORR-00531-12975, e-Docs # 4915888.

Guidance:

Not applicable to this LC.

15.5 Regulatory Hold Points for Return to Service and Continued Operation

Licence Condition 15.5:

The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.

Preamble:

CNSC have identified four (4) regulatory hold points for the return to service of each unit undergoing a Major Component Replacement (MCR) outage for which CNSC approval will be sought prior to proceeding to the subsequent commissioning phase. These hold points require regulatory verification to confirm operational readiness of the plant safety systems to satisfy regulatory requirements for staged progress through the commissioning phases up to full power operation. These regulatory hold points are consistent with the regulatory approach described in REGDOC-2.3.1, CONDUCT OF LICENSED ACTIVITY: CONSTRUCTION AND COMMISSIONING PROGRAMS.

Compliance Verification Criteria:

The licensee shall seek approval of the Commission or consent of a person authorized by the Commission prior to the removal of the following regulatory hold points for the return to service of each unit. The regulatory hold points that mark the completion of the commissioning phases are as follows:

1. Prior to **Fuel Load - Phase A**
2. Prior to removal of **Guaranteed Shutdown State - Phase B**
3. Prior to exceeding **1% Full Power - Phase C**
4. Prior to exceeding **35% Full Power - Phase D**

In its 2018 Record of Decision for Bruce A and B licence renewal, the Commission delegated the authority for this licence condition for the removal of regulatory hold points for the return to service of each unit undergoing a MCR outage to the Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch.

For each of the regulatory hold points, the licensee shall submit Completion Assurance Documents (CADs). In addition to these CADs, the licensee shall submit CADs following sustained operation at 100% full rated power that will specify activities that were completed between 35% and 100% full rated power. Each CAD shall present evidence that all pre-established conditions for removal have been met.

Prior to GSS removal, all plant personnel who work on the reactor that has undergone major component replacement shall have completed update training appropriate to the knowledge and skill requirements of the applicable position covering the changes to facility systems, equipment and procedures made during the Major Component Replacement outages.

For each ANO, CRSS and SM this includes, at a minimum:

- Principles of reactor operation with a pre-equilibrium core;
- Principles of nuclear safety relevant to the operation of the reactor unit with a pre-equilibrium core;

- Operating constraints and limits associated with the operation of the reactor unit with a pre-equilibrium core;
- The initial approach to criticality and power increase until control by the reactor regulating system is established, including the systems and equipment required and their operation; and
- Changes in fuel composition and core reactivity until reaching equilibrium fuel conditions.

This training shall include formal knowledge and performance evaluations that confirm and document that, at the time of GSS removal, the person has the required knowledge and skills to perform the duties of the applicable position.

Low power testing (Phase C) shall be carried out at the lowest possible power level, with a maximum of 1% of full power.

Prior to release of a regulatory hold point, CNSC staff will verify compliance of the licensee to the pre-requisites for release of a hold point and provide a report to the Commission or person authorized by the Commission. Based on the results of the review of this report, the CNSC's Regulatory Operations Branch will issue a record of decision.

Pre-requisites for Release of Hold Points

<u>Pre-requisites for Fuel Load</u>

1. All IIP commitments required prior to fuel load are complete;
2. All SSCs required for safe operation beyond fuel load are available for service;
3. Staffing levels to safely operate the unit are adequate;
4. Specified operating procedures for fuel load have been formally validated;
5. Specified training for fuel load is complete and staff qualified;
6. Specified SSCs meet the quality and completion requirements of CSA N286;
7. All non-conformances and open items identified as a pre-requisite to fuel load are addressed; and
8. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to fuel load have been successfully completed.

With respect to pre-requisite #3: Staffing levels refers to a sufficient number of qualified workers present at all times to ensure the safe operation of the nuclear facility and to ensure adequate emergency response capability. The licensee should have adequate staff available such that absences due to vacation, sick leave and training do not cause violations of the minimum shift complement levels.

<u>Pre-requisites for GSS Removal</u>

1. All IIP commitments required prior to GSS removal are complete;
2. All SSCs required for safe operation beyond GSS removal are available for service;
3. Specified operating procedures for GSS removal have been formally validated;
4. Specified training for GSS removal is complete and staff qualified;
5. All non-conformances and open items identified as a pre-requisite to GSS removal are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to GSS removal have been successfully completed.

Pre-requisites for Reactor Power Increases Prior to exceeding 1% Full Power

1. All IIP commitments required prior to increasing reactor power are complete;
2. All SSCs required for safe operation are available for service;
3. Specified operating procedures have been formally validated;
4. Specified training is complete and staff qualified;
5. All non-conformances and open items identified as a pre-requisite to reactor power increases above 1% power are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to increasing reactor power have been successfully completed.

Pre-requisites for Reactor Power Increases Prior to exceeding 35% Full Power

1. All IIP commitments required prior to normal operation are complete;
2. All SSCs required for safe operation are available for service;
3. Specified operating procedures have been formally validated;
4. Specified training is complete and staff qualified;
5. All non-conformances and open items identified as a pre-requisite to reactor power increases above 35% power are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to increasing reactor power have been successfully completed.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Conduct of Licensed Activity: Construction and Commissioning Programs	REGDOC-2.3.1	2016
IAEA	Commissioning for Nuclear Power Plants	Specific Safety Guide Series No. SSG-28	2014
IAEA	Safety of Nuclear Power Plants: Commissioning and Operation	Specific Safety Requirements Series No. SSR-2/2	2011

Bruce Power should apply the concepts described in REGDOC-2.3.1, CONDUCT OF LICENSED ACTIVITY: CONSTRUCTION AND COMMISSIONING PROGRAMS, to the extent practicable, when commissioning and returning SSCs to service, as part of the MCR. CNSC staff will consider pertinent sections of REGDOC-2.3.1 when evaluating Bruce Power's commissioning and return to service activities related to MCR.

15.6 Periodic Safety Review

Licence Condition 15.6:

The licensee shall conduct and implement a periodic safety review.

Preamble:

A periodic safety review (PSR) is a comprehensive evaluation of the design, condition and operation of a nuclear power plant. It is an effective way to obtain an overall view of actual plant safety and the quality of the safety documentation, and to determine reasonable and practical improvements to ensure safety until the next PSR or, where appropriate, until the end of commercial operation.

This licence condition pertains to the next PSR that Bruce Power shall submit during the licence period.

Compliance Verification Criteria:

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Periodic Safety Reviews	REGDOC-2.3.3	2015	June 1, 2015

The licensee shall conduct a PSR to obtain an overall view of actual plant safety and the quality of safety documentation and to determine reasonable and practical improvements to ensure safety. The PSR shall be conducted in accordance with CNSC regulatory document REGDOC-2.3.3, PERIODIC SAFETY REVIEWS.

Bruce Power shall submit the next PSR to CNSC staff for review approximately 18 months prior to the next licence application.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Periodic safety review for nuclear power plants	N290.18	2017
IAEA	Periodic Safety Review for Nuclear Power Plants	Specific Safety Guide No. SSG-25	2013

15.7 End of Commercial Operations

Licence Condition 15.7:

The licensee shall inform the Commission of any reactor to be removed from commercial operation at Bruce A and B, and shall provide a plan describing the activities and timeline for transitioning from operations to safe storage.

Preamble:

Given that Bruce Power leases the Bruce A and Bruce B facilities, there is a need to ensure that when Bruce Power plans to take a reactor unit out of commercial service that there are adequate plans to ensure the safe transition from an operating unit into safe storage and the eventual transfer of the facility back to Ontario Power Generation.

Compliance Verification Criteria:

For any reactor that is to be removed from commercial operation, Bruce Power shall produce a strategy and plan of activities to manage and execute a safe process for removal from commercial service of a reactor unit at the nuclear facility. This plan shall cover:

- safe operation until end of commercial operation;
- transition to safe storage;
- staffing profiles;
- any required changes to Bruce Power programs covered in the operating licence;
- transition of the facility back to the owner for decommissioning.

Guidance:

The licensee should consider all units at a facility when developing the required plan. This is to take into consideration that units are likely to be removed from commercial service in a staggered approach such that the plan may need to cover several years.

15.8 Booster Fuel

Licence Condition 15.8:

The licensee shall store and manage booster fuel assemblies at Bruce A in a manner that ensures their physical security.

Preamble:

This LC is required for Bruce A due to the booster fuel assemblies.

Compliance Verification Criteria:

Bruce Power shall ensure the inner areas within the nuclear facility at Bruce A are protected in accordance with section 14 of the *Nuclear Security Regulations* against design basis threats and any other credible threat identified in the Threat and Risk Assessment documentation.

Guidance:

Not applicable to this LC.

15.9 Criticality Program

Licence Condition 15.9:

The licensee shall implement and maintain a nuclear criticality safety program.

Preamble:

This LC is required for Bruce A due to the booster fuel assemblies and for Bruce B due to the Low Void Reactivity Fuel (LVRF) Demonstration Irradiation. The booster fuel assemblies and LVRF bundles are currently in storage and only relevant sections of REGDOC-2.4.3, NUCLEAR CRITICALITY SAFETY are applicable. The other sections would apply only if Bruce Power proposes a change to the storage conditions.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Criticality Safety Management	BP-PROC-00324	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Nuclear Criticality Safety	REGDOC-2.4.3	2020	May 31, 2016

Bruce Power is to maintain their nuclear criticality safety program in accordance with certain sections of CNSC regulatory document REGDOC-2.4.3. Due to the presence of fissionable materials (as defined in section 2.3.1.3 of REGDOC-2.4.3) in the booster fuel assemblies at Bruce A and the LVRF bundles at Bruce B, several of the requirements listed in REGDOC-2.4.3 have been assessed as being applicable. The applicable requirements are:

Applicable Requirements in REGDOC-2.4.3	
Subject	Section
Nuclear criticality safety program relative to categorization	2.3.1.3, 2.3.1.4, 12.8
Responsibilities	2.3.2.1, 12.3.1, 12.3.2, 12.3.3
Quality Management program and procedures	2.3.2.3, 2.3.2.6
Materials control	2.3.2.4, 12.6
Operational control	2.3.2.7
Emergency procedures	2.3.2.9, 12.7
Nuclear criticality safety in the storage of fissile materials	6.0
Nuclear criticality safety training	13.0

Bruce Power is to maintain their nuclear criticality safety program in accordance with the Nuclear Criticality Safety Management procedure such that Upper Subcritical Limits established by the program will not be exceeded under both normal and credible abnormal conditions of operations with fissionable materials outside the reactors.

BP-PROC-00324 has been updated to meet the requirements of CSA standard N286-12.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Guidance for Nuclear Criticality Safety	GD-327	2010

15.10 Cobalt-60 and Lutetium-177

Licence Condition 15.10:

The licensee shall implement and maintain a program for the production of the nuclear substances Cobalt-60 and Lutetium-177.

Preamble:

Bruce Power is limited to nuclear substances production at the following locations:
- Cobalt-60 at Bruce B
- Lutetium-177 at Bruce B, Unit 7

Bruce Power harvests Cobalt-60 during the removal of Cobalt adjusters from each of the Bruce B reactors. These cobalt rods are processed into cobalt bundles that are placed in sealed containers and transported to Nordion Inc. who reprocess the bundles into sealed sources. Due to decay, Cobalt-60 sealed sources cannot be used for commercial use after many years and are shipped to Bruce Power. The sealed sources are stored in the Secondary Irradiated Fuel Bay at Bruce B NGS and upon decommissioning; they will be placed in permanent dry storage.

An Isotope Production System (IPS) in Bruce B Unit 7 is used to produce Lutetium-177 (Lu-177) from Ytterbium-176 (Yb-176) oxide powder. The powder is encapsulated in a target consisting of a sealed quartz ampule and aluminum carrier. Two zircaloy target finger tube (TFT) assemblies have been installed via vacated vertical flux detector guide tube assemblies. Using a pneumatic system, targets in their aluminum carriers are inserted into and retrieved from the reactor through the TFT assemblies. The aluminum carriers (irradiated targets) are then discharged to transport containers and shipped to processing facilities. Bruce Power is authorized to use the IPS for the production of Lu-177 at Unit 7 only.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Cobalt Handling	BP-PROC-00003	Yes
Irradiation Services	BP-PROG-18.01	No
Management of Lutetium-177 Production	BP-PROC-01120	No

LC 15.10 provides the basis for regulatory oversight related to the licensed activity associated with the radioisotopes production program. The Bruce Power licence authorizes through the licensing basis the production and possession of Cobalt-60 in both sealed and unsealed forms at the Bruce B nuclear facility. Bruce Power shall ensure that handling, processing and accounting of Cobalt is in accordance with Bruce Power's procedure for Cobalt Handling.

The receipt of any Cobalt-60 sealed sources shall be reported to the CNSC via the Sealed Source Tracking System and in accordance with CNSC regulatory document REGDOC-3.1.1.

The Bruce Power licence authorizes through the licensing basis the production, possession, transfer, packaging, managing and storing of Lutetium-177. Furthermore, the licence also authorizes the possession, transfer, use, packaging, managing and storage of nuclear substances associated with the production of Lutetium-177: radioactive ytterbium oxide (Yb_2O_3) targets. Bruce Power will require up to 300 unirradiated targets in ampules containing Yb-169, with additional radionuclides having significantly lower activities. Bruce Power is authorized to receive ampules of up to the manufacturer's specification of 600 MBq/ampule, which is greater than the Exemption Quantity (EQ).

Prohibition of Human Use

The licensee is not authorized by the licence to conduct activities related to nuclear medicine and therefore it is prohibited to use nuclear substances in or on human beings.

CNSC staff will verify by whatever means available that the licensee is not using radioactive prescribed substances in or on humans.

Guidance:
Not applicable to this LC.

15.11 Class II Nuclear Facility

Licence Condition 15.11:

The licensee shall implement and maintain a program for the operation of the Class II nuclear facility.

Preamble:

Bruce Power possesses Class II prescribed equipment and associated nuclear substances for the Class II nuclear facility as listed in B-LIST-67874-00001.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Management of Class II Nuclear Facilities	BP-PROC-00817	No
Leak Testing	BP-PROC-00143	No
Radiation Calibration Facility Safety Interlock Checks and Operation	NK29-CMP-67880-00001	No
Radiation Calibration Facility General Arrangement Drawing	NK29-DRAW-67880-10001	No
Radiation Calibration Facility Cable Block Diagram	NK29-DRAW-67880-10003	No
Nuclear Substances and Prescribed Equipment List	B-LIST-67874-00001	Yes

Licensee Documents		
Document Title	Document #	Prior Notification
Plans and Design of the Calibration Facility	NK29-CORR-00531-01343	N/A
Shielding Calculations for the Calibration Facility	NK29-CORR-00531-04839	N/A

Sealed Source Tracking

Unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission the licensee shall, in respect of a radioactive nuclear substance set out:

1) in table 15.11.1 column 1, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, export, or import of a sealed source whose corresponding activity is equal to or greater than the value set out in column 2; or
2) in B-LIST-67874-00001 section 4.0, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, import or export of any sealed source:
   (a) at least 24 hours before any transfer within Canada;
   (b) at least 7 days before any export; and
   (c) within 48 hours of any receipt of a transfer or import.

Table 15.11.1: Activity Limits

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

The written report shall be in a form acceptable to the Commission that includes:

1) on transfer or export of a sealed source(s),
   (a) the date of transfer or export,
   (b) the export licence number (where applicable),
   (c) the name of the recipient and licence number or the name of the importer,
   (d) the address of the recipient's or importer's authorized location,
   (e) the nuclear substance (radionuclide),
   (f) activity (radioactivity) (Bq) per sealed source on the reference date,
   (g) the reference date,
   (h) the number of sealed source(s),
   (i) the aggregate activity (Bq),
   (j) the sealed source unique identifiers (if available), and
   (k) where the sealed source is incorporated in a prescribed equipment,
      i. the name and model number of the equipment, and
      ii. the equipment serial number (if available)

2) on receipt or import of a sealed source(s),
   (a) the date of receipt of a transfer or import,
   (b) the name of the shipper and licence number or the name of the exporter,
   (c) the address of the shipper's or exporter's authorized location,
   (d) the nuclear substance (radionuclide),
   (e) activity (radioactivity) (Bq) per sealed source on the reference date,
   (f) the reference date,
   (g) the number of sealed source(s),
   (h) the aggregate activity (Bq),
   (i) sealed source unique identifiers (if available), and
   (j) where the sealed source is incorporated in a prescribed equipment,
      i. the name and model number of the equipment, and
      ii. the equipment serial number (if available)

Annual Compliance Report for a Class II Nuclear Facility

The licensee is required to submit to the Commission the annual compliance report by March 31 of each year. The report shall include activities covering the nuclear substances and prescribed equipment of the Class II nuclear facility as listed in this section of the LCH.

The report shall include:

- information on the activities conducted during the previous year, including a summary of workload;
- the current inventory of radiation devices, sealed sources, and unsealed sources; and
- information on any transfers or disposals.

Guidance:

Not applicable to this LC.

15.12 Nuclear Substances and Prescribed Equipment

Licence Condition 15.12:

The licensee shall implement and maintain a program for nuclear substances and prescribed equipment.

Preamble:

Bruce Power has been authorized to use the types of nuclear substances and prescribed equipment listed in B-LIST-67874-00001 and B-LIST-67874-00002.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Management of Nuclear Substances and Radiation Generating Equipment	BP-RPP-00043	No
Hopewell Designs BX-3-Box Calibrator Pre-Use Operational and Safety Interlock Checks	NK21-CMP-67870-00002	No
Hopewell Designs Inc. Model BX3 Gamma Irradiator Operations & Maintenance Manual (Version 1)	N/A	No
Hopewell Designs, Inc. Stand-Alone Irradiator Calibrator 3347-R2 User Manual	N/A	No
Instructions for the Removal/Replacement of Kinectrics KIN-FLS400 Sealed Source Assembly	N/A	No
Conduct of Radiography	BP-PROC-00036	No
Radiography Emergency Procedures	BP-PROC-00798	No
Leak Testing	BP-PROC-00143	No
Nuclear Substances and Prescribed Equipment List	B-LIST-67874-00001	Yes
Security Protected Nuclear Substances and Prescribed Equipment List	B-LIST-67874-00002	Yes

The licensee shall implement and maintain a nuclear substances and prescribed equipment program.

The licensee main support process document which describes the program for nuclear substances and prescribed equipment is BP-RPP-00043, *Management of Nuclear Substances and Radiation Generating Equipment*.

Nuclear substances and prescribed equipment are used throughout the Bruce site, subject to the requirements of the program for nuclear substances and prescribed equipment.

The licensee is authorized to conduct licensed activities with the nuclear substances and the prescribed equipment listed in B-LIST-67874-00001 and B-LIST-67874-00002 throughout the Bruce site. This includes use of the nuclear substances and the prescribed equipment to support dosimetry services authorized by CNSC licence 13152-6-27.5 and any subsequent amendments or renewals.

Prohibition of Human Use

The licensee is not authorized by the licence to conduct activities related to nuclear medicine and therefore it is prohibited to use nuclear substances in or on human beings.

CNSC staff will verify by whatever means available that the licensee is not using radioactive prescribed substances in or on humans.

List of areas, rooms and enclosures

The licensee shall maintain a list of all areas, rooms and enclosures in which more than one exemption quantity of a nuclear substance is used or stored. The allowable maximum quantities of radionuclides are found in B-LIST-67874-00001 sections 1.0 and 2.0 and B-LIST-67874-00002.

Posting of Safety Posters

The licensee shall post and keep posted, in a readily visible location in the areas, rooms or enclosures where nuclear substances are handled, a radioisotope safety poster approved by the Commission or a person authorized by the Commission, which corresponds to the classification of the area, room or enclosure.

Storage

The licensee shall:
- ensure that when in storage radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee;
- ensure that the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 microSv/h; and
- have measures in place that the dose limits in the *Radiation Protection Regulations* are not exceeded as a result of the substances or devices in storage.

Area Classification

The licensee shall classify each room, area or enclosure where more than one exemption quantity of an unsealed nuclear substance is used at a single time as:
- basic-level if the quantity does not exceed 5 Annual Limit on Intake (ALI);
- intermediate-level if the quantity used does not exceed 50 ALI;
- high-level if the quantity does not exceed 500 ALI; or
- containment-level if the quantity exceeds 500 ALI;

Except for the basic-level classification, the licensee shall not use unsealed nuclear substances in these rooms, areas or enclosures without written approval of the Commission or a person authorized by the Commission.

Contamination Meter Requirements

The licensee shall make available to workers at all times at the site of the licensed activity a properly functioning portable contamination meter.

Survey Meter Requirements

The licensee shall provide at all times where nuclear substances, except for Hydrogen-3 and Nickel-63, are handled or stored a radiation survey meter.

Contamination Criteria

The licensee shall ensure that for nuclear substances listed in table 15.12.1, Classes of Radionuclides, given below:

1) non-fixed contamination in all areas, rooms or enclosures where unsealed nuclear substances are used or stored does not exceed:
   a) 3 becquerels per square centimetre for all Class A radionuclides;
   b) 30 becquerels per square centimetre for all Class B radionuclides;
   c) 300 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres;

and

2) non-fixed contamination in all other areas does not exceed:
   a) 0.3 becquerels per square centimetre for all Class A radionuclides;
   b) 3 becquerels per square centimetre for all Class B radionuclides;
   c) 30 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres.

The most commonly licensed radionuclides have been grouped into Class A, Class B and Class C, based upon their radiological properties as shown in the table below.

Table 15.12.1: Classes of Radionuclides

Class	Radionuclide				
Class A	All alpha emitters and their daughter isotopes				
	Ag-110m	Bi-210	Co-56	Co-60	Cs-134
	Cs-137	I-124	Lu-177m	Mn-52	Na-22
	Po-210	Pu-238	Pu-239	Pu-240	Sb-124
	Sc-46	Sr-82	U-234	U-235	U-238
	V-48	Zn-65			
Class B	Au-198	Ba-133	Br-82	Ce-143	Co-58
	Cu-67	Fe-59	Hg-194	Hg-203	I-131
	Ir-192	La-140	Mo-99	Nb-95	Pa-233
	Ra-223	Re-186	Re-188	Ru-103	Sb-122
	Sm-153	Sr-90	Xe-127	Y-86	Y-90
	Yb-169	Zr-89	Zr-95		
Class C	C-11	C-14	Ca-45	Cd-109	Ce-141
	Cl-36	Co-57	Cr-51	Cu-60	Cu-61
	Cu-64	F-18	Fe-55	Ga-67	Ga-68
	Ge-68	H-3	I-123	I-125	In-111
	In-113m	In-114	K-42	Kr-85	Lu-177

Table 15.12.1: Classes of Radionuclides					
Class	Radionuclide				
	Mn-52m	Mn-56	N-13	Na-24	Nb-98
	Ni-63	O-15	P-32	P-33	Pd-103
	Pr-144	Pu-241	Rh-106	S-35	Sc-44
	Sn-113	Sr-89	Tc-94m	Tc-99	Tc-99m
	Te-127	Tl-201	V-49	W-181	W-188
	Xe-133	Zn-63			

When using more than one radionuclide in a room, the radionuclide with the lowest contamination limit must be used to determine the limit, Class A, Class B or Class C that applies to the room.

Extremity Dosimetry – Beta Emitters

The licensee shall ensure that any person who handles a container which contains more than 50 MBq of phosphorus 32, strontium 89, yttrium 90, samarium 153 or rhenium 186 wears an extremity dosimeter, such as, a ring dosimeter, a Thermoluminescent Dosimeter (TLD) chip taped to the middle finger or other acceptable dosimetry methods that may be developed in the future. The dosimeters must be supplied and read by a dosimetry service licensed by the Commission.

Internal Authorization

The licensee shall ensure that:

- internal authorizations are issued in accordance with the licensee's internal authorization policies and procedures approved by the Commission or a person authorized by the Commission;
- internal authorization forms are posted in a readily visible location in or near each room, area or enclosure where nuclear substances and radiation devices are used or stored; and
- the licensed activity is conducted in accordance with the terms and conditions of the internal authorization.

Project Approval

The licensee shall obtain written approval from the Commission or a person authorized by the Commission before starting any work requiring the use of more than 10,000 exemption quantities of a nuclear substance at a single time.

Disposal (General)

When disposing of unsealed nuclear substances set out in table 15.12.2 column 1, Disposal Limits to municipal waste, to sewer systems or to atmosphere, the licensee shall ensure that the concentration limit set out for each nuclear substance is not exceeded:

a) The concentration limits set out in column 2 apply to quantities of solid waste of less than three tonnes per building per year. Nuclear substances released to the municipal garbage system must be in solid form and uniformly distributed in the waste with a concentration that is less than the limits in column 2. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 2 shall not exceed one.
b) The limits set out in column 3 apply to the water soluble liquid form of each nuclear substance which may be disposed of per building per year. Where more than one nuclear substance is disposed of at

one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 3 shall not exceed one.

c) The concentration limits set out in column 4 may be averaged over a one-week period and apply to releases of less than 3 million cubic metres per year. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 4 shall not exceed one.

Table 15.12.2: Disposal Limits

Column 1 Nuclear Substance	Column 2 Solids to Municipal Garbage System (Qty per kg)	Column 3 Liquids (Water Soluble) to Municipal Sewer System (Qty per year)	Column 4 Gases to Atmosphere (Qty per cubic metre)
Americium 241	0.001 MBq	10 MBq	0.03 Bq
Antimony 124	0.37 MBq	0.1 MBq	N/A
Barium 133	0.037 MBq	1 MBq	N/A
Cadmium 109	0.37 MBq	10 MBq	N/A
Carbon 14	3.7 MBq	10000 MBq	N/A
Cerium 139	0.1 MBq	1 MBq	30 Bq
Cesium 134	0.01 MBq	0.1 MBq	N/A
Cesium 137	0.01 MBq	1 MBq	N/A
Chlorine 36	0.37 MBq	10000 MBq	N/A
Cobalt 57	0.37 MBq	1000 MBq	N/A
Cobalt 60	0.01 MBq	0.1 MBq	0.3 Bq
Hydrogen 3	37 MBq	1 TBq	37 kBq
Iron 55	3.7 MBq	10000 MBq	N/A
Mercury 203	0.1 MBq	10 MBq	N/A
Natural Uranium	0.01 MBq	1.4 kg	N/A
Nickel 63	0.1 MBq	10000 MBq	N/A
Niobium 95	0.01 MBq	N/A	N/A
Strontium 85	0.1 MBq	1 MBq	N/A
Strontium 90	0.1 MBq	1 MBq	0.3 Bq
Tin 113	1 MBq	N/A	N/A
Yttrium 88	0.01 MBq	0.1 MBq	3 Bq

Decommissioning

The licensee shall ensure that prior to decommissioning any area, room or enclosure where the licensed activity has been conducted:

1) the non-fixed contamination for nuclear substances listed in the licence application guide table titled "Classification of Radionuclides" does not exceed:
   a) 0.3 becquerels per square centimetre for all Class A radionuclides;
   b) 3 becquerels per square centimetre for all Class B radionuclides;
   c) 30 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres;
2) the release of any area, room or enclosure containing fixed contamination, is approved in writing by the Commission or person authorized by the Commission;
3) all nuclear substances and radiation devices have been transferred in accordance with the conditions of this licence; and
4) all radiation warning signs have been removed or defaced.

Sealed Source Tracking

Unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission the licensee shall, in respect of a radioactive nuclear substance set out:

1) in table 15.12.3 column 1, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, export, or import of a sealed source whose corresponding activity is equal to or greater than the value set out in column 2; or
2) in B-LIST-67874-00001 section 3.0 or B-LIST-67874-00002, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, import or export of any sealed source:
    a) at least 24 hours before any transfer within Canada;
    b) at least 7 days before any export; and
    c) within 48 hours of any receipt of a transfer or import.

Table 15.12.3: Activity Limits

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

The written report shall be in a form acceptable to the Commission that includes:

1) on transfer or export of a sealed source(s),
    a) the date of transfer or export,
    b) the export licence number (where applicable),
    c) the name of the recipient and licence number or the name of the importer,
    d) the address of the recipient's or importer's authorized location,
    e) the nuclear substance (radionuclide),
    f) activity (radioactivity) (Bq) per sealed source on the reference date,
    g) the reference date,
    h) the number of sealed source(s),
    i) the aggregate activity (Bq),
    j) the sealed source unique identifiers (if available), and
    k) where the sealed source is incorporated in a prescribed equipment,
        i. the name and model number of the equipment, and

ii. the equipment serial number (if available)

2) on receipt or import of a sealed source(s),
   a) the date of receipt of a transfer or import,
   b) the name of the shipper and licence number or the name of the exporter,
   c) the address of the shipper's or exporter's authorized location,
   d) the nuclear substance (radionuclide),
   e) activity (radioactivity) (Bq) per sealed source on the reference date,
   f) the reference date,
   g) the number of sealed source(s),
   h) the aggregate activity (Bq),
   i) sealed source unique identifiers (if available), and
   j) where the sealed source is incorporated in a prescribed equipment,
      i. the name and model number of the equipment, and
      ii. the equipment serial number (if available)

Annual Compliance Report for Nuclear Substances and Prescribed Equipment

The licensee is required to submit to the Commission the annual compliance report by March 31 of each year. The report shall include activities covering the nuclear substances and prescribed equipment listed in this section of the LCH.

The report shall include:
- information on the activities conducted during the previous year,
- the current inventory of radiation devices, sealed sources, and unsealed sources, and
- information on any transfers or disposals.

Import and Export Restrictions

The licensee shall not import or export any items described in the schedule, Parts A and B, to the *Nuclear Non-proliferation Import and Export Control Regulations,* without a valid import/export licence issued by the CNSC.

The import or export licence issued by the CNSC includes licence conditions to verify compliance with the *Nuclear Non-proliferation Import and Export Control Regulations*. CNSC inspectors can verify compliance by reviewing shipping documents pertaining to imports and exports.

Export Limitations – Sealed Sources

The licence does not authorize the licensee, in respect of a radioactive nuclear substance set out in table 15.12.4 column 1, to export a sealed source whose corresponding activity is equal to or greater than the value set out in column 2.

Table 15.12.4: Export Limitations

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6

Table 15.12.4: Export Limitations

Column 1 Nuclear Substance	Column 2 (TBq)
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

Import and Export of Nuclear Substances as Contamination on Equipment

The licensee is authorized to import and export nuclear substances present as contamination on equipment, subject to activity limits per package provided in table 15.12.5. It is not necessary to notify the CNSC of shipments, including destination.

Table 15.12.5: Authorized Import and Export of Nuclear Substances Present as Contamination

Unsealed Nuclear Substance	Maximum activity per package
Iron 55	400 GBq
Cobalt 60	40 GBq
Niobium 95	40 GBq
Antimony 124	40 GBq
Zirconium 95	40 GBq
Carbon 14	4 TBq
Natural Uranium	1 MBq
Activated materials	10 GBq
Fission products	10 GBq

Location Notification

The licensee shall, for any site where licensed activities are to be conducted for more than 90 consecutive days, notify the Commission in writing of the site within 7 days of starting to conduct the activities at the site. The licensee shall notify the Commission in writing within 7 days of the discontinuance of licensed activities at any site. The continuity of consecutive days is not broken during offsite use or offsite temporary storage.

Maintenance Limitations

The licence authorizes the cleaning and lubrication of the radiation devices listed in this section, in accordance with the manufacturer's operating manual.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Import and Export, Version 2	REGDOC-2.13.2	2018

APPENDIX A – Acronyms and Definitions

A.1 Acronyms

The following is the list of acronyms used in the LCH:

ADL	Administrative Dose Limits
AIA	Authorized Inspection Agency
AL	Action Levels
ALARA	As Low As Reasonably Achievable
AMP	Aging Management Plan
ASME	American Society of Mechanical Engineers
BBL	Break Before Leak
BDBA	Beyond-Design-Basis Accident
BEAU	Best Estimate Analysis and Uncertainty
BOP	Balance of Plant
BPMS	Bruce Power Management System
BRPD	Bruce Regulatory Program Division
CANDU	Canadian Deuterium Uranium
CCW	Condenser Cooling Water
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
cUL/ULC	Underwriters Laboratory of Canada
CVC	Compliance Verification Criteria
CZM-R2	Cohesive Zone-based fracture toughness Model
DBA	Design-Basis Accident
DCR	Document Change Request
DiD	Defence-in-Depth
DG	Director General
DPRR	Directorate of Power Reactor Regulation
DRL	Derived Release Limits
EAL	Environmental Action Levels
ECCC	Environment and Climate Change Canada
EFPH	Equivalent Full Power Hours
EMS	Environmental Management System
EQ	Environmental Qualification
ERA	Environmental Risk Assessment
FFSG	Fitness for Service Guidelines
Heq	Hydrogen Equivalent Concentration
HTO	Hydrogenated Tritium Oxide (Tritium)
I&C	Instrumentation and control
IAEA	International Atomic Energy Agency
ICI	In-service Inspection
IFB	Industrial Fire Brigade
IIP	Integrated Implementation Plan
IUCs	Instrument Uncertainty Calculations
LC	Licence Condition
LCH	Licence Conditions Handbook
LCMP	Life Cycle Management Plans

LOE	Limit of Operating Envelope
LVRF	Low Void Reactivity Fuel
mfp	Mixed Fission Products
MECP	Ministry of Environment, Conservation and Parks
NCB	National Certification Body
NDE	Non-destructive Examination
NEW	Nuclear Energy Worker
NFPA	National Fire Protection Association
NGS	Nuclear Generating Station
NMAR	Nuclear Material Accountancy Reporting
NOP/ROP	Neutron Overpower Protection/Regional Overpower Protection
NPP	Nuclear Power Plant
NSCA	*Nuclear Safety and Control Act*
OP&P	Operating Policies and Principles
OPEX	Operating Experience
OPG	Ontario Power Generation Inc.
OSRs	Operational Safety Requirements
ppm	Parts per million
PBQA	Pressure Boundary Quality Assurance
PCA	Probabilistic Core Assessment
PFP	Probabilistic Fracture Protection
PIDP	Public Information and Disclosure Program
PIP	Periodic Inspection Program
PLBB	Probabilistic assessment of Leak-Before-Break
PROL	Nuclear Power Reactor Operating Licence
PSA	Probabilistic Safety Assessment
PSR	Periodic Safety Review
ROE	Realistic Operating Envelope
RPD	Regulatory Program Division
SAMGs	Severe Accident Management Guidelines
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SCC	Standards Council of Canada
SCO	Station Containment Outage
SFC	Single Failure Criterion
SOE	Safe Operating Envelope
SPOC	Single Point of Contact
SQ	Seismic Qualification
SSCs	Structures, systems and components
VB	Vacuum Building
WN	Written Notification [document]

A.2 Definitions

The following is a list of definitions of words or expressions used in the LCH that may need clarification. Unless a reference source is provided in parenthesis, the words or expressions have been defined for the purpose of the LCH. Additional definitions could be found in REGDOC-3.6, GLOSSARY OF CNSC TERMINOLOGY.

Accept/ed/able/ance

Meet regulatory requirements, which mean it is in compliance with regulatory documents or technical standards referenced in the licence.

Approval

Commission's permission to proceed, for situations or changes where the licensee would be:

- not compliant with a regulatory requirements set out in applicable laws and regulations; or
- not compliant with a licence condition; or
- not in the safe direction but the objective of the licensing basis is met.

Boundary conditions (context differs from REGDOC-3.6)

Procedural, administrative rules and operating limits for ensuring safe operation of the facility based on safety analysis. It also includes any applicable regulatory requirements.

Certified staff

Trained licensee staff, certified by the Commission to be competent in completing tasks identified in their respective roles.

Compliance verification criteria

Criteria used by CNSC staff to verify compliance with a licence condition. CVC provides the licensee and CNSC staff with detailed information to clarify regulatory requirements for compliance purposes.

Consent

Written permission to proceed, given by CNSC delegated authority, for situations or changes where the licensee would:

- comply with a regulatory requirements set out in applicable laws and regulations;
- comply with a licence condition; and
- not adversely impact the licensing basis.

Effective date

The date that a given document becomes incorporated into the licensing basis within the licensing period.

Extent of condition

Means an evaluation to determine if an issue has potential or actual applicability to other activities, processes, equipment, programs, facilities, operations or organizations.

Graduated enforcement

A process for escalating enforcement action. If initial enforcement action does not result in timely compliance, gradually more severe enforcement actions may need to be used. It takes into account such things as:

- the risk significance of the non-compliance with respect to health, safety, security, the environment and international obligations;
- the circumstances that lead to the non-compliance (including acts of willfulness);
- previous compliance record; and
- operational and legal constraints (for example, Directive on the Health of Canadians)
- industry specific strategies.

Levels 1 and 2 Outage Plans

A level 1 outage plan is a schedule which identifies the key components of the finalized critical path, major projects and programs. A level 2 outage plan is a schedule which identifies the system windows with durations.

Program(s)

A documented group of planned activities, procedures, processes, standards and instructions coordinated to meet a specific purpose.

Qualified staff

Trained licensee staff, deemed competent and qualified to carry out tasks associated to their respective positions.

Guidance

These are non-mandatory suggestions on how to comply with the licence condition. Guidance may include regulatory advice and/or recommended industry best practices to guide the licensee towards a higher level of safety and/or fully satisfactory performance/implementation of its programs.

Safe direction

Means changes in plant safety levels which would not result in:

- a reduction in safety margins,
- a breakdown of barrier,
- an increase (in certain parameters) above accepted limits,
- an increase in risk,
- impairment(s) of special safety systems,
- an increase in the risk of radioactive releases or spills of hazardous substances,
- injuries to workers or members of the public,
- introduction of a new hazard,
- reduction of the defense-in-depth provisions,
- reducing the capability to control, cool and contain the reactor while retaining the adequacy thereof, and
- causing hazards or risks different in nature or greater in probability or magnitude than those stated in the safety analysis of the nuclear facility.

Safety and control measures

Criteria used in assessing the compliance of a licence application with regulatory requirements. These measures or provisions demonstrate that the applicant:

(i) is qualified to carry on the licensed activities, and
(ii) has made adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and any measures required to implement international obligations to which Canada has agreed.

Shall

Is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the licence.

APPENDIX B – List of All Version-Controlled Documents

Table B.1 – All Canadian Standards Association (CSA) Documents

Document #	Document Title	Issue Date	L.C.
N286	Management system requirements for nuclear facilities	2012	1.1
N290.15	Requirements for the safe operating envelope for nuclear power plants	2010 Update 1 (2016)	3.1
N286.7	Quality assurance of analytical, scientific, and design computer programs	2016	4.1
N290.12	Human factors in design for nuclear power plants	2014	5.1
N290.14	Qualification of digital hardware and software for use in instrumentation and control applications for nuclear power plants	2015	5.1
N291	Requirements for safety-related structures for nuclear power plants (2015)	2015	5.1, 6.1
N285.0	General requirements for pressure-retaining systems and components in CANDU nuclear power plants	2012 Update No. 1 (Sep. 2013) & Update No. 2 (Nov. 2014)	5.2
N289.1	General requirements for seismic design and qualification of CANDU nuclear power plants	2008	5.3
N289.2	Ground motion determination for seismic qualification of CANDU nuclear power plants	2010	5.3
N289.3	Design procedures for seismic qualification of CANDU nuclear power plants	2010	5.3
N289.4	Testing procedures for seismic qualification of nuclear power plant structures, systems, and components	2012	5.3
N289.5	Seismic instrumentation requirements for nuclear power plants and nuclear facilities	2012	5.3
N290.13	Environmental qualification of equipment for CANDU nuclear power plants	2018	5.3
N285.4	Periodic inspection of CANDU nuclear power plant components	2014	6.1
N285.5	Periodic inspection of CANDU nuclear power plant containment components	2018	6.1
N285.7	Periodic inspection of CANDU nuclear power plant balance of plant systems and components	2015	6.1
N285.8	Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors	2021	6.1
N287.7	In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plant components	2008	6.1

Table B.1 – All Canadian Standards Association (CSA) Documents			
Document #	Document Title	Issue Date	L.C.
N288.1	Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities	2020	9.1
N288.4	Environmental monitoring program at Class I nuclear facilities and uranium mines and mills	2010	9.1
N288.5	Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills	2011	9.1
N288.6	Environmental risk assessments at Class I nuclear facilities and uranium mines and mills	2012	9.1
N288.7	Groundwater protection programs at Class I nuclear facilities and uranium mines and mills	2015	9.1
N288.8	Establishing and implementing action levels for releases to the environment from nuclear facilities	2017	9.1
N292.3	Management of low- and intermediate-level radioactive waste	2014	11.1
N290.7	Cyber security for nuclear power plants and small reactor facilities	2014	12.1
N293	Fire protection for nuclear power plants	2012 (R2017)	10.2
N393	Fire protection for facilities that process, handle, or store nuclear substances	2022	10.2

CSA standards are the proprietary of the Canadian Standards Association (CSA Group) and are covered by copyright law. The CNSC has an online subscription (licence agreement) with the CSA Group for CNSC staff to access the nuclear standards ("my subscription"). The public has read-only access through the following platform:

https://community.csagroup.org/community/nuclear

CNSC staff may access standards and codes via e-Access – folder #4021465 – maintained by the Regulatory Framework Division.

Table B.2 – All CNSC documents			
Document #	Document Title	Issue Date	L.C.
REGDOC-3.2.1	Public Information and Disclosure	May 2018	G.5
REGDOC-2.1.2	Safety Culture	April 2018	1.1
REGDOC-2.2.4	Fitness for Duty: Managing Worker Fatigue	March 2017	2.1
REGDOC-2.2.4	Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3	January 2021	2.1
REGDOC-2.2.2	Personnel Training, Version 2	Dec. 2016	2.3
REGDOC-2.2.3	Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2	Oct. 2023	2.4
REGDOC-2.3.2	Accident Management: Severe Accident Management Programs for Nuclear Reactors, Version 2	Sep. 2015	3.1
REGDOC-2.4.5	Nuclear Fuel Safety and Qualification	April 2024	3.2
REGDOC-3.1.1	Reporting Requirements: Nuclear Power Plants, Version 3	May 2024	3.3
REGDOC-2.4.1	Deterministic Safety Analysis	May 2014	4.1
REGDOC- 2.4.2	Probabilistic Safety Assessment (PSA) For Nuclear Power Plants	May 2014	4.1
REGDOC-2.6.1	Reliability Programs for Nuclear Power Plants	August 2017	6.1
REGDOC-2.6.2	Maintenance Programs for Nuclear Power Plants	August 2017	6.1
REGDOC-2.6.3	Aging Management	March 2014	6.1
REGDOC- 2.9.1	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	Sep. 2020	9.1
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response, V2	Feb. 2016	10.1
REGDOC-2.2.4	Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness	Sep. 2018	12.1
REGDOC-2.12.1	High-Security Facilities, Vol. I: Nuclear Response Force, Version 2	Sep. 2018	12.1
REGDOC-2.12.1	High-Security Facilities, Vol. II: Criteria for Nuclear Security Systems and Devices	April 2018	12.1
REGDOC-2.12.2	Site Access Security Clearance	April 2013	12.1
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources	May 2013	12.1
REGDOC-2.13.1	Safeguards and Nuclear Material Accounting	February 2018	13.1
REGDOC-2.3.3	Periodic Safety Reviews	April 2015	15.6
REGDOC-2.4.3	Nuclear Criticality Safety, Version 1.1	Sep. 2020	15.9

ALL CNSC REGULATORY DOCUMENTS CAN BE FOUND ON THE CNSC WEBSITE: https://www.cnsc-ccsn.gc.ca

Any superseded regulatory document may be requested through the email account: consultation@cnsc-ccsn.gc.ca

Table B.3 - Other Documents referenced in the LCH under CVC				
Document #	Document Title	Date	L.C.	e-Docs #
EG1	Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants	July 2005	2.3	3402702
EG2	Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants	June 2004	2.3	3402705
N/A	Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants	May 2009	2.3	3436327

APPENDIX C – List of Documents used as Guidance

Table C.1 – Other Codes or Standards to be used as guidance		
Document #	Document Title	L.C.
CSA N286.0.1	Commentary on N286-12, Management system requirements for nuclear facilities (2021)	1.1
CSA N290.11	Requirements for heat removal capability during outage of nuclear power plants (2013)	3.1
CSA N290.16	Requirements for beyond design basis accidents (2016)	3.1
COG-09-9030	Principles & Guidelines For Deterministic Safety Analysis, CANDU Owners Group, Safety Analysis Improvement Task Team	3.2
COG-12-2049	Fuel and Pressure Tube Fitness-For-Service Criteria for LOF, SBLOCA and Slow LORC	3.2
CSA N290.17	Probabilistic safety assessment for nuclear power plants (2017)	4.1
CSA N292.1	Wet storage of irradiated fuel and other radioactive materials (2016)	4.1
CSA N292.2	Interim dry storage of irradiated fuel (2013)	4.1
COG-09-9030	Principles & Guidelines For Deterministic Safety Analysis	4.1
COG-11-9023	Guidelines for Application of the LOE/ROE Methodologies to Deterministic Safety Analysis	4.1
COG-06-9012	Guidelines for Application of the Best Estimate Analysis and Uncertainty (BEAU) Methodology to Licensing Analysis	4.1
COG-08-2078	Principles and Guidelines for NOP/ROP Trip Setpoint Analysis for CANDU Reactors	4.1
CSA N286.10	Configuration management for high energy reactor facilities (2016, R2021)	5.1
CSA N287.1	General requirements for concrete containment structures for CANDU nuclear power plants (2014)	5.1
CSA N287.2	Material requirements for concrete containment structures for CANDU nuclear power plants (2008)	5.1
CSA N287.3	Design requirements for concrete containment structures for CANDU nuclear power plants (2014)	5.1
CSA N287.4	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants (2009)	5.1
CSA N287.5	Examination and testing requirements for concrete containment structures for CANDU nuclear power plants (2011)	5.1
CSA N287.6	Pre-operational proof and leakage rate testing requirements for concrete containment structures for CANDU nuclear power plants (2011)	5.1
CSA N290.0	General requirements for safety systems of nuclear power plants (2011)	5.1
CSA N290.1	Requirements for the shutdown systems of CANDU nuclear power plants (2013)	5.1
CSA N290.2	Requirements for emergency core cooling systems of nuclear power plants (2011)	5.1
CSA N290.3	Requirements for the containment system of nuclear power plants (2016)	5.1
CSA N290.4	Requirements for reactor control systems of nuclear power plants (2011)	5.1
CSA N290.5	Requirements for electrical power and instrument air systems of CANDU nuclear power plants (2016)	5.1

Table C.1 – Other Codes or Standards to be used as guidance		
Document #	Document Title	L.C.
CSA N290.6	Requirements for monitoring and display of nuclear power plant safety functions in the event of an accident (2009, R2014)	5.1
(USNRC) UFC-3-340-02	Unified Facilities Criteria – Structures to Resist the Effects of Accidental Explosions	5.1
ASME B31.1	Power Piping	5.2
ASME B31.3	Process Piping	5.2
ASME B31.5	Refrigeration Piping and Heat Transfer Components	5.2
ASME	Boiler and Pressure Vessel Code – Code Cases	5.2
CSA B51	Boiler, Pressure Vessel and Piping Code	5.2
CSA N285.0	General requirements for pressure-retaining systems and components in CANDU nuclear power plants (2017)	5.2
COG-05-9011	Interim Implementation Guidelines for CANDU Nuclear Plant Reliability Programs	6.1
CSA N285.4	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants (2014)	6.1
CSA N287.8	Aging management for concrete containment structures for nuclear power plants (2015)	6.1
CSA N290.9	Reliability and maintenance programs for nuclear power plants (2019)	6.1
CSA N288.3.4	Performance testing of nuclear air-cleaning systems at nuclear facilities (2013)	9.1
CSA N288.9	Guideline for design of fish impingement and entrainment programs at nuclear facilities (2018)	9.1
CSA N1600	General requirements for nuclear emergency management programs (2016)	10.1
NEI 00-01	Guidance for Post Fire Safe Shutdown Circuit Analysis	10.2
CSA N393-12	Fire protection for facilities that process, handle, or store nuclear substances	10.2
CSA N292.0	General principles for the management of radioactive waste and irradiated fuel (2014)	11.1
CSA N292.1	Wet storage of irradiated fuel and other radioactive materials (2016)	11.1
CSA N292.2	Interim dry storage of irradiated fuel	11.1
N/A	TBS Standard on Security Screening	12.1
CSA N292.5	Guideline for the exemption of clearance from regulatory control of materials that contain, or potentially contain, nuclear substances (2011, R2021)	11.1
CSA N292.6	Long-term management of radioactive waste and irradiated fuel	11.1
IAEA	IAEA Nuclear Security Series No. 4 Technical Guidance: Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage	12.1
IAEA	IAEA Nuclear Security Series No. 13 Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)	12.1
IAEA	IAEA Nuclear Security Series No. 17 Technical Guidance: Computer Security at Nuclear Facilities	12.1
IAEA	IAEA Nuclear Security Series No 33-T Technical Guidance: Computer Security of Instrumentation and Control Systems at Nuclear Facilities	12.1

Table C.1 – Other Codes or Standards to be used as guidance		
Document #	Document Title	L.C.
COG JP-4491-V197	Fuel Channel Life Management – Third Party Review of Probabilistic Fracture Protection Evaluation Methodology Acceptance Criteria (2017)	15.3
IAEA	Specific Safety Guide Series No. SSG-28 Commissioning for Nuclear Power Plants	15.5
IAEA	Specific Safety Requirements Series No. SSR-2/2 Safety of Nuclear Power Plants: Commissioning and Operation	15.5
CSA N290.18	Periodic safety review for nuclear power plants (2017)	15.6
IAEA	Specific Safety Guide No. SSG-25 Periodic Safety Review for Nuclear Power Plants	15.6

Canadian standards/codes and international documents can be found on the internet under the organization's website. CNSC staff may access standards and codes via e-Access folder #4021465 – maintained by the Regulatory Framework Division.

Table C.2 – Other CNSC documents referenced in the LCH

Document #	Document Title	L.C.
REGDOC-3.5.3	Regulatory Fundaments, Version 3 (2023)	G.1
REGDOC-3.2.1	Public Information and Disclosure (2018)	G.5
REGDOC-3.2.2	Indigenous Engagement, Version 1.2 (2022)	G.5
REGDOC-2.1.1	Management System (2019)	1.1
REGDOC-2.2.1	Human Factors (2019)	2.1
REGDOC-2.2.5	Minimum Shift Complement (2019)	2.2
REGDOC-2.5.1	General Design Considerations: Human Factors	2.2, 5.1
REGDOC-2.5.2	Design of Reactor Facilities: Nuclear Power Plants (2014)	5.1
REGDOC-2.7.1	Radiation Protection (2021)	7.1
REGDOC-2.7.2	Dosimetry, Volume I: Ascertaining Occupational Dose	7.1
REGDOC-2.8.1	Conventional Health and Safety (2019)	8.1
REGDOC-2.12.1	High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices (2018)	12.1
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1 (2020)	12.1
REGDOC-2.13.2	Import and Export, Version 2 (2018)	13.1 15.12
REGDOC-2.14.1	Packaging and Transport: Information Incorporated by Reference in Canada's *Packaging and Transport of Nuclear Substances Regulations*, 2015, Volume I, Version 2 (2021)	14.1
REGDOC-2.3.1	Conduct of Licensed Activity: Construction and Commissioning Programs (2016)	15.5
GD-327	Guidance for Nuclear Criticality Safety (2010)	15.9

ALL CNSC REGULATORY DOCUMENTS CAN BE FOUND ON THE CNSC WEBSITE:
https://www.cnsc-ccsn.gc.ca

APPENDIX D – List of Licensee Documents Requiring Written Notification

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
GENERAL			
BP-PROG-03.01	Document Management	At Implementation	G.2
BP-PROC-00166	Management of Program, Procedure and Internal Standard Documents	At Implementation	G.2
NK37-DRAW-10200-10001	Site Facilities Plan of the Bruce Nuclear Power Development Lots 11 to 28 and Part of 29 and 30	Prior to Implementation	G.3
NK21-SR-01320-00001	Bruce A Safety Report Part 1: Plant and Site Description	Prior to Implementation	G.3
NK29-SR-01320-00001	Bruce B Safety Report Part 1: Plant and Site Description	Prior to Implementation	G.3
BP-PROG-09.02	Stakeholder Engagement	At Implementation	G.5
MANAGEMENT SYSTEM			
BP-MSM-1	Management System Manual	Prior to Implementation	1.1
BP-PROG-16.01	Conduct of Business	Prior to Implementation	1.1
BP-PROG-05.01	Supply Chain	At Implementation	1.1
BP-PROG-15.01	Compliance Internal Audit	At Implementation	1.1
BP-PROG-14.01	Project Management and Construction	At Implementation	1.1
BP-PROG-14.02	Contractor Management	At Implementation	1.1
BP-PROC-00001	Organization Structure Change	At Implementation	1.1
BP-PROG-17.01	Quality Assurance Program	Prior to Implementation	1.1
HUMAN PERFORMANCE MANAGEMENT			
BP-PROC-00005	Limits to Hours of Work	Prior to Implementation	2.1
BP-PROG-16.01	Conduct of Business	Prior to Implementation	2.1
BP-PROC-00610	Fitness For Duty	At Implementation	2.1
GRP-OPS-00055	Fitness for Duty Considerations for Shift Complement Staff Held Over for More than 13 Hours	At Implementation	2.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
BP-STND-00152	Bruce Power Shift Complement and Fitness for Duty Standard for any complement staff exceeding a 12-hour shift	Prior to Implementation	2.2
BP-PROG-02.01	Human Resources Management	At Implementation	2.1
BP-PROG-02.02	Worker Learning and Qualification	At Implementation	2.3
BP-PROC-01071	Systematic Approach to Training Process	Prior to Implementation	2.3
BP-STND-00153	Bruce Power Shift Operations Role Descriptions and Certification Maintenance Requirements for Licence Related Positions	Prior to Implementation	2.4
BP-STND-00092	Certification Training – Development and Administration of Comprehensive Written and Oral Examinations for Certification Training	Prior to Implementation	2.4
BP-STND-00038	Certification Training Examinations – Standards for Development and Administration of Closed Reference Multiple Choice Questions for Initial General Certification Written Examinations EG1	Prior to Implementation	2.4
BP-STND-00093	Certification Testing & Examinations - Development and Administration of Comprehensive Simulator-Based Examinations for INITIAL Certification Training Programs	At Implementation	2.4
BP-STND-00085	Certifications Training Examinations - Standards for Initial Certification Comprehensive Simulator-Based Examinations (CTS, DTS, PCTS)	At Implementation	2.4
OPERATING PERFORMANCE			
BP-OPP-00001	Operating Policies and Principles – Bruce B	Prior to Implementation	3.1
BP-OPP-00002	Operating Policies and Principles – Bruce A	Prior to Implementation	3.1
BP-OPP-00003	Operating Policies and Principles – Central Maintenance and Laundry Facility	Prior to Implementation	3.1
BP-PROG-12.01	Conduct of Plant Operations	At Implementation	3.1
NK21-OSR-31000-00001	Operational Safety Requirements for Bruce A Fuel and Reactor Physics	At Implementation	3.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK21-OSR-32000-00001	Operational Safety Requirements for Bruce A Moderator System	At Implementation	3.1
NK21-OSR-33100-00001	Bruce A NGS: Operational Safety Requirements for Heat Transport System	At Implementation	3.1
NK21-OSR-34110-00001	Operational Safety Requirements for Bruce A End Shield Cooling System	At Implementation	3.1
NK21-OSR-34200-00004	Operational Safety Requirements for Bruce A Containment System	At Implementation	3.1
NK21-OSR-34340-00003	Operational Safety Requirements for Bruce A Emergency Coolant Injection System	At Implementation	3.1
NK21-OSR-34360-00001	Operational Safety Requirements for Bruce A Powerhouse Emergency Venting System	At Implementation	3.1
NK21-OSR-34700-00001	Operational Safety Requirements for Bruce A Shutdown and Maintenance Cooling Systems	At Implementation	3.1
NK21-OSR-34980-00001	Operational Safety Requirements for Bruce A Annulus Gas System	At Implementation	3.1
NK21-OSR-35000-00001	Operational Safety Requirements for Bruce A Fuel Handling	At Implementation	3.1
NK21-OSR-36100-00001	Operational Safety Requirements for Bruce A Main Steam Supply System	At Implementation	3.1
NK21-OSR-38330/21175-00001	Operational Safety Requirements for Bruce A Confinement	At Implementation	3.1
NK21-OSR-43200-00001	Operational Safety Requirements for Bruce A Feedwater and Condensate System	At Implementation	3.1
NK21-OSR-53000/55000-00001	Operational Safety Requirements for Bruce A Electrical System	At Implementation	3.1
NK21-OSR-54400-00001	Operational Safety Requirements for Bruce A Qualified Power Supply System	At Implementation	3.1
NK21-OSR-60060-00001	Operational Safety Requirements for Bruce A Critical Safety Parameter Monitoring	At Implementation	3.1
NK21-OSR-63710-00001	Operational Safety Requirements for Bruce A Reactor Regulating System	At Implementation	3.1
NK21-OSR-63720-63730-00001	Operational Safety Requirements for Bruce A Shutdown Systems	At Implementation	3.1
NK21-OSR-71310-00001	Operational Safety Requirements for Bruce A Service Water Systems	At Implementation	3.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK21-OSR-71910-00001	Operational Safety Requirements for Bruce A Emergency Boiler Cooling System	At Implementation	3.1
NK29-OSR-31000-00001	Operational Safety Requirements for Bruce B Fuel and Reactor Physics	At Implementation	3.1
NK29-OSR-32000-00001	Operational Safety Requirements for Bruce B Moderator System	At Implementation	3.1
NK29-OSR-33000-00001	Operational Safety Requirements for Bruce B Heat Transport System	At Implementation	3.1
NK29-OSR-34110-00001	Operational Safety Requirements for Bruce B End Shield Cooling System	At Implementation	3.1
NK29-OSR-34200-00001	Operational Safety Requirements for Bruce B Containment System	At Implementation	3.1
NK29-OSR-34340-00001	Operational Safety Requirements for Bruce B Emergency Coolant Injection System	At Implementation	3.1
NK29-OSR-34360-00001	Operational Safety Requirements for Bruce B Powerhouse Emergency Venting System	At Implementation	3.1
NK29-OSR-34700-00001	Operational Safety Requirements for Bruce B Shutdown and Maintenance Cooling Systems	At Implementation	3.1
NK29-OSR-34980-00001	Operational Safety Requirements for Bruce B Annulus Gas System	At Implementation	3.1
NK29-OSR-35000-00001	Operational Safety Requirements for Bruce B Fuel Handling	At Implementation	3.1
NK29-OSR-36100-00001	Operational Safety Requirements for Bruce B Main Steam Supply System	At Implementation	3.1
NK29-OSR-38330-21190-00001	Operational Safety Requirements for Bruce B Confinement	At Implementation	3.1
NK29-OSR-43200-00001	Operational Safety Requirements for Bruce B Feedwater and Condensate System	At Implementation	3.1
NK29-OSR-53000/55000-00001	Operational Safety Requirements for Bruce B Electrical System	At Implementation	3.1
NK29-OSR-54300-00001	Operational Safety Requirements for Bruce B Emergency Power Supply System	At Implementation	3.1
NK29-OSR-60060-00001	Operational Safety Requirements for Bruce B Critical Safety Parameter Monitoring	At Implementation	3.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK29-OSR-63710-00001	Operational Safety Requirements for Bruce B Reactor Regulating System	At Implementation	3.1
NK29-OSR-63720-63730-00001	Operational Safety Requirements for Bruce B Shutdown Systems	At Implementation	3.1
NK29-OSR-71310-00001	Operational Safety Requirements for Bruce B Service Water Systems	At Implementation	3.1
NK29-OSR-71380-00001	Operational Safety Requirements for Bruce B Emergency Water System	At Implementation	3.1
NK37-CORR-00531-02784	Bruce Power Safeguards Site Plan 2015	At Implementation	3.1
BP-STND-00222	Station Transient Operations	Prior to Implementation	3.2
BP-PROC-01139	Operational Decision Making	At Implementation	3.2
DIV-ENG-00004	Engineering Evaluation	At Implementation	3.2
BP-PROG-06.01	Nuclear Regulatory Affairs	At Implementation	3.3
SAFETY ANALYSIS			
NK21-SR-01320-00002, Part 2	Bruce A Safety Report Part 2: Plant Components and Systems	Prior to Implementation	4.1
NK29-SR-01320-00001, Part 2	Bruce B Safety Report Part 2: Plant Components and Systems	Prior to Implementation	4.1
NK21-SR-01320-00003, Part 3	Bruce A Safety Report Part 3: Safety Analysis	Prior to Implementation	4.1
NK29-SR-01320-00002, Part 3	Bruce B Safety Report Part 3: Safety Analysis	Prior to Implementation	4.1
BP-PROC-00659	Severe Accident Management	At Implementation	4.1
PHYSICAL DESIGN			
BP-PROG-10.01	Configuration Management	Prior to Implementation	5.1
BP-PROC-01081	Engineering Change Control	At Implementation	5.1
BP-QMAN-00002	Pressure Boundary Quality Assurance (PBQA) Manual	At Implementation	5.2
B-LIST-01900-00001	Index to Pressure Boundary Program Elements (CSA N285.0-12 Table N.1)	At Implementation	5.2
DIV-ENG-00017	System and Item Classification	Prior to Implementation	5.2
DIV-ENG-00018	Design Registration and Reconciliation	At Implementation	5.2
BP-STND-00126	Environmental Qualification Program Requirements	At Implementation	5.3
FITNESS FOR SERVICE			
BP-PROG-11.04	Plant Maintenance	At Implementation	6.1
BP-PROG-11.01	Equipment Reliability	At Implementation	6.1

Table D – List of licensee documents requiring written notification				
Document #	Document Title		Notification Requirements	L.C.
NK21-PIP-21100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)	Prior to Implementation	6.1
NK21-PIP-25100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Vacuum Building	Prior to Implementation	6.1
NK29-PIP-21100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)	Prior to Implementation	6.1
NK29-PIP-25100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Vacuum Building	Prior to Implementation	6.1
BP-PROC-00815	N287.7	Visual Inspection of Containment Boundary Components	Prior to Implementation	6.1
NK21-PIP-03641.2-00001	N285.4	Bruce A Periodic Inspection Plan Units 1, 2, 3 and 4	Prior to Implementation	6.1
NK29-PIP-03641.2-00001	N285.4	Bruce B Periodic Inspection Plan Units 5, 6, 7 and 8	Prior to Implementation	6.1
B-PIP-31100-00002	N285.4	Bruce Nuclear Generating Station Fuel Channel Periodic Inspection Program	Prior to Implementation	6.1
NK21-PIP-03642-00001	N285.5	Bruce A NGS N285.5 Periodic Inspection Plan for Unit 0 and Units 1 to 4 Containment Components	Prior to Implementation	6.1
NK29-PIP-03642-00001	N285.5	Bruce B Periodic Inspection Plan for Unit 0 and Units 5 to 8 Containment Components	Prior to Implementation	6.1
B-LCM-20000-00001	Life Cycle Management Plan for Safety Related Civil Structures		Prior to Implementation	6.1
B-LCM-31100-00001	Fuel Channel Life Cycle Management Plan		Prior to Implementation	6.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
B-PIP-33110-00001	Steam Generator and Preheater Periodic Inspection Plan	Prior to Implementation	6.1
B-PIP-33126-00001	PHT Feeder Piping Periodic Inspection Plan	Prior to Implementation	6.1
BP-PROG-11.02	On-Line Work Management Program	At Implementation	6.1
BP-PROG-11.03	Outage Work Management	At Implementation	6.1
BP-PROG-12.02	Chemistry Management	At Implementation	6.1
B-REP-31100-00010	Evaluation Process of Pressure Tube Fitness-for-Service Using CSA N285.8	Prior to Implementation	6.1
RADIATION PROTECTION			
BP-PROG-12.05	Radiation Protection Program	Prior to Implementation	7.1, 11.1
BP-RPP-00044	ALARA Program	At Implementation	7.1
BP-PROC-00280	Dosimetry Requirements	Prior to Implementation	7.1
BP-RPP-00009	Dose Limits and Exposure Control	Prior to Implementation	7.1
CONVENTIONAL HEALTH AND SAFETY			
BP-PROG-00.06	Health and Safety Management	At Implementation	8.1
ENVIRONMENTAL PROTECTION			
BP-PROG-00.02	Environmental Management	Prior to Implementation	9.1
NK21-REP-03482-00002	Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station A	Prior to Implementation	9.1
NK29-REP-03482-00003	Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station B	Prior to Implementation	9.1
NK37-REP-03482-00001	Derived Release Limits and Environmental Action Levels for Central Maintenance and Laundry Facility	Prior to Implementation	9.1
NK37-REP-03482-00002	Derived Release Limits and Environmental Action Levels for Central Storage Facility (CSF)	Prior to Implementation	9.1
BP-STND-00049	Radiological Emissions and Effluent Monitoring	Prior to Implementation	9.1
EMERGENCY MANAGEMENT AND FIRE PROTECTION			
BP-STND-00001	Bruce Power Nuclear Emergency Response Plan	Prior to Implementation	10.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
BP-PLAN-00005	Radioactive Material Transportation Emergency Response Plan	At Implementation	10.1
BP-PROG-08.01	Emergency Management and Fire Protection	At Implementation	10.1
BP-STND-00166	Fire Safety Management	At Implementation	10.2
BP-PLAN-00006	Conventional Emergency Plan	At Implementation	10.2
WASTE MANAGEMENT			
BP-PROG-12.03	Nuclear Fuel Management	At Implementation	11.1
BP-PROG-12.05	Radiation Protection Program	Prior to Implementation	7.1, 11.1
SECURITY			
BP-PROG-08.02	Nuclear Security	Prior to Implementation	12.1
BP-PROC-00784	Cyber Security	At Implementation	12.1
B-REP-08160-00001	Site Security Plan	Prior to Implementation	12.1
N/A	Tactical Response Plan	Prior to Implementation	12.1
SAFEGUARDS			
NK21-OM-35370	Safeguards Operating Manual (Bruce A) U0 F/H	At Implementation	13.1
NK29-OM-35370	Safeguards Operating Manual (Bruce B) U0 F/H	At Implementation	13.1
PACKAGING AND TRANSPORT			
BP-PROC-00188	Radioactive Material Transportation	At Implementation	14.1
NUCLEAR FACILITY-SPECIFIC			
BP-PROC-00324	Nuclear Criticality Safety Management	Prior to Implementation	15.9
BP-PROC-00003	Cobalt Handling	Prior to Implementation	15.10
BP-PROG-18.01	Irradiation Services	At Implementation	15.10
BP-PROC-01120	Management of Lutetium-177 Production	At Implementation	15.10
BP-PROC-00817	Management of Class II Nuclear Facilities	At Implementation	15.11
BP-PROC-00143	Leak Testing	At Implementation	15.11, 15.12

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK29-CMP-67880-00001	Radiation Calibration Facility Safety Interlock Checks and Operation	At Implementation	15.11
NK29-DRAW-67880-10001	Radiation Calibration Facility General Arrangement Drawing	At Implementation	15.11
NK29-DRAW-67880-10003	Radiation Calibration Facility General Arrangement Drawing	At Implementation	15.11
B-LIST-67874-00001	Nuclear Substances and Prescribed Equipment List	Prior to Implementation	15.11, 15.12
BP-RPP-00043	Management of Nuclear Substances and Radiation Generating Equipment	At Implementation	15.12
NK21-CMP-67870-00002	Hopewell Designs BX-3-Box Calibrator Pre-Use Operational and Safety Interlock Checks	At Implementation	15.12
BP-PROC-00036	Conduct of Radiography	At Implementation	15.12
BP-PROC-00798	Radiography Emergency Procedures	At Implementation	15.12
B-LIST-67874-00002	Security Protected Nuclear Substances and Prescribed Equipment List	Prior to Implementation	15.12

Canada's Nuclear Regulator

e-Docs # ~~7161886~~ 7643979
(Word)

e-Docs # ~~7474949~~ XXX
(PDF)

LICENCE CONDITIONS HANDBOOK

LCH-PR-18.04/2028-~~R005~~R006

BRUCE NUCLEAR GENERATING STATIONS A AND B NUCLEAR POWER REACTOR OPERATING LICENCE LICENCE # PROL 18.04/2028

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canada

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Licence Conditions Handbook

LCH-PR-18.04/2028-~~R005~~R006

Bruce Nuclear Generating Stations A and B Nuclear Power Reactor Operating Licence

PROL 18.04/2028

Effective:
~~March~~ XXXX ~~04~~XX, ~~2025~~XXX

SIGNED at OTTAWA this ~~4th~~ XXth day of ~~March~~ XX ~~2025~~XXXX

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Alexandre Viktorov, Ph.D.

Director General
Directorate of Power Reactor Regulation
CANADIAN NUCLEAR SAFETY COMMISSION

Revision History

Effective Date	Revision	Word e-Docs # and Version	Description of the Changes	DCR List e-Docs #
October 1, 2018	0	5331057 v6	Original Document (Licence Renewal)	N/A
April 1, 2019	1	5653897 v2B	See DCR	5655484
May 25, 2020	2	5863808 v4	See DCR	5863777
September 28, 2021	3	6309625 v4	See DCR	6309683
November 3, 2023	4	6669165 v4	See DCR	6669223
March 4, 2025	5	7161886 v3	See DCR	7161877
XXXX	6	7623239 v.XX	See DCR	7643981

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INTRODUCTION

The general purpose of the Licence Conditions Handbook (LCH) is to identify and clarify the relevant parts of the licensing basis for each licence condition (LC). This will help ensure that the licensee maintains facility operation in accordance with the licensing basis for the facility and the intent of the licence. The LCH should be read in conjunction with the licence.

The LCH typically has three parts under each LC: the Preamble, Compliance Verification Criteria (CVC), and Guidance. The Preamble explains, as needed, the regulatory context, background, and/or history related to the LC. CVC are criteria used by CNSC staff to verify and oversee compliance with the LC. Guidance is non-mandatory information including expectations on how to comply with the LC.

Most CNSC documents referenced in the LCH are available through the CNSC public website. Documents listed on the CNSC website may contain prescribed information as defined by the *General Nuclear Safety and Control Regulations*. Information in these documents will be made available only to stakeholders with appropriate security clearance and a valid need to know.

The licensee documents referenced in the LCH are not publicly available; they contain proprietary information or prescribed information as defined by the *General Nuclear Safety and Control Regulations.*

The documents referenced in the LCH by e-Access numbers are not publicly available. The links provided in the LCH are references to the internal CNSC electronic filing system, and those documents cannot be opened from outside of the CNSC network.

Throughout the licence, the statement "or consent of a person authorized by the Commission" reflects to whom the Commission may delegate certain authority (hence "consent") to CNSC staff. Unless otherwise indicated in the CVC of specific LCs in this LCH, the delegation of authority by the Commission to act as a "person authorized by the Commission" is only applied to the incumbents of the following positions [1]:

- Director, Bruce Regulatory Program Division
- Director General, Directorate of Power Reactor Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

Interaction between the licensee and CNSC staff that is described in this LCH is governed by the prevailing communication protocol [2] between the two.

Current versions of the licensee documents listed in this LCH are recorded in the document "Bruce PROL - Written Notification Documents in LCH" [3], which is controlled by the Bruce Regulatory Program Division (BRPD) and is available to the licensee upon request.

The content of this LCH is an input to the compliance program for this facility.

This LCH includes appendices A to D which contain acronyms, a glossary of terms and lists of LCH-related documents.

More information on the LCH is available in the CNSC document titled *How to: Write a Licence Conditions Handbook (LCH)* [4].

References:

[1] Record of Decision for "Application to renew the Power Reactor Operating Licence for Bruce A and Bruce B Nuclear Generating Stations – Public Hearing dates March 14, 2018 and May 28-31, 2018", issued September 2018, NK21-CORR-00531-14702, NK29-CORR-00531-15384/NK37-CORR-00531-03067, e-Docs # 5629974.

[2] CNSC Letter, A. Bulkan to M. Burton, "Bruce A and B: Notification of a change to the Communications Protocol", September 5, 2024, e-Doc 7357936, BP-CORR-00531-05813.

[3] CNSC Internal Document, "Bruce PROL - Written Notification Documents in LCH", e-Docs # 5356815.

[4] CNSC Internal Work Instruction Rev. 0, "How To: Write a Licence Conditions Handbook (LCH)", March 2017, e-Docs # 4967591.

GENERAL

G. GENERAL

G.1 Licensing Basis for the Licensed Activities

Licence Condition G.1:

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

(i) the regulatory requirements set out in the applicable laws and regulations;

(ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;

(iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC, hereinafter "the Commission").

Preamble:

Licensing Basis

The licensing basis is discussed in CNSC document REGDOC-3.5.3, *Regulatory Fundamentals*, Version 3 (2023).

Licensed Activities

Subsection 24 (1) of the Nuclear Safety and Control Act (NSCA) states "The Commission may establish classes of licences authorizing the licensee to carry on any activity described in any of paragraphs 26 (a) to (f) that is specified in the licence for the period that is specified in the licence."

Paragraph 26 (a) of the NSCA states "Subject to the regulations, no person shall, except in accordance with a licence,

(a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;
(b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;
(c) produce or service prescribed equipment;
(d) operate a dosimetry service for the purposes of this Act;
(e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility; or
(f) construct, operate, decommission or abandon a nuclear-powered vehicle or bring a nuclear-powered vehicle into Canada."

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce Power letter, Frank Saunders to Marc Leblanc, "Application for the Renewal of the Power Reactor Operating Licence for Bruce Nuclear Generating Stations A and B", June 30, 2017, e-Docs # 5291208	NK21-CORR-00531-13493	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for Renewal of the Power Reactor Operating Licence: Periodic Safety Review Reports (including revised Bruce A and B Global Assessment Report and Integrated Implementation Plan)", July 19, 2017, e-Docs # 5303331, 5303343 and 5303344	NK21-CORR-00531-13543	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Major Component Replacement Project Execution Plan and Bruce B Unit 6 Return to Service Plan", June 30, 2017, e-Docs # 5292343	NK21-CORR-00531-14175	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Updated Environmental Risk Assessment that includes Major Component Replacement", June 30, 2017, e-Docs # 5291221	NK21-CORR-00531-13620	N/A
Bruce Power letter, Frank Saunders to Ken Lafrenière, "Bruce A Environmental Assessment Follow-up Monitoring Report, 2015", November 21, 2016, e-Docs # 5128322	NK21-CORR-00531-13142	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Whitefish Research Review", June 30, 2017, e-Docs # 5291210	NK21-CORR-00531-13494	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: University Research Summary", June 30, 2017, e-Docs # 5291217	NK21-CORR-00531-13587	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Security Program Description", June 30, 2017, e-Docs # 5291200 **(PROTECTED)**	NK21-CORR-00531-13367 NK29-CORR-00531-13917	N/A

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce Power letter, Frank Saunders to Marc Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Fitness-for-Service of Pressure Tubes", October 13, 2017, e-Docs # 5369131	NK21-CORR-00531-13854 NK29-CORR-00531-14517	N/A
Bruce Power letter, F. Saunders to M. Leblanc, "Supplement to the Application for the Renewal of the Power Reactor Operating Licence: Bruce Power Indigenous Community Interest Reports for Saugeen Ojibway Nation, Historic Saugeen Metis and Metis Nation of Ontario", January 24, 2018, e-Docs # 5442220 **(Protected-B-Restricted)**	NK21-CORR-00531-14156 NK29-CORR-00531-14842 NK37-CORR-00531-02912	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Bruce Power Application for the Renewal of the Power Reactor Operating Licence: Supplemental Requests", February 1, 2018, e-Docs # 5451672	NK21-CORR-00531-13890	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Supplemental Material", February 12, 2018, e-Docs # 5458711	NK21-CORR-00531-14126 NK29-CORR-00531-14817 NK37-CORR-00531-02906	N/A
Bruce Power letter, Frank Saunders to Marc Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Community Interests", March 6, 2018, e-Docs # 5476968	NK21-CORR-00531-14245 NK29-CORR-00531-14932 NK37-CORR-00531-02941	N/A
Bruce Power letter, Frank Saunders to Luc Sigouin, "Bruce Power Application for the Renewal of the Power Reactor Operating Licence Supplemental Material: Probabilistic Safety Assessment", March 13, 2018, e-Docs # 5484062	NK21-CORR-00531-14261 NK29-CORR-00531-14950 NK37-CORR-00531-02944	N/A
Bruce Power letter, F. Saunders to M. Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Supplemental Material", May 16, 2018, e-Docs # 5536574	NK21-CORR-00531-14285 NK29-CORR-00531-14980 NK37-CORR-00531-02956	N/A
Bruce Power letter, F. Saunders to M. Leblanc, "Application for the Renewal of the Power Reactor Operating Licence: Supplemental Material", May 23, 2018, e-Docs # 5541447	NK21-CORR-00531-14428 NK29-CORR-00531-15130 NK37-CORR-00531-02989	N/A
Bruce Power letter, Maury Burton to Luc Sigouin, "Application for the Renewal of the Power Reactor Operating Licence: Licensing Basis Documents", June 29, 2018, e-Docs # 5575936	NK21-CORR-00531-14288 NK29-CORR-00531-14982 NK37-CORR-00531-02957	N/A
Bruce Power letter, M. Burton to M. Leblanc, "Request for Amendment of the Nuclear Power Reactor Operating	NK21-CORR-00531-15378 NK29-CORR-00531-16213	N/A

Licensee Documents		
Document Title	Document #	Prior Notification
Licence Bruce Nuclear Generating Stations A and B - PROL 18.00/2028", November 11, 2019, e-Docs # 6042771		
Bruce Power letter, M. Burton to M. Leblanc, "Application for the Amendment of the Power Reactor Operating Licence", November 25, 2020, e-Docs # 6430874	BP-CORR-00531-00982	N/A
Bruce Power letter, M. Burton to D. Saumure, "Application for the Amendment of the Power Reactor Operating Licence", October 11, 2022, e-Docs # 6889090.	BP-CORR-00531-01842	N/A

Part (i) of the licensing basis includes, but is not limited to, the following:

- *Nuclear Safety and Control Act;*
- *Impact Assessment Act;*
- *Canadian Environment Protection Act;*
- *Nuclear Liability and Compensation Act;*
- *Transportation of Dangerous Goods Act;*
- *Radiation Emitting Devices Act;*
- *Access to Information Act; and*
- *Canada/IAEA Safeguards Agreement.*

The safety and control measures mentioned in the LC under Parts (ii) and (iii) of the licensing basis include important aspects of analysis, design, operation, etc. They may be found in high-level, programmatic licensee documents but might also be found in lower-level, supporting documentation. They also include safety and control measures in licensing basis publications (e.g., CNSC regulatory documents or CSA standards) that are cited in the licence, the application, or in the licensee's supporting documentation.

Licensing basis publications are listed in tables in this LCH under the most relevant LC. All "shall" or normative statements in licensing basis publications are considered CVC unless stated otherwise. If any "should" or informative statements in licensing basis publications are also considered CVC, this is explained under the most relevant LC.

The licensee documents and relevant licensing basis publications may cite other documents that also contain safety and control measures (i.e., there may be safety and control measures in "nested" references). There is no predetermined limit to the degree of nesting at which relevant safety and control measures may be found.

LC G.1 requires the licensee to implement all the safety and control measures. However, not all details in referenced documents are necessarily considered to be safety and control measures, specifically:

- Details that are not directly relevant to safety and control measures for facilities or activities authorized by the licence are excluded from the licensing basis.
- Details that are relevant to a different safety and control area (i.e., not the one associated with the

main document) are only part of the licensing basis to the extent they are consistent with the main requirements for both safety and control areas.

In the event of any perceived or real conflict or inconsistency between two elements of the licensing basis, the licensee shall consult CNSC staff to determine the approach to resolve the issue.

In case of a conflict between CSA standards, CNSC will consult with CSA Group before reaching a conclusion on the resolution.

This LC is not intended to unduly inhibit the ongoing management and operation of the facility or the licensee's ability to adapt to changing circumstances and continuously improve, in accordance with its management system. Where the licensing basis refers to specific configurations, methods, solutions, designs, etc., the licensee is free to propose alternate approaches as long as they remain, overall, in accordance with the licensing basis and have a neutral or positive impact on health, safety, the environment, security, and safeguards. However, the licensee shall assess changes to confirm that operations remain in accordance with the licensing basis.

Changes to certain licensee documents require written notification to the CNSC, even if they are in accordance with the licensing basis. Further information on this topic is provided under LC G.2.

For unapproved operation that is not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation.

In the event that the Commission grants approval to operate in a manner that is not in accordance with existing licensing basis, this would effectively revise the licensing basis for the facility. The appropriate changes would be reflected in the CVC of the relevant LC.

Guidance:

When the licensee becomes aware that a proposed change or activity might not be in accordance with the licensing basis, it should first seek direction from CNSC staff regarding the potential acceptability of this change or activity. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them. Examples of these types of changes are discussed under various LCs in this LCH. Guidance for notifications to the CNSC related to licensee changes are discussed under LC G.2.

G.2 Notification of Changes

Licence Condition G.2:

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

Preamble:

CNSC staff records the version history of licensee documents that require notification of change (with the exception of security-related documents) [1].

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Document Management	BP-PROG-03.01	No
Management of Program, Procedure and Internal Standard Documents	BP-PROC-00166	No

Written notification is a physical or electronic communication from the licensee.

In general, the changes for which the licensee shall notify the CNSC are captured as changes to specific licensee documents. The LCH identifies them under the most relevant LC (see example above). However, the licensee documents identified in the LCH only represent the minimum subset of documents that require notification of change. For any change that is not captured as a change to a document listed in the LCH, the licensee shall provide written notification (WN) of the change if the change is a significant deviation that negatively impacts designs, operating conditions, policies, programs, methods, or other elements that are integral to the licensing basis. For example, if a licensee document in the CVC refers to another document, including a third-party document, without citing the revision # of that document, if that document changes and the licensee uses the revised version, the licensee shall determine if it is necessary to notify the CNSC of the change.

The documents needed to support the licence application may include documents produced by third parties (e.g., reports prepared by third party contractors). Changes to these documents require written notification to the CNSC only if the new version continues to form part of the licensing basis. That is, if the licensee implements a new version of a document prepared by a third party, it shall inform the CNSC of the change(s), per LC G.2. On the other hand, if a third party has updated a certain document, but the licensee has not adopted the new version as part of its safety and control measures, the licensee is not required to inform the CNSC that the third party has changed the document.

Licensee documents tabulated in the CVC of the LCH are subdivided into groups having different requirements for notification of change – ones that require prior written notification of changes and those that require written notification only. For the former type, the licensee shall submit the document to the CNSC prior to implementing changes. The licensee shall allow sufficient time for the CNSC to review the change proportionate to its complexity and the importance of the safety and control measures being affected. Typically, significant changes require submission a minimum of 30 days prior to planned implementation. For the latter type, the licensee need only submit the document at the time of implementing the change.

Written notifications shall include a summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis (e.g., an evaluation of the impact on health, safety, security, the environment and Canada's international obligations). A copy of the revised WN document shall accompany the notification.

The above also applies to a notice of change that requires CNSC staff acceptance, due to some other requirement in the licensing basis.

Changes that are not clearly in the safe direction require further assessment of impact to determine if Commission approval is required in accordance with LC G.1.

The licensee shall notify the CNSC in writing when it plans to implement a new licensing basis publication, including the date by which implementation of the publication will be complete. The notice shall indicate the corresponding changes to licensee documents listed in CVC of the LCH.

Guidance:

A list of criteria that could help determine if a change would be in accordance with the licensing basis is provided in Appendix A of [2]. Such criteria would also be used if the change requires CNSC staff acceptance, due to some other requirement in the licensing basis.

For proposed changes that would not be in accordance with the licensing basis, the Guidance for LC G.1 applies.

References:

[1] CNSC Internal Document, "Bruce PROL - Written Notification Documents in LCH", e-Docs # 5356815.

[2] CNSC Internal Process Document Rev 0, "Overview of: Assessing licensee changes to documents or operations", March 2017, e-Docs # 4055483.

G.3 Land Use and Occupation

Licence Condition G.3:

The licensee shall control the use and occupation of any land within the exclusion zone.

Preamble:

The siting guide used at the time of design of all Canadian NPPs stipulated an exclusion zone that extended at least 914 metres from the exterior of any reactor building [1]. The exclusion zone is an area, immediately surrounding a nuclear facility where no permanent habitation is allowed.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Site Facilities Plan of the Bruce Nuclear Power Development Lots 11 to 28 and Part of 29 and 30	NK37-DRAW-10200-10001	Yes
Bruce A Safety Report Part 1: Plant and Site Description	NK21-SR-01320-00001	Yes*
Bruce B Safety Report Part 1: Plant and Site Description	NK29-SR-01320-00001	Yes*

**The reporting requirements for updates to facility descriptions are given in REGDOC-3.1.1 (LC 3.3)*

Bruce Power shall ensure that the use and occupancy of land within the exclusion zones does not compromise the safety and control measures in the licensing basis. Specifically, the licensee shall consider emergency preparedness and ALARA with respect to land use within the exclusion zones. This applies to land that Bruce Power occupies as well as to land occupied by others.

The licensee shall not permit a permanent dwelling to be built within the exclusion zone. “Permanent dwelling” refers to housing that is meant to be fixed. The licensee may erect, for a short time without prior notification, a temporary structure (e.g., a trailer).

Bruce Power shall notify the CNSC of permanent changes to the use and occupation of any land within the exclusion zones. The notice shall be submitted prior to the change, with lead time in proportion to the expected impact of the change on the licensee’s safety and control measures.

The Bruce A nuclear facility is located on the shore of Lake Huron on parts of lots 28, 29 and 30, Lake Range, Municipality of Kincardine, County of Bruce, Province of Ontario. The Bruce B nuclear facility is located on the shore of Lake Huron on parts of lots 12, 13, 14 and 15, Lake Range, Municipality of Kincardine, County of Bruce, Province of Ontario. The location of the exclusion zones and any structures within those zones are found in Ontario Power Generation (OPG) Drawing, “Site Facilities Plan of the Bruce Nuclear Power Development Lots 11 to 28 and Part of 29 and 30”. This drawing is a plan of survey dated May 10, 1999, prepared by Marshall Macklin Monaghan Ontario Limited, Ontario Land Surveyors, and certified by Mr. Roy C. Mayo, O.L.S.

Guidance:

Not applicable to this LC.

Reference:

[1] D.G. Hurst and F.C. Boyd, "Reactor Licensing and Safety Requirements, AECB-1059", Paper 72-CNA-102, presented at the 12th Annual Conference of the Canadian Nuclear Association, Ottawa, Canada, 11-14 June 1972, e-Docs # 3000249.

G.4 Office for CNSC Onsite Inspectors

Licence Condition G.4:

The licensee shall provide, at the Bruce site and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of Bruce A and B (onsite Commission staff).

Preamble:

CNSC staff requires suitable office space and equipment at the nuclear facility in order to satisfactorily carry out its regulatory activities.

Compliance Verification Criteria:

Any changes of accommodation or equipment shall be made based on discussion and subsequent agreement between the CNSC and Bruce Power.

Bruce Power shall keep the office space of onsite Commission staff separate from the remainder of the building in which it is located by walls, partitions or other suitable structures.

Guidance:

Not applicable to this LC.

G.5 Public Information and Disclosure

Licence Condition G.5:

The licensee shall implement and maintain a public information and disclosure program.

Preamble:

A Public Information and Disclosure Program (PIDP) includes a disclosure program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects of the licensed facility and its activities on the environment, health and safety of persons, thereby generating an atmosphere of openness, transparency and trust.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Stakeholder Engagement	BP-PROG-09.02	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Public Information and Disclosure	REGDOC-3.2.1	2018	August 5, 2020

CNSC regulatory document REGDOC-3.2.1, PUBLIC INFORMATION AND DISCLOSURE outlines the requirements for a public information and disclosure program.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Indigenous Engagement, Version 1.2	REGDOC-3.2.2	2022

It is recommended that Bruce Power submit annually to CNSC staff a report summarizing the events and developments involving the Bruce nuclear facilities for the purposes of promoting compliance verification.

1 SCA – MANAGEMENT SYSTEM

1.1 Management System

Licence Condition 1.1:

The licensee shall implement and maintain a management system.

Preamble:

Safe and reliable operation requires a commitment and adherence to a set of management system principles and, consistent with those principles, the establishment and implementation of processes that achieve the expected results. CSA standard N286 contains the requirements for a management system throughout the life cycle of a nuclear power plant and extends to all safety and control areas.

The management system must satisfy the requirements set out in the *NSCA*, regulations made pursuant to the *NSCA*, the licence and the measures necessary to ensure that safety is of paramount consideration in implementation of the management system. An adequately established and implemented management system provides the evidence that the licensing basis remains valid.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Management System Manual	BP-MSM-1	Yes
Conduct of Business	BP-PROG-16.01	Yes
Supply Chain	BP-PROG-05.01	No

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Compliance Internal Audit	BP-PROG-15.01	No
Project Management and Construction	BP-PROG-14.01	No
Contractor Management	BP-PROG-14.02	No
Organization Structure Change	BP-PROC-00001	No
Quality Assurance Program	BP-PROG-17.01	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Management system requirements for nuclear facilities	N286	2012	Dec. 31, 2018
CNSC	Safety Culture	REGDOC-2.1.2	2018	Apr 1, 2020

Management System

The management and operation of Bruce Power are defined by the programs and their implementing documents, as described by Bruce Power's Management System Manual. Changes to the management system documents, including Bruce Power's programs and procedures listed in the LCH and the processes are to be made in accordance with BP-MSM-1, Management System Manual.

Organization

Bruce Power shall document the organizational structure for safe and reliable conduct of licensed activities and shall include all positions with responsibilities for the management and control of the licensed activity. Any changes to the nuclear organization shall be made in accordance with Bruce Power's "Organization Structure Change".

Safety Culture

Bruce Power shall ensure that management supports the safe conduct of licensed activities at the nuclear facilities.

The Bruce nuclear facilities' operations and performance must ensure that sound nuclear safety is the overriding priority in all activities performed in support of the licensee's nuclear facilities and has clear priority over schedule, cost and production. Bruce Power's Nuclear Oversight Management and Operating Experience Program contribute to the development of a healthy safety culture throughout the oversight of Bruce Power's programs and processes by using internal and external assessments and self-assessments in order to continuously improve performance.

A safety culture self-assessment methodology has been developed by Bruce Power. It is governed by its business assessment process which promotes continuous improvement.

Configuration management

Configuration management, the process that identifies, documents changes and ensure conformance is maintained between design requirements, physical configuration and facility configuration information, is discussed in section 5.1.

Management of Contractors

Bruce Power shall implement and maintain a management of contractors program that will ensure compliance with regulatory requirements.

Business Continuity

Business continuity planning ensures that essential functions can continue to operate safely when affected by adverse physical conditions or following interruptions to normal operation. Bruce Power shall maintain contingency plans to:

- ensure minimal disruptions in the event of a labour dispute or public protest; and
- provide for essential services through a sustained period with significant employee absenteeism (e.g., influenza outbreak).

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Management System	REGDOC-2.1.1	2019
CSA	Commentary on N286-12, Management system requirements for nuclear facilities	N286.0.1	2021
CSA	Configuration management for high energy reactor facilities	N286.10	2016 (R2021)

The management system should be used to promote and support a healthy safety culture. The CNSC recognizes the following characteristics that form the framework for a healthy safety culture:

- safety is a clearly recognized value;
- accountability for safety is clear;
- safety is integrated into all activities;
- a safety leadership process exists; and
- safety culture is learning-driven.

The licensee should conduct self-assessments of safety culture periodically. The assessment method should be documented and the framework should include links to the safety culture characteristics listed above.

CNSC staff encourages senior management at the Bruce nuclear facilities to continue fostering a healthy safety culture so licensee staff understands the influence that safety culture has over all other organizational processes and its role in maintaining and improving safety performance.

The management system documentation should contain sufficient directions for workers to comply with the regulatory requirements.

2 SCA – HUMAN PERFORMANCE MANAGEMENT

2.1 Human Performance Program

Licence Condition 2.1:

The licensee shall implement and maintain a human performance program.

Preamble:

Human performance relates to reducing the likelihood of human error in work activities. It refers to the outcome of human behaviour, functions and actions in a specified environment, reflecting the ability of workers and management to meet the system's defined performance under the conditions in which the system will be employed.

Human factors are factors that influence human performance as it relates to the safety of a nuclear facility or activity over all design and operations phases. These factors may include the characteristics of the person, task, equipment, organization, environment, and training. The consideration of human factors in issues such as interface design, training, procedures, and organization and job design may affect the reliability of humans performing tasks under various conditions.

CNSC regulatory document REGDOC-2.2.1, HUMAN FACTORS, describes how the CNSC will take human factors into account during its licensing, compliance and standards-development activities.

For clarification, CNSC regulatory oversight related to hours of work is for the purpose of "nuclear safety" not for the purpose of "worker protection". Worker protection is covered under the SCA "Conventional Health and Safety" (section 8.1).

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Limits to Hours of Work	BP-PROC-00005	Yes
Conduct of Business	BP-PROG-16.01	Yes
Human Resources Management	BP-PROG-02.01	No
Fitness For Duty	BP-PROC-00610	No
Fitness for Duty Considerations for Shift Complement Staff Held Over for More than 13 Hours	GRP-OPS-00055	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Fitness for Duty: Managing Worker Fatigue	REGDOC-2.2.4	2017	Dec. 31, 2018
CNSC	Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3	REGDOC-2.2.4	2021	July 22, 2021 (except random testing) Jan. 22, 2022 (complete document)*

* See details below under *Implementation strategy for REGDOC-2.2.4, Volume II, Version 3*

In order to establish, maintain and improve human performance, Bruce Power shall monitor and control the work hours and shift schedules of nuclear workers, in accordance with BP-PROC-00005, LIMITS TO HOURS OF WORK.

Bruce Power shall also monitor and control the fitness for duty of its workers at all times as per the provisions set out in BP-PROC-00610, FITNESS FOR DUTY. Fitness for duty considerations for shift complement staff held over from their regular shift are contained in GRP-OPS-00055.

Implementation strategy for REGDOC-2.2.4, Volume II: Managing Alcohol and Drug Use, Version 3

REGDOC-2.2.4 *Fitness for Duty, Volume II: Managing Alcohol and Drug Use*, Version 3, sets out requirements and guidance for managing fitness for duty of workers in relation to alcohol and drug use and abuse. Bruce Power shall implement all REGDOC-2.2.4 Vol II, Version 3 requirements except for random alcohol and drug testing provided in sections 5.1 and 5.5. In [1], Bruce Power was directed to implement all REGDOC-2.2.4 Vol II, Version 3 requirements by December 1, 2023. However, on October 27, 2023, the Federal Court of Appeal granted an injunction [2] staying the implementation of REGDOC-2.2.4 Vol II, Version 3 sections 5.1 and 5.5 until the appeal is heard. Hence, Bruce Power is no longer expected to implement these requirements by December 1, 2023 until the appeal is decided.

References:

[1] Letter, M. Hornof to L. Sigouin, "Bruce Nuclear Generating Stations A and B: Implementation of Sections 5.1 and 5.5 for REGDOC-2.2.4 Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3, New Action Item 2023-07-27890", June 19, 2023, e-Docs # 7067208.

[2] Federal Court of Appeal Order between "Power Workers' Union, Society of United Professionals, The Chalk River Nuclear Safety Officers Association, International Brotherhood of Electrical Workers Local 37, Chris Damant, Paul Catahno, Scott Lampman, Greg MacLeod, Matthew Stewart and Thomas Shields" and "Attorney General of Canada, Ontario Power Generation, Bruce Power, New Brunswick Power Corporation and Canadian Nuclear Laboratories", M. Biringer, J.A., docket A-184-23, issued on October 27, 2023.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Human Factors	REGDOC-2.2.1	2019

The program should include elements that continuously monitor human performance, identify human performance weaknesses, improve human performance, and reduce the likelihood of human performance related causes and root causes of nuclear safety events.

In addition to those listed as requirements, the human performance program should address the range of human and organizational factors that influence human performance. Moreover, the human performance program should integrate all these factors. The range of factors includes, but is not limited to, the following:

- The provision of qualified staff
    - Certification and Training
    - Staffing
    - Minimum Shift Complement
    - Fitness for duty (hours of work, fatigue management)
- The reduction of human error
    - Procedures Development
    - Procedural Compliance
    - Work protection and Work Permit Systems
    - Shift Turnover
    - Pre and Post Job Briefings
    - Safe work strategies/practices
- Organizational support for safe work activities
    - Human Actions in Safety Analysis
    - Organizational Performance and Safety Culture
- The continuous improvement of human performance

2.2 Minimum Shift Complement and Control Room Staffing

Licence Condition 2.2:

The licensee shall implement and maintain the minimum shift complement and control room staffing for Bruce A and B.

Preamble:

The minimum shift complement specifies the numbers of qualified staff that are required to operate and maintain unit(s) safely under all operating states including normal operations, anticipated operational occurrences, design-basis accidents and emergencies.

This licence condition ensures the presence of a sufficient number of qualified workers who must be present at all times to ensure safe operation of the nuclear facility, and to ensure adequate emergency response capability.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce Power Shift Complement and Fitness for Duty Standard for any complement staff exceeding a 12-hour shift	BP-STND-00152	Yes

Minimum Shift Complement

Bruce Power's minimum shift complement procedures describe the minimum number of workers with specific qualifications required for the safe operation of the nuclear facilities under all operating states and the measures in place to mitigate the impact of any minimum shift complement violations until minimum complement requirements are restored.

Bruce Power shall operate the nuclear facilities in accordance with these documents and shall monitor and keep records of each shift's complement. The following tables (Tables A to D) summarize the number of workers located at Bruce A and Bruce B during one shift, as well as additional staff on site and available as call-ins. The tables in this section represent the minimum shift complement and control room staffing required for operational and emergency response purposes. These tables do not include minimum shift complement number for security on-site personnel. Security staffing requirements are managed separately under secure protocols.

Table A: Number of Workers Present at the Bruce A Nuclear Facility			
DESIGNATED POSITION	# of Staff	# of Staff with a Bruce A Unit in DFGSS[1]	EMERGENCY RESPONSE ORGANIZATION POSITION
Shift Manager	1	1	Shift Emergency Controller (SEC)
Control Room Shift Supervisor	1	1	Back-up SEC
Shift Assistant Technical Support	1	1	Emergency Shift Assistant
Field Shift Operating Supervisor	1	1	Field Team Coordinator for Bruce B
Authorized Nuclear Operator	6	5	
Supervising Nuclear Operator – Reactor Units	4	3	Shift Resource Coordinator
Nuclear Operator – Reactor Units	8	7	
Unit 0 Control Room Operator	2	2	
Supervising Nuclear Operator – Unit 0	1	1	
Nuclear Operator – Unit 0	3	3	
Fuel Handling Control Room Operator	1	1	Work Control Area Accounting Supervisor
Nuclear Operator – Fuel Handling	1	1	
Control Maintenance First Line Manager or Union Team Lead (UTL)	1	1	In-plant Coordinator
Control Technician	2	2	
Chemistry Technician	2	2	Chemistry Laboratory and Supervisor
Emergency Services Maintainer Union Team Lead – Bruce A	1	1	Emergency Response Team - Field Command (Bruce A), OSST Captain (Bruce B)
TOTAL	**36**	**33**	

1. With a Bruce A Unit in DFGSS, a reduced minimum shift complement may be applied in limited circumstances in accordance with BP-STND-00152.

Table B: Number of Workers Present at the Bruce B Nuclear Facility			
DESIGNATED POSITION	# of Staff	# of Staff with a Bruce B Unit in DFGSS[1]	EMERGENCY RESPONSE ORGANIZATION POSITION
Shift Manager	1	1	Shift Emergency Controller (SEC)
Control Room Shift Supervisor	1	1	Back-up SEC
Shift Assistant Technical Support	1	1	Emergency Shift Assistant
Field Shift Operating Supervisor	1	1	Field Team Coordinator for Bruce A
Authorized Nuclear Operator	6	5	
Supervising Nuclear Operator – Reactor Units	4	3	
Nuclear Operator – Reactor Units	8	7	
Unit 0 Control Room Operator	2	2	
Supervising Nuclear Operator – Unit 0	1	1	
Nuclear Operator – Unit 0	4	4	
Fuel Handling Control Room Operator	1	1	Shift Resource Coordinator
Nuclear Operator – Fuel Handling	1	1	Work Control Area Accounting Supervisor
Control Maintenance First Line Manager or Union Team Lead (UTL)	1	1	In-plant Coordinator
Control Technician	2	2	
Mechanical Maintainer	1	1	
Chemistry Technician	2	2	Chemistry Laboratory and Supervisor
Emergency Services Maintainer Union Team Lead – Bruce B	1	1	Emergency Response Team - Field Command (Bruce B), OSST Captain (Bruce A)
TOTAL	**38**	**35**	

1. With a Bruce B Unit in DFGSS, a reduced minimum shift complement may be applied in limited circumstances in accordance with BP-STND-00152.

Table C: Number of Additional Workers Present at Site in Support of the Bruce A and B Nuclear Facilities		
DESIGNATED POSITION	# of Staff	EMERGENCY RESPONSE ORGANIZATION POSITION
Staff Normally Based at Bruce A		
Control Technician	1	Emergency Entry/Repair Team
Emergency Services Maintainer - Bruce A	2	Emergency Response Team
Staff Normally Based at Bruce B		
Mechanical Maintainer	1	Emergency Entry/Repair Team
Stock Keeper	1	Stores
Emergency Services Maintainer - Bruce B	2	Emergency Response Team
Additional Staff Normally Based on Site		
Shift Emergency Response Manager	1	Emergency Response Coordinator
Emergency Services Maintainer – Union Team Lead - Site	1	Emergency Response Team
Emergency Services Maintainer - Site	3	Emergency Response Team
Emergency Services Maintainer - Site	2	In-plant Survey Team
Emergency Services Maintainer - Site	2	Source Term Survey Team
TOTAL[1]	**16**	

1. The ESM - Dispatcher position has been removed, reducing the minimum shift complement compared to what is stated in LCH-PR-18.03/2028-R004. The responsibilities of dispatcher have been transferred to an existing position in EPS Security and are now governed under Bruce Power's Security Program, and the minimum complement requirements associated with that program.

Table D: Number of Call-in Workers in Addition to Station and Site Personnel		
DESIGNATED POSITION	# of Staff	EMERGENCY RESPONSE ORGANIZATION POSITION
Call-in Staff		
Security	2	Offsite Survey Team Drivers
Radiation Technician	2	Offsite Survey Team Surveyors
TOTAL	**4**	

Control Room Staffing

Bruce Power shall comply with the minimum certified worker requirements for the nuclear facilities and for the main control rooms. The designated positions are listed in LC 2.4.

In conjunction with the minimum shift complement for the facility, Bruce Power shall maintain adequate control room staffing. The licensee shall, at all times, have the following certified workers:

- at least one shift manager, six authorized nuclear operators, one control room shift supervisor and two Unit 0 control room operators at each nuclear facility (Bruce A and B);
- an authorized nuclear operator in direct attendance at the control panels of each reactor unit in the main control rooms;

- a minimum of one Unit 0 control room operator in the main control room at each nuclear facility (Bruce A and B), except for brief absences to respond to security alerts or to determine the origin of fire alarms.

"In direct attendance" means the certified person is physically in the direct line of sight and in close proximity to the control room panels to continuously monitor, recognize and differentiate panel displays, alarms and indications.

The minimum certified worker requirements for the main control rooms that this condition imposes do not apply where this minimum cannot be met due to emergency conditions that could cause an unwarranted hazard to workers in the main control rooms, in which case Bruce Power shall place the reactor(s) in a safe shutdown state and the nuclear facilities in a safe condition.

A certified person shall be in a position to rapidly respond, in accordance with his/her role, to changing unit conditions, at all times.

Bruce Power shall provide a rolling 5-year staffing profile of certified operators on an annual basis.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Minimum Staff Complement	REGDOC-2.2.5	2019
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1	2019

The adequacy of the minimum shift complement should be determined through a systematic analysis of the most resource-intensive conditions under all operating states, design-basis accidents, and emergencies. The results of the analysis should then be validated to determine the degree to which the minimum shift complement facilitates the achievement of the overall safety goals.

Guidance for the development and validation of the minimum shift complement are provided in the following CNSC guidance documents:

- REGDOC-2.2.5, MINIMUM STAFF COMPLEMENT, describes the CNSC recommended approach for defining the minimum shift complement and sets out the key factors that CNSC staff will take into account when assessing whether the licensee has made, or the applicant will make, adequate provision for ensuring the presence of a sufficient number of qualified staff.
- REGDOC-2.5.1, GENERAL DESIGN CONSIDERATIONS: HUMAN FACTORS, describes the elements of effective human factors verification and validation planning, including a suggested format for documenting these elements.

2.3 Training Programs

Licence Condition 2.3:

The licensee shall implement and maintain training programs for workers.

Preamble:

This LC provides the regulatory requirements for the development and implementation of training programs for workers. It also provides the regulatory requirements for the development and implementation of training programs and processes to support responsibilities, qualifications, and requalification training of workers at the nuclear facility.

As defined by the *General Nuclear Safety and Control Regulations* a "worker means a person who performs work that is referred to in a licence". Workers include contractors and temporary employees who perform work that is referred to in the licence. Training requirements apply equally to these types of workers as to the licensees own employees.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Worker Learning and Qualification	BP-PROG-02.02	No
Systematic Approach to Training Process	BP-PROC-01071	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Personnel Training, Version 2	REGDOC-2.2.2	2016	October 1, 2018

Given that REGDOC-2.2.2 Version 2 has no material changes to it, where REGDOC-2.2.2 (i.e., initial version) is referenced in Bruce Power governing documents, it shall be taken to mean REGDOC-2.2.2 Version 2. Bruce Power will update the references in their governance on the regular document review cycle.

Training Programs for Workers

The licensee shall implement and maintain training programs, including initial and continuing training program elements, for workers in accordance with REGDOC-2.2.2, *Personnel Training*, Version 2, which defines the requirements regarding the development and implementation of a training system.

All training programs related to workers in positions where the consequence of human error poses a risk to the environment, the health and safety of persons, or to the security of the nuclear facilities and licensed activities, are evaluated against the criteria for a systematic approach to training (SAT).

Guidance:

Not applicable to this LC.

2.4 Certification Programs

Licence Condition 2.4:

The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, PERSONNEL CERTIFICATION, VOLUME III: CERTIFICATION OF REACTOR FACILITY WORKERS, VERSION 2. Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030.

Persons appointed to the following positions require certification:

(i) authorized health physicist;

(ii) authorized nuclear operator;

(iii) control room shift supervisor;

(iv) Unit 0 control room operator; and

(v) shift manager.

Preamble:

This LC provides the regulatory requirements for the programs and processes to be implemented in support of the certification and the renewal of the certification of workers employed in designated positions, including those related to initial and continuing training, certification examinations, and requalification testing.

The licensee's governance describes the roles and responsibilities of workers employed in designated positions.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce Power Shift Operations Role Descriptions and Certification Maintenance Requirements for Licence Related Positions	BP-STND-00153	Yes
Certification Training – Development and Administration of Comprehensive Written Oral Examinations for Certification Training Programs	BP-STND-00092	Yes
Certification Training Examinations – Standards for Development and Administration of Closed Reference Multiple Choice Questions for Initial General Certification Written Examinations EG1	BP-STND-00038	Yes

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Certification Testing & Examinations - Development and Administration of Comprehensive Simulator-Based Examinations for INITIAL Certification Training Programs	BP-STND-00093	No
Certifications Training Examinations - Standards for Initial Certification Comprehensive Simulator-Based Examinations (CTS, DTS, PCTS)	BP-STND-00085	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Certification of Reactor Facility Workers, Version 2	REGDOC-2.2.3, Vol. III, V2	2023	Jan. 31, 2025

Training and Certification of Workers Employed in Designated Positions

Bruce Power shall ensure that workers employed in designated positions at the nuclear facilities hold a valid certification duly issued by the CNSC for the position to which they have been appointed.

Bruce Power shall implement and maintain effective qualification and requalification programs in support of the certification, and the renewal of certification, of workers employed in the positions designated in the licence, in accordance with the requirements and guidance set out in REGDOC-2.2.3, Vol. III.

In addition, the initial and continuing training programs for workers employed in designated positions shall be implemented and maintained in accordance with the requirements and guidance set out in REGDOC-2.2.2, *Personnel Training*.

The roles and responsibilities of the designated positions listed above are considered safety and control measures. Any changes to them will be reviewed by CNSC staff to confirm they remain within the licensing basis, in consultation with the designated officer to certify and decertify workers referred to in sections 9 and 12 of the *Class I Nuclear Facilities Regulations* and the Director of the Personnel Certification Division. The general criteria for reviewing changes include those described in LC G.1 and LC G.2. Any changes outside the licensing basis would require prior written approval of the Commission, per LC G.1.

The roles and responsibilities of an authorized health physicist, a designated position are found in the Bruce Power document BP-PROG-12.05 listed in section 7.1 as a licensee document requiring prior notification of change.

Certification Examinations and Requalification Tests

Currently, the following three CNSC documents specify the requirements and guidance for administering the certification examinations and requalification tests required by REGDOC-2.2.3, Vol. III:

- CNSC document: Examination Guide CNSC-EG1, Rev.0: Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants,
- CNSC document: Examination Guide CNSC-EG2, Rev.0: Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants, and
- CNSC document: Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants, Revision 2

As per the CNSC letter [1] for the General certification examinations specified in CNSC document EG1, Bruce Power may choose to administer General certification examinations using a Multiple Choice Question (MCQ) format on a pilot basis. During this pilot period, the development, conduct and marking of MCQ general certification examinations shall be in accordance with the following Bruce Power documents (updated in January 2022 [2]):

- BP-STND-00092, and
- BP-STND-00038

References:

[1] CNSC Letter, L. Sigouin to F. Saunders, "Bruce NGS: CNSC Assessment of Bruce Power's Pilot Multiple Choice Question Format for General Certification Examinations", December 19, 2017, NK21-CORR-00531-14087/NK29-CORR-00531-14785, e-Docs # 5340379.

[2] Email, J. Thompson to L. Sigouin, "Notification of a Revision to an LCH Document: Revision 000 of BP-STND-00038 supersedes B-HBK-09510-00012 and Revision 000 of BP-STND-00092 supersedes BP-PROC-00568", January 13, 2022, BP-CORR-00531-02406, e-Docs # 6717444.

Guidance:

Not applicable to this LC.

3 SCA – OPERATING PERFORMANCE

3.1 Operations Program

Licence Condition 3.1:

The licensee shall implement and maintain an operations program, which includes a set of operating limits.

Preamble:

The operations program establishes safe operating practices within the nuclear facility, under all operating conditions (routine and non-routine), and provides the ability to ensure the facility is operated in such a manner that:

- applicable regulations, LCs, and standards are followed;
- the requirements of the operating policies and principles are implemented; and
- limits established in accordance with a safe operating envelope (SOE) are not exceeded.

The Operating Policies and Principles (OP&Ps):

- outline the operating rules consistent with the safety analyses and other licensing support documentation within which the station will be operated, maintained and modified, all of which should ensure nuclear safety;
- specify the authorities of the station staff positions to make decisions within the defined boundaries; and
- identify and differentiate between actions where discretion may be applied and where jurisdictional authorization is required.

The safe operating limits are derived from the safety analysis limits as well as design requirements. The SOE parameters are currently identified in various station documents, including Operational Safety Requirements (OSRs) and Instrument Uncertainty Calculations (IUCs). These limits are monitored through compliance documents such as the Impairments Manual and surveillance documentation.

Power limit specifications set limits on parameters that affect reactor core, channel, and fuel bundle powers, to ensure compliance with limits imposed by the design and safety analysis assumptions. The magnitude of the initial reactor power, channel powers and bundle powers in the reactor prior to an accident are the fundamental parameters governing whether fuel or fuel channel failure will occur during anticipated transients and the postulated Design-Basis Accidents (DBAs).

Accident management provisions address defences against radiological hazards resulting from DBAs and Beyond-Design-Basis Accidents (BDBAs). The fundamental premise underlying accident management is that overlapping measures for accident prevention and accident response are in place to:

- Prevent the escalation of the accident;
- Mitigate the consequences of the accident; and
- Achieve a long-term safe stable state after the accident.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operating Policies and Principles – Bruce B	BP-OPP-00001	Yes
Operating Policies and Principles – Bruce A	BP-OPP-00002	Yes
Operating Policies and Principles – Central Maintenance and Laundry Facility	BP-OPP-00003	Yes
Conduct of Plant Operations	BP-PROG-12.01	No
Operational Safety Requirements for Bruce A Fuel and Reactor Physics	NK21-OSR-31000-00001	No
Operational Safety Requirements for Bruce A Moderator System	NK21-OSR-32000-00001	No
Bruce A NGS: Operational Safety Requirements for Heat Transport System	NK21-OSR-33100-00001	No
Operational Safety Requirements for Bruce A End Shield Cooling System	NK21-OSR-34110-00001	No
Operational Safety Requirements for Bruce A Containment System	NK21-OSR-34200-00004	No
Operational Safety Requirements for Bruce A Emergency Coolant Injection System	NK21-OSR-34340-00003	No
Operational Safety Requirements for Bruce A Powerhouse Emergency Venting System	NK21-OSR-34360-00001	No
Operational Safety Requirements for Bruce A Shutdown and Maintenance Cooling Systems	NK21-OSR-34700-00001	No
Operational Safety Requirements for Bruce A Annulus Gas System	NK21-OSR-34980-00001	No
Operational Safety Requirements for Bruce A Fuel Handling	NK21-OSR-35000-00001	No
Operational Safety Requirements for Bruce A Main Steam Supply System	NK21-OSR-36100-00001	No
Operational Safety Requirements for Bruce A Confinement	NK21-OSR-38330/21175-00001	No
Operational Safety Requirements for Bruce A Feedwater and Condensate System	NK21-OSR-43200-00001	No
Operational Safety Requirements for Bruce A Electrical System	NK21-OSR-53000/55000-00001	No

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operational Safety Requirements for Bruce A Qualified Power Supply System	NK21-OSR-54400-00001	No
Operational Safety Requirements for Bruce A Critical Safety Parameter Monitoring	NK21-OSR-60060-00001	No
Operational Safety Requirements for Bruce A Reactor Regulating System	NK21-OSR-63710-00001	No
Operational Safety Requirements for Bruce A Shutdown Systems	NK21-OSR-63720-63730-00001	No
Operational Safety Requirements for Bruce A Service Water Systems	NK21-OSR-71310-00001	No
Operational Safety Requirements for Bruce A Emergency Boiler Cooling System	NK21-OSR-71910-00001	No
Operational Safety Requirements for Bruce B Fuel and Reactor Physics	NK29-OSR-31000-00001	No
Operational Safety Requirements for Bruce B Moderator System	NK29-OSR-32000-00001	No
Operational Safety Requirements for Bruce B Heat Transport System	NK29-OSR-33000-00001	No
Operational Safety Requirements for Bruce B End Shield Cooling System	NK29-OSR-34110-00001	No
Operational Safety Requirements for Bruce B Containment System	NK29-OSR-34200-00001	No
Operational Safety Requirements for Bruce B Emergency Coolant Injection System	NK29-OSR-34340-00001	No
Operational Safety Requirements for Bruce B Powerhouse Emergency Venting System	NK29-OSR-34360-00001	No
Operational Safety Requirements for Bruce B Shutdown and Maintenance Cooling Systems	NK29-OSR-34700-00001	No
Operational Safety Requirements for Bruce B Annulus Gas System	NK29-OSR-34980-00001	No
Operational Safety Requirements for Bruce B Fuel Handling	NK29-OSR-35000-00001	No
Operational Safety Requirements for Bruce B Main Steam Supply System	NK29-OSR-36100-00001	No
Operational Safety Requirements for Bruce B Confinement	NK29-OSR-38330-21190-00001	No

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operational Safety Requirements for Bruce B Feedwater and Condensate System	NK29-OSR-43200-00001	No
Operational Safety Requirements for Bruce B Electrical System	NK29-OSR-53000/55000-00001	No
Operational Safety Requirements for Bruce B Emergency Power Supply System	NK29-OSR-54300-00001	No
Operational Safety Requirements for Bruce B Critical Safety Parameter Monitoring	NK29-OSR-60060-00001	No
Operational Safety Requirements for Bruce B Reactor Regulating System	NK29-OSR-63710-00001	No
Operational Safety Requirements for Bruce B Shutdown Systems	NK29-OSR-63720-63730-00001	No
Operational Safety Requirements for Bruce B Service Water Systems	NK29-OSR-71310-00001	No
Operational Safety Requirements for Bruce B Emergency Water System	NK29-OSR-71380-00001	No
Bruce Power Safeguards Site Plan 2015	NK37-CORR-00531-02784	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Requirements for the safe operating envelope for nuclear power plants	N290.15	2010 Update No. 1 (2016)	Oct. 1, 2018
CNSC	Accident Management: Severe Accident Management Programs for Nuclear Reactors	REGDOC-2.3.2	V2, Updated September 2015	July 25, 2023

The licensee shall implement and maintain operations programs. These programs shall consist of, at a minimum, a safe operating envelope, a set of operating policies and principles, and accident management procedures and/or guides for design-basis and beyond-design-basis accidents, including overall strategies for recovery.

Bruce Power employs a number of programs and other governance to fulfill the objective of this LC. Operation in states not considered in, or not bounded by, the safety analyses is not permitted.

Power Limits

Bruce Power shall operate the reactor within the following limits:

Bruce A		
	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 969 kilowatts	Shall not exceed 857 kilowatts
Total power generated in any fuel channel	Shall not exceed 6.84 megawatts under normal steady-state operating conditions	Shall not exceed 6.25 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel	Shall not exceed 2619.6 megawatts (92.5% full power) under steady-state operating conditions	

Bruce B		
	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 837 kilowatts under normal steady-state operating conditions	
Total power generated in any fuel channel	Shall not exceed 6.70 megawatts in the inner flow zone of the reactor core under normal steady-state operating conditions	Shall not exceed 6.23 megawatts in the outer flow zone of the reactor core under normal steady-state operating conditions
Total thermal power from the reactor fuel	Shall not exceed 2634 megawatts (93% full power) under steady-state operating conditions	

The reactor, channel and bundle power limits are considered safety and control measures. Any changes to them, or planned operations outside of these limits, would require prior written approval by the Commission, per LC G.1 and LC G.2.

CNSC have identified a regulatory hold point for operation beyond 92.5% full power (FP) for Bruce A units and 93% FP for Bruce B units for which approval of the Commission or the consent of a person authorized by the Commission will be sought prior to power increase to 95.5% FP for Bruce A units and 96% FP for Bruce B units. This hold point is detailed under LC 15.5.

Upon removal of this regulatory hold point, Bruce Power shall operate the reactor within the following limits:

	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 1000 kilowatts	Shall not exceed 885 kilowatts
Total power generated in any fuel channel	Shall not exceed 7.060 megawatts under normal steady-state operating conditions	Shall not exceed 6.450 megawatts under normal steady-state operating conditions
Total thermal power from the reactor fuel	Shall not exceed 2705 megawatts (95.5% full power) under steady-state operating conditions	

Bruce B		
	Inner Flow Zone	Outer Flow Zone
Total power generated in any one fuel bundle	Shall not exceed 864 kilowatts under normal steady-state operating conditions	
Total power generated in any fuel channel	Shall not exceed 6.912 megawatts in the inner flow zone of the reactor core under normal steady-state operating conditions	Shall not exceed 6.432 megawatts in the outer flow zone of the reactor core under normal steady-state operating conditions
Total thermal power from the reactor fuel	Shall not exceed 2719 megawatts (96% full power) under steady-state operating conditions	

Operating Policies and Principles

The OP&Ps shall provide direction for operating the nuclear facilities safely and, as a minimum, reflect the safety analyses that have been previously submitted to the Commission, or a person authorized by the Commission.

Bruce Power shall, at all times, maintain and operate the nuclear facilities within the principles of the OP&Ps and the limits of the SOE. If operation outside the operating boundaries specified by the OP&Ps and SOE is discovered, the licensee shall take immediate action to return the facility within the boundaries of safety analyses, in a safe manner as per Bruce Power procedures.

Safe Operating Envelope

CSA standard N290.15, REQUIREMENTS FOR THE SAFE OPERATING ENVELOPE FOR NUCLEAR POWER PLANTS outlines the requirements for a safe operating envelope.

Bruce Power's safe operating limits, conditions and surveillance requirements as well as their bases are documented in station and system specific Operational Safety Requirements (OSRs) documents along with any associated Instrument Uncertainty Calculations (IUCs). The limits and conditions documented in the OSRs, including any requirements for corrective or mitigating actions and action times, are specified in the applicable operations and maintenance tests, procedures and processes to ensure compliance with the SOE.

Bruce Power shall, at all times, maintain and operate the nuclear facilities within the limits of the SOE.

The SOE is considered part of the licensing basis. Changes to the SOE documentation are subject to LC G.1 and LC G.2. Changes that may reduce safety margins would require prior notification of CNSC staff, per LC G.2.

Accident Management and Recovery

CNSC regulatory document REGDOC-2.3.2, ACCIDENT MANAGEMENT: SEVERE ACCIDENT MANAGEMENT PROGRAMS FOR NUCLEAR REACTORS, VERSION 2 outlines the requirements related to severe accident management programs, which provide additional defence against the consequences of those accidents that fall beyond the scope of events considered in the reactor design basis.

Bruce Power shall implement and maintain operational procedures for operation in all states analyzed in the design basis, including abnormal and emergency states.

Bruce Power's operational procedures ensure that the operation of the facility can be returned to a safe and controlled state should operation deviate from normal operation. Bruce Power shall ensure all abnormal operational scenarios analyzed in the design basis are accounted for in the operational procedures with the purpose of mitigating situations that may arise which cause a deviation from the expected state. These documents are conceived to return the plant to a safe and controlled state and to prevent the further escalation of the abnormal incident into a more serious deviation.

In addition to the operational guidance for abnormal and emergency states, Bruce Power shall implement and maintain a severe accident management program to address residual risks posed by severe accidents. Bruce Power shall also ensure clear instruction is provided directing operations in abnormal scenarios to the appropriate set of procedures or guides, including severe accident management guidelines (SAMGs), if a severe accident is detected.

Other Requirements

As described in [1, 2], Bruce Power shall inform CNSC staff of any changes to the RBGSS operating manuals, safety system tests and chemistry procedures that impact RBGSS. Proposed changes are subject to LC G.2. CNSC staff will review and confirm that the changes remain within the licensing basis; changes outside of the licensing basis require written approval by the Commission, per LC G.1.

References:

[1] CNSC Letter, L. Sigouin to M. Burton, "Bruce B: Concurrence for Rod Based Guaranteed Shutdown State, Closed Action Item 2021-14-22724", June 15, 2022, BP-CORR-00531-02932, e-Docs # 6812209.

[2] Bruce Power letter, M. Burton to M. Hornof, "Bruce B: Rod Based Guaranteed Shutdown State, Closed Action Item 2021-14-22724", November 30, 2022, BP-CORR-00531-03064, e-Docs # 6933259.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Requirements for reactor heat removal capability during outage of nuclear power plants	N290.11	2013
CSA	Requirements for beyond design basis accidents	N290.16	2016

The licensee should manage all outage heat sink work activities in accordance with CSA standard N290.11, REQUIREMENTS FOR REACTOR HEAT REMOVAL CAPABILITY DURING OUTAGE OF NUCLEAR POWER PLANTS.

3.2 Approval to Restart after a Serious Process Failure

Licence Condition 3.2:

The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or the prior written consent of a person authorized by the Commission.

Preamble:

A serious process failure and its related definitions are defined, as follows:

- Serious process failure: With respect to CANDU reactor facilities, a failure that leads or that could lead, in the absence of action by any special safety system, to significant fuel damage or a significant release from the CANDU reactor facility.
- Significant fuel damage: An event or situation that brought the fuel (>1%) outside of its fitness for service limits.
- Significant release: A release of radioactive material that results in an effective dose, received by or committed to a typical member of the critical group, in excess of 0.5 millisievert.

The definition of serious process failure can also be found in CNSC regulatory document REGDOC-3.6, *Glossary of CNSC Terminology*. The reporting requirements are also provided in CNSC regulatory document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.

Person(s) authorized by the Commission, see LCH introduction for more information, have the authority to give the consent to Bruce Power to proceed with the restart of the reactor if there is sufficient assurance that the:

- Cause of the serious process failure has been resolved;
- Bruce Power is within the licensing basis;
- Fuel is fit for service; and
- the serious process failure did not exceed a frequency of greater than one per three year rolling period.

Otherwise, approval to restart must be granted by the Commission.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Operating Policies and Principles – Bruce B	BP-OPP-00001	Yes
Operating Policies and Principles – Bruce A	BP-OPP-00002	Yes

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Station Transient Operations	BP-STND-00222	Yes
Operational Decision Making	BP-PROC-01139	No
Engineering Evaluation	DIV-ENG-00004	No

Serious process failures are reportable in accordance with REGDOC-3.1.1, see LC 3.3. When an event is found to be a serious process failure or where the determination as to the cause and/or extent of condition has proved inconclusive (i.e., a serious process failure cannot be ruled out), a request for restart of the reactor shall be submitted in writing to the CNSC. In accordance with the licence condition, to restart the reactor, Bruce Power shall obtain approval of the Commission, or the prior written consent of a person authorized by the Commission, depending on the criteria.

The written request for restart of the reactor is to include the following information:

- a description of the event;
- the causes of the event;
- the consequences and safety significance of the event;
- a recovery plan including corrective actions, and fitness for service assessment on the systems/components impacted from the failure if applicable. This shall be completed prior to reactor restart;
- a statement regarding plant readiness to resume safe operation. This shall include any conditions that the licensee proposes to impose upon reactor restart and/or subsequent reactor operation to ensure safe operation of the nuclear facilities; and
- an extent of completion of the conditions mentioned in the statement regarding plant readiness to resume safe operation.

As specified for LC G.1, for unapproved operation that is not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation.

For minor deviations outside the licensing basis, the licensee may use their internal procedures to return to a state consistent with the licensing basis and report the incident to the CNSC through REGDOC-3.1.1 [LC 3.3].

For more significant situations, serious process failures, approval or consent is required before returning to service in accordance with LC 3.2. In such cases systematic and systemic damage to a barrier to the release of radioactivity has or could have occurred.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Nuclear Fuel Safety and Qualification	REGDOC-2.4.5	April 2024
COG	Principles & Guidelines For Deterministic Safety Analysis, CANDU Owners Group, Safety Analysis Improvement Task Team	COG-09-9030	R03
COG	Fuel and Pressure Tube Fitness-For-Service Criteria for LOF, SBLOCA and Slow LORC	COG-12-2049	R02

In addition to the requirements listed above, the written request to restart a reactor after a serious process failure should also include the following information:

- the documentation and communication to licensee staff addressing the root cause analysis, corrective actions, and plant readiness to resume operation (including additional training, if necessary); and
- applicable historical operating experience (OPEX) review for comparable events (OPEX is further described in LC 1.1).

As the fuel sheath is the barrier that contains the vast majority of the fission products during normal operations, this barrier was selected, with its fitness for service limits as the criteria. Specifically: Sheath Temperatures less than or equal to 450°C; and Sheath Strains less than or equal to 0.5%.

In order to screen out insignificant events, such as individual fuel failure due to debris fretting, a threshold criteria was established of at least 1% of the core or about 50 bundles in the definition for significant fuel damage. If a single component of a bundle is not fit for service (e.g., one pin) then the entire bundle is not fit for service.

A review of the applicable criteria should be performed to ensure the continued operations will remain within the licensing basis, in accordance with Appendix A of CNSC internal document “Overview of assessing licensee changes to documents or operations”, e-Doc 4055483 including results of Serious Process Failure Tool screening, e-Doc 7046698.

3.3 Reporting Requirements

Licence Condition 3.3:

The licensee shall notify and report in accordance with CNSC regulatory document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.

Preamble:

CNSC regulatory document REGDOC-3.1.1 has comprehensive reporting requirements (scheduled and unscheduled) for licensees of NPPs. It describes information that the CNSC needs to evaluate the performance of the facilities it regulates. This document is complementary to the reporting requirements in the *Nuclear Safety and Control Act* and the associated regulations.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Regulatory Affairs	BP-PROG-06.01	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Reporting Requirements for Nuclear Power Plants, Version 3	REGDOC-3.1.1	2024	Jan. 1, 2025

The licensee shall adjust its reporting to meet the requirements of REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants* based on the clarifications and interpretations provided in the CNSC staff interpretation document, *Interpretation of REGDOC-3.1.1, Reporting Requirements for Nuclear Power Plants.* In addition,

1. **For REGDOC-3.1.1 Section 3.1, Quarterly report on safety performance indicators:**
Bruce Power's quarterly report on Safety Performance Indicators (SPIs) is to include contributions from the licensed support activities at Bruce Power Center of Site locations for SPI 1, Collective Radiation Exposure and SPI 5, Environmental Releases – Radiological.

2. **For REGDOC-3.1.1 Section 3.5, Annual report on environmental protection:**
Bruce Power is to provide the reporting data with respect to sewage plant radioactivity monitoring in the annual report on environmental protection.

Guidance:

Not applicable to this LC.

4 SCA – SAFETY ANALYSIS

4.1 Safety Analysis Program

Licence Condition 4.1:

The licensee shall implement and maintain a safety analysis program.

Preamble:

A deterministic safety analysis evaluates the NPP responses to events by using predetermined rules and assumptions. The objectives of the deterministic safety analysis are stated in REGDOC-2.4.1, DETERMINISTIC SAFETY ANALYSIS.

Probabilistic safety assessment (PSA) is a comprehensive and integrated assessment of the safety of the NPP that, by considering the initial plant state and the probability, progression, and consequences of equipment failures and operator response, derives numerical estimates of a consistent measure of the safety of the design. Such assessments are most useful in assessing the relative level of safety. The objectives of the PSA are stated in REGDOC-2.4.2, PROBABILISTIC SAFETY ASSESSMENT (PSA) FOR NUCLEAR POWER PLANTS.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce A Safety Report Part 2: Plant Components and Systems	NK21-SR-01320-00002, Part 2	Yes*
Bruce B Safety Report Part 2: Plant Components and Systems	NK29-SR-01320-00001, Part 2	Yes*
Bruce A Safety Report Part 3: Safety Analysis	NK21-SR-01320-00003, Part 3	Yes*
Bruce B Safety Report Part 3: Safety Analysis	NK29-SR-01320-00002, Part 3	Yes*
Severe Accident Management	BP-PROC-00659	No

**The reporting requirements for updates to safety reports are given in REGDOC-3.1.1 (LC 3.3)*

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Deterministic Safety Analysis	REGDOC-2.4.1	2014	Dec. 31, 2017
CNSC	Probabilistic Safety Assessment (PSA) for Nuclear Power Plants	REGDOC-2.4.2	2014	June 30, 2019
CSA	Quality assurance of analytical, scientific, and design computer programs	N286.7	2016	Dec 31, 2016

Deterministic Safety Analysis

CNSC regulatory document REGDOC-2.4.1 outlines the requirements related to safety analysis events, operating modes, acceptance criteria, methods, documentation and review.

COG document COG-13-9035-R02, *Derived Acceptance Criteria for Deterministic Safety Analysis* shall be used by Bruce Power when conducting deterministic safety analysis for the associated accident scenarios.

Bruce Power shall conduct and maintain a deterministic safety analysis in accordance with applicable requirements and reflecting the actual plant design and conditions. The deterministic safety analysis shall demonstrate that the radiological consequences of the postulated initiating events involving a single process failure and events involving a single process failure in conjunction with failure of one of the special safety systems do not exceed the accident-dependent reference public dose limits specified in the siting guide [see reference in G.3] and reproduced in the following table:

	Individual Dose Limit		Population Dose Limit	
	Thyroid Dose (mSv)	Whole Body Dose (mSv)	Thyroid Dose (Person mSv)	Whole Body Dose (Person mSv)
Single Failure	30	5	10^5	10^5
Dual Failure	2500	250	10^7	10^7

The Bruce A and B Nuclear Power Plants are designed to earlier standards and regulatory requirements. Where compliance with the requirements (e.g., the single failure criterion (SFC)) cannot be demonstrated by the existing design, the REGDOC-2.4.1 requirements should be applied commensurate with risk, such as permitted in CSA N286-12, recognizing the existing design basis.

These include:

- When demonstrating Level 3 Defence-in-Depth (DiD) for DBAs
    - Apply the SFC by selecting the SFC from the active components that are required to change state for each acceptance criterion

  - For system availability, sensitivity cases instead of the SFC applying the minimum allowable performance, which accounts for the withdrawal from service of components for limited periods for maintenance, testing, inspection, or repair (MTIR) by selecting components unavailable as assessed in the operational limits and conditions
- For Anticipated Operating Occurrences (AOOs)
  - Assess operating experience to establish whether the facility had a consequential radioactive release and remain operable

  - Assess Level 2 system actions, if necessary, using realistic operating conditions
- For each hazard Postulated Initiating Events, classify credible external events into the AOO, DBA and Design Extension Conditions classes using event-specific standards and guidelines that are consistent with the existing design basis of the plant

Bruce Power shall submit the deterministic safety analysis to the CNSC every five (5) years (the next due date is in 2027).

Probabilistic Safety Assessment

CNSC regulatory document REGDOC-2.4.2 outlines the requirements related to PSA. REGDOC-2.4.2, which was published in 2014 includes amendments to reflect the lessons learned from the Fukushima accident.

Overall, Bruce Power has met the requirements of REGDOC-2.4.2. CNSC staff will continue monitoring the compliance of the next updates of PSA reports.

Bruce Power shall update, and submit to CNSC, PSA models and reports every five (5) years (the next due date is June 30, 2029) or sooner if there are significant changes in the plant design or operation.

In addition, Bruce Power shall implement internal policy to address if the PSA results are in between the safety limit and the target.

Beyond-Design-Basis Accidents/Severe Accident Analysis

REGDOC-2.4.1 provides the requirements for the performance of a safety analysis for beyond-design-basis accidents (BDBAs), including severe accidents. Severe accidents represent the set of accidents under beyond-design-basis accidents that involve significant fuel degradation, either in-core or in fuel storage.

Beyond-design-basis analysis is performed to ensure that prevention and mitigation measures are identified. The analysis can identify challenges to the plant presented by such events and identify equipment that can be included in the severe accident management guidelines.

Design and Analysis Computer Codes and Software

CSA N286.7, QUALITY ASSURANCE OF ANALYTICAL, SCIENTIFIC, AND DESIGN COMPUTER PROGRAMS provides the specific requirements related to the development, modification, maintenance and use of computer programs used in analytical, scientific and design applications.

Bruce Power shall comply with CSA N286.7 for computer programs used in design and safety analysis.

The safety and control measures are implemented through BP-PROG-10.01, "Configuration Management", which is cited in section 5.1.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Probabilistic safety assessment for nuclear power plants	N290.17	2017
CSA	Wet storage of irradiated fuel and other radioactive materials	N292.1	2016
CSA	Interim dry storage of irradiated fuel	N292.2	2013

Detailed methodologies and derived acceptance criteria for the conduct of deterministic safety analysis are described in the following COG documents:

COG Documents		
Document Title	Document #	Revision #
Principles & Guidelines For Deterministic Safety Analysis	COG-09-9030	Rev 3
Guidelines for Application of the Limit of the LOE/ROE Methodologies to Deterministic Safety Analysis	COG-11-9023	Rev 1
Guidelines for Application of the Best Estimate Analysis and Uncertainty (BEAU) Methodology to Licensing Analysis	COG-06-9012	Rev 1
Principles and Guidelines for NOP/ROP Trip Setpoint Analysis for CANDU Reactors	COG-08-2078	Rev 1

Updates to deterministic safety analysis should contain a revision summary sheet highlighting the key differences between the existing analyses and updated analysis; if the updated deterministic safety analysis has been reformatted in accordance with REGDOC-2.4.1, a mapping of new-section to old-section numbers should be considered. The revision summary should include:

- Summary of changes (key differences) such as:
  - in acceptance criteria
  - In event characterization
  - In safety analysis assumptions
  - In methodology, or in elements of a methodology
  - In plant models
  - In use of computer codes and embedded models
  - In trip coverage
- Reasons for updating the analysis and for updating models, assumptions, initial conditions or boundary conditions;
- Significance of changes, and their justification;
- Significant changes in results that may affect the conclusions of the analysis for the design; operational or emergency safety requirements for a particular situation or event; and
- Impact on operating and safety margins.

The licensee should maintain a Safety Report Basis consisting of a listing of Analysis of Record Items and auxiliary documents. The licensee should continue to provide CNSC staff with regular updates of the list indicating the submissions to be included in the next Safety Report, Part 3 update.

When the deterministic safety analysis methodology is modified as a result of improved knowledge, or to address emerging issues, the licensee should assess the impact of such a modification on the operating limits, as well as procedural and administrative rules.

The licensee should not credit results obtained with a modified safety analysis methodology to relax operating conditions and/or change safety margins until the modification of the methodology has been reviewed by CNSC staff. If CNSC staff indicate that the modified methodology is appropriate, the licensee must still fulfill any other requirements or criteria associated with the changes to the operating conditions or safety margins, as documented under other LCs such as those in Section 3.

In addition to industry standards, CNSC staff will refer to the applicable industry verification and validation process practices related to computer codes and software used to support the safe plant operation.

Beyond-Design-Basis Accidents/Severe Accident Analysis

The following can be considered as analysis of BDBA:

- Analysis of low-probability ($<10^{-5}$) dual-failure events included in the current Safety Reports;
- Recent assessments that consider the conditions beyond the plant original design basis (e.g., sensitivity cases recently performed for low-probability CME);
- MAAP-CANDU severe accident analyses as part of Level 1 and Level 2 PSA;
- MAAP-CANDU severe accident analyses to support the severe accident management technical basis; and
- BDBA/severe accident assessments (e.g., for in-vessel retention, hydrogen control and mitigation, containment performance, etc.) to address post-Fukushima questions and demonstrate the effectiveness of the design complementary features, including post-Fukushima enhancements for severe accident prevention, mitigation, and management.

Documentation of severe accident (also referred to as beyond-design-basis accident) analyses and assessments is currently not consolidated and centralized. REGDOC-2.4.1 section 4.5 provides the requirements for safety analysis documentation; however, the licensee should consider consolidating the existing and new analyses to improve the integration, maintenance, control and further updates to facilitate the regulatory review and verification.

5 SCA – PHYSICAL DESIGN

5.1 Design Program

Licence Condition 5.1:

The licensee shall implement and maintain a design program.

Preamble:

A design program ensures that the plant design is managed using a well-defined systematic approach. Implementing and maintaining a design program confirms that safety-related systems, structures and components (SSCs) and any modifications to them, continue to meet their design bases given new information arising over time and taking changes in the external environment into account. It also confirms that SSCs continue to be able to perform their safety functions under all plant states. An important cross-cutting element of a design program is design basis management.

A design program includes, but is not limited to: pressure boundary design, civil structure design, seismic design, mechanical design, fuel design, core nuclear design, core thermal-hydraulic design, safety system design, fire protection design, electrical power system design, as well as instrumentation and control system design.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Configuration Management	BP-PROG-10.01	Yes
Engineering Change Control	BP-PROC-01081	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Human factors in design for nuclear power plants	N290.12	2014	Mar. 31, 2021
CSA	Qualification of digital hardware and software for use in instrumentation and control applications for nuclear power plants	N290.14	2015	Oct. 1, 2018
CSA	Requirements for safety-related structures for nuclear power plants	N291	2015	Oct. 1, 2018

Bruce Power shall ensure that all SSCs important to safety are designed to perform their required functions under all plant states for which the system must remain available.

CSA N291-15, REQUIREMENTS FOR SAFETY-RELATED STRUCTURES FOR NUCLEAR POWER PLANTS

Any gaps identified with respect to N291-15 are subject to the disposition and/or corrective actions described in the Bruce A and B Global Assessment Report and Integrated Implementation Plan. Specifically, with respect to Clause 4.3(f), Ontario Power Generation (not Bruce Power) is responsible for decommissioning.

Design Basis Management

Bruce Power shall ensure that design modifications are controlled such that the plant is maintained and modified within the limits prescribed by the licensing basis. Aspects of design are considered safety and control measures if changes to them could

- invalidate the limits documented in the operating policies and principles or safe operating envelope referred to in LC 3.1;
- introduce hazards different in nature or greater in probability or consequence than those considered by the safety analyses and probabilistic safety assessment; and/or
- adversely impact other important safety and control measures, such as those related to operations, radiation protection, emergency preparedness, etc.

Bruce Power shall ensure that changes to those aspects of design remain within the licensing basis and shall notify the CNSC when such changes are planned. Changes outside the licensing basis would require prior written approval by the Commission, per LC G.1.

Bruce Power shall ensure that plant design and changes to plant design are accurately reflected in the safety analysis (see section 4.1 for licensee documents that contain the facilities descriptions and the final safety analysis reports).

Design Program Elements

See LC 5.2 for compliance verification criteria on pressure boundary design and LC 5.3 for information on equipment and structure qualification.

Bruce Power shall have design program elements that address the modification of the special safety systems (Shutdown System 1, Shutdown System 2, Emergency Core Cooling System and Containment). Significant changes to the special safety systems or systems connected to the special safety systems (e.g., change that would impact safety margins) would require prior notification of CNSC, per LC G.2. Changes outside the licensing basis would require prior written approval by the Commission, per LC G.1. Prior notification is not required for changes to items that serve the same functional characteristics of the originally designed item and does not result in a change to operating procedures or safety system testing.

Bruce Power shall have design program elements that address the design and modification of concrete containment structures and safety-related structures.

Any changes that have the potential to impact fire protection are assessed for compliance with CSA standard N293 or CSA N393 for applicable Centre of Site (CoS) facilities containing radioactive materials and as listed in BP-STND-00166. See LC 10.2 for version control of CSA N293 and CSA N393.

The plant electrical power system design shall include the safety classifications of the systems. Its design shall be adequate for all modes of operation under steady-state, voltage and frequency excursion, and transient conditions, as confirmed by electrical analysis. The electrical power systems shall be monitored and tested to demonstrate they comply with the design requirements and to verify the operability for AC systems and DC systems.

Bruce Power shall ensure that the plant overall instrumentation and control (I&C) system is designed to satisfy the following:

- the safety classification of the I&C system is in compliance with plant level system classification and is justified by analysis;
- I&C system meets separation requirements between the groups and channels;
- safety features for enhancing I&C system reliability and integrity are identified and implemented in the design, for example, fail-safe design, redundancy, independence and testing capability;
- I&C system is not vulnerable to common-cause failures;
- I&C of safety system meets the requirements of single-failure criteria.

Prior to making use of a new fuel bundle/fuel bundle string or fuel assembly design in the reactor, Bruce Power shall perform design verification activities, analyses and testing to demonstrate that design requirements are met. The length and complexities of those activities depend on the novelty of the design.

Bruce Power shall update and maintain the reactor core nuclear design information found in Bruce A and B Safety Reports, Part 2 (WN documents in section 4.1) and supporting design manuals. Core surveillance activities shall be implemented to ensure compliance with reactor core nuclear design and operation within the design envelope. Significant changes to core nuclear design would require prior notification of CNSC, per LC G.2. Changes outside the reactor core nuclear design basis that would impact the licensing basis would require prior written approval by the Commission, per LC G.1.

Modification to the design of existing safety-related structures and components shall include adequate consideration for human factors in accordance with CSA N290.12, HUMAN FACTORS IN DESIGN FOR NUCLEAR POWER PLANTS.

Bruce Power shall ensure configuration management is aligned with the design and safety analysis and incorporated into purchasing, construction, commissioning, operating and maintenance documentation. Conformance is to be maintained between design requirements, physical configuration and facility configuration information. Bruce Power shall establish a design authority function with the authority to review, verify, approve (or reject), document the design changes and maintain design configuration control.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1	2019
CNSC	Design of Reactor Facilities: Nuclear Power Plants	REGDOC-2.5.2	2014
CSA	General requirements for concrete containment structures for CANDU nuclear power plants	N287.1	2014
CSA	Material requirements for concrete containment structures for CANDU nuclear power plants	N287.2	2008
CSA	Design requirements for concrete containment structures for CANDU nuclear power plants	N287.3	2014
CSA	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants	N287.4	2009
CSA	Examination and testing requirements for Concrete Containment Structures for CANDU Nuclear Power Plants	N287.5	2011
CSA	Pre-operational proof and leakage rate testing requirements for concrete containment structures for CANDU nuclear power plants	N287.6	2011
CSA	General requirements for safety systems of nuclear power plants	N290.0	2011
CSA	Requirements for the shutdown systems of CANDU nuclear power plants	N290.1	2013
CSA	Requirements for emergency core cooling systems of nuclear power plants	N290.2	2011
CSA	Requirements for the containment system of nuclear power plants	N290.3	2016
CSA	Requirements for reactor control systems of nuclear power plants	N290.4	2011
CSA	Requirements for electrical power and instrument air systems of CANDU nuclear power plants	N290.5	2016
CSA	Requirements for monitoring and display of nuclear power plant safety functions in the event of an accident	N290.6	2009 (R2014)
US NRC	Unified Facilities Criteria – Structures to Resist the Effects of Accidental Explosions	UFC 3-340-02	2008

Since Bruce Power's design program spans many other programs and processes not included as a written notification document, a table or roadmap that identifies relevant design basis documents, design sub-programs and processes should be maintained by Bruce Power and made available to CNSC staff.

With regard to modifications, the design basis for the plant should be documented and maintained to reflect design changes to ensure adequate configuration management. The design basis should be maintained to reflect new information, operating experience, safety analyses, and resolution of safety issues or correction of deficiencies. The impacts of the design changes should be fully assessed, addressed and accurately reflected in the safety analyses prior to implementation.

The licensee should demonstrate survivability of the I&C systems and component that are critical to the management of BDBAs, and the availability of power supply to necessary equipment and associated I&C for BDBAs.

For proposed modifications to the design of existing safety-related structures and components, modern requirements, that are consistent with the current licensing basis of the plant, should be applied to the extent practicable.

The design program should minimize the potential for human error and promote safe and reliable system performance through the consideration of human factors in the design of facilities, systems, and equipment. Guidance for considering human factors in design programs is provided in CNSC regulatory document REGDOC-2.5.1, GENERAL DESIGN CONSIDERATIONS: HUMAN FACTORS.

5.2 Pressure Boundary Program

Licence Condition 5.2:

The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

Preamble:

This LC provides regulatory oversight with regards to the licensee's implementation of a pressure boundary program and holds the licensee responsible for all aspects of pressure boundary registration and inspections.

A pressure boundary program is comprised of the many programs, processes and procedures and associated controls that are required to ensure compliance with CSA standard N285.0, GENERAL REQUIREMENTS FOR PRESSURE RETAINING SYSTEMS AND COMPONENTS IN CANDU NUCLEAR POWER PLANTS which defines the technical requirements for the design, procurement, fabrication, installation, modification, repair, replacement, testing, examination and inspection of pressure-retaining and containment systems, including their components and supports.

This LC also ensures that an Authorized Inspection Agency (AIA) will be subcontracted directly by the licensee. An AIA is an organization recognized by the CNSC as authorized to register designs and procedures, and perform inspections and other functions and activities as defined by CSA N285.0 and its applicable referenced publications (e.g., CSA standard B51 and the NATIONAL BOARD INSPECTION CODE). The AIA is accredited by the American Society of Mechanical Engineers (ASME) as stipulated by NCA-5121 of the ASME Boiler and Pressure Vessel Code.

The licensee is also responsible for all aspects of pressure boundary registration and inspections.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Pressure Boundary Quality Assurance (PBQA) Manual	BP-QMAN-00002	No
Index to Pressure Boundary Program Elements (CSA N285.0-12 Table N.1)	B-LIST-01900-00001	No
System and Item Classification	DIV-ENG-00017	Yes
Design Registration and Reconciliation	DIV-ENG-00018	No

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce A and B: Authorized Inspection Agency Services Agreement for Bruce Power (May 1, 2020 - April 30, 2025), e-Docs # 6297491	BP-CORR-00531-00291	N/A
Authorized Inspection Agency Services Agreement for Bruce Power L. P., (January 1, 2015 - April 30, 2020), e-Docs # 4810289	NK21-CORR-00531-12247 NK29-CORR-00531-12671	N/A
Bruce A and Bruce B: Notification of Changes to the Authorized Inspection Agency Agreement, June 20, 2018, e-Docs # 5573071	NK21-CORR-00531-14395 NK29-CORR-00531-15087	N/A

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	General requirements for pressure-retaining systems and components in CANDU nuclear power plants	N285.0	2012 Update No. 1 (Sep. 2013) & Update No. 2 (Nov. 2014)	August 31, 2015

Note: Annex L is accepted to be used as a “Normative” Annex.

General

CSA standard N285.0 outlines the requirements for a pressure boundary program. Bruce Power shall maintain an index of the processes and procedures of the pressure boundary program (governing and implementing documents).

The licensee shall operate vessels, boilers, systems, piping, fittings, parts, components, and supports safely and keep them in a safe condition. Bruce Power shall:

- follow accepted work plans and procedures to test, maintain, or alter over-pressure protection devices;
- comply with operating limits specified in certificates, orders, designs, overpressure protection reports, and applicable codes and standards; and
- have any certified boiler or vessel that is in operation or use inspected and certified by an authorized inspector according to an accepted schedule.

Personnel conducting non-destructive examinations shall be certified in accordance with the edition of CAN/CGSB 48.9712/ISO 9712 currently adopted for use by the National Certification Body (NCB) of Natural Resources Canada for the appropriate examination method. If the NCB does not offer certification for a specific inspection method, the relevant alternate requirements of Clause 11.3 of CSA N285.0 shall apply to ensure that personnel are appropriately trained and qualified.

Bruce Power shall obtain acceptance from CNSC staff for use of ASME Code cases on a case-by-case basis with the exception of code cases in Annex K of CSA N285.0-17.

Classification, Registration and Reconciliation Procedures

Licensee procedures describing the classification, registration and reconciliation processes and the associated controls must form a part of the pressure boundary program. Bruce Power shall provide prior notification of any changes to these procedures.

Overpressure Protection Reports

Bruce Power shall provide written notification to CNSC staff, of new or revised overpressure protection reports after the final registration of the system.

Classification and Registration of Fire Protection Systems

Fire protection systems and associated fittings and components are to be classified at least as Code Class 6, designed to ASME B31.1 and registered, unless the exemption criteria noted below are met. The requirements of CSA standard N285.0 apply for components higher than Code Class 6.

The following fittings and components may be exempt from requiring a Canadian Registration Number provided they meet the following exemption criteria:

- fittings and components that are Underwriters Laboratory (UL) or Underwriters Laboratory of Canada (cUL/ULC) listed, or Factory Mutual (FM) approved as per accreditation by the Standards Council of Canada (SCC) and are suitable for the expected environmental conditions and maximum pressures; or
- pressurized cylinders and tubes, such as extinguishers, inert gas and foam tanks, which bear Transport Canada approvals, and are suitable for the expected environmental conditions and maximum pressures; or
- buried fire protection piping when in compliance with NFPA-24.

Buried fire protection piping may be exempt from the ASME testing requirements if testing is performed to NFPA-24.

Formal Agreement with an Authorized Inspection Agency

The licensee shall always have in place a formal agreement with an AIA to provide services for the pressure boundaries of the nuclear facilities as defined by CSA N285.0 and its applicable referenced publications.

Design registration services for pressure boundary shall be provided by an AIA legally entitled under the provincial boilers and pressure vessels acts and regulations to register designs. Registration of piping systems shall be done by the AIA, who is legally entitled to register designs in Ontario.

A copy of the signed agreement shall be provided to the CNSC. During the licence period, Bruce Power shall notify the CNSC in writing of any change to the terms and conditions of the agreement, including termination of the agreement. This correspondence shall be addressed to the Director of the Bruce Regulatory Program Division.

The licensee shall arrange for the AIA inspectors to have access to all areas of the facility and records, and to the facilities and records of the licensee's pressure boundary contractors and material organizations, as necessary for the purposes of performing inspections and other activities required by the standards. Inspectors of the AIA shall be provided with information, reasonably in advance with notice and time necessary to plan and perform inspections and other activities required by the standards.

For a variance or deviation from the requirements of CSA N285.0, except as noted below, the licensee must first submit the proposed resolution to the AIA for evaluation, and then to the CNSC for consent. The licensee must demonstrate that meeting the code requirement is impracticable and the proposed resolution will provide adequate safety. Per the agreement with the AIA, the evaluated resolution shall not be implemented without the prior written consent of CNSC staff. A variance or deviation related to Code Edition, Code Classification, and Legacy Registration issues may be submitted directly to the CNSC without prior AIA evaluation. General criteria for obtaining prior written consent/approval for a proposed resolution from the CNSC can be found in LC G.1 and LC G.2.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
ASME	Boiler and Pressure Vessel Code – Code Cases	N/A	2010 Edition with 2011 Addendum
ASME	Power Piping	B31.1	2010
ASME	Process Piping	B31.3	2010
ASME	Refrigeration Piping and Heat Transfer Components	B31.5	2010
CSA	Boiler, Pressure Vessel and Piping Code	B51	2014
CSA	General requirements for pressure-retaining systems and components in CANDU nuclear power plants	N285.0	2017

Note: Where these standards/codes or portions thereof are required for compliance with a governing standard referenced in the CVC of the LCH, compliance to the referenced standards/codes or portions thereof is required for compliance with the governing standard and the LC.

The AIA, and its authorized inspectors, should be familiar with and capable of applying the CSA N285.0 provisions to perform their activities as defined by the standard.

5.3 Equipment and Structure Qualification Program

Licence Condition 5.3:

The licensee shall implement and maintain an equipment and structure qualification program.

Preamble:

Environmental qualification (EQ) ensures that all required equipment in a nuclear facility is qualified to perform its safety functions if exposed to harsh environmental conditions resulting from credited Design-Basis Accidents (DBAs) and that this capability is preserved for the life of the plant.

Seismic qualification (SQ) ensures that all seismically credited safety-related SSCs in a nuclear power plant are designed, installed and maintained to perform their safety function during and/or after (as needed and pre-defined) a design basis earthquake or site design earthquake and also ensures an adequate margin against review level earthquakes.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Environmental Qualification Program Requirements	BP-STND-00126	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	General requirements for seismic design and qualification of CANDU nuclear power plants	N289.1	2008	October 1, 2018
CSA	Ground motion determination for seismic qualification of CANDU nuclear power plants	N289.2	2010	October 1, 2018
CSA	Design procedures for seismic qualification of CANDU nuclear power plants	N289.3	2010	October 1, 2018
CSA	Testing procedures for seismic qualification of nuclear power plant structures, systems, and components	N289.4	2012	October 1, 2018
CSA	Seismic instrumentation requirements for nuclear power plants and nuclear facilities	N289.5	2012	October 1, 2018
CSA	Environmental qualification of equipment for CANDU nuclear power plants	N290.13	2018	July 25, 2022

Any gaps identified with respect to N289.1-08, N289.2-10, N289.3-10, N289.4-12, and N289.5-12 are subject to the disposition and/or corrective actions described in the Bruce A and B Global Assessment Report and Integrated Implementation Plan. Specifically with respect to Clause 4.1.1.3 of N289.5-12, Bruce Power is not required to install an onsite seismic instrumentation system and Bruce Power complies with the intent of Clause 6.5.2(c) of N289.1-08 through offsite monitoring within 20 km of the Bruce site.

CSA standard N290.13, ENVIRONMENTAL QUALIFICATION OF EQUIPMENT FOR CANDU NUCLEAR POWER PLANTS outlines the requirements for an EQ program.

In addition to the criteria set out in CSA N290.13, Bruce Power's EQ program shall include a monitoring program consisting of condition monitoring and environmental monitoring, to measure degradation and failures of qualified equipment, including cables.

Guidance:

The processes and procedures related to the EQ program should meet the requirements of recognized industrial standards.

6 SCA – FITNESS FOR SERVICE

6.1 Fitness for Service Program

Licence Condition 6.1:

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

Preamble:

A fitness for service program includes the following elements:

- Maintenance program defining the policies, processes and procedures that provide direction for maintaining structures, systems and components (SSCs) of the plant;
- An effective control of plant chemistry to ensure critical plant equipment performs safely and reliably;
- aging management activities to ensure the availability of required safety functions of SSCs;
- periodic and in-service inspection programs to ensure that pressure-boundary components, containment structures and components, continue to meet their design requirements;
- in-service inspection of balance of plant to ensure safety significant pressure retaining systems, components and safety-related structures are monitored for degradation; and
- proper reliability program and implementation to ensure that SSCs important to safety continue to meet their performance requirements.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document Title		Document #	Prior Notification
Plant Maintenance		BP-PROG-11.04	No
Equipment Reliability		BP-PROG-11.01	No
N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)	NK21-PIP-21100-00001	Yes
	CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Vacuum Building	NK21-PIP-25100-00001	Yes
	CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)	NK29-PIP-21100-00001	Yes
	CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Vacuum Building	NK29-PIP-25100-00001	Yes
	Visual Inspection of Containment Boundary Components	BP-PROC-00815	Yes

Licensee Documents that Require Notification of Change

Document Title		Document #	Prior Notification
N285.4	Bruce A Periodic Inspection Plan Units 1, 2, 3 and 4	NK21-PIP-03641.2-00001	Yes
	Bruce B Periodic Inspection Plan Units 5, 6, 7 and 8	NK29-PIP-03641.2-00001	Yes
	Bruce Nuclear Generating Station Fuel Channel Periodic Inspection Program	B-PIP-31100-00002	Yes
N285.5	Bruce A NGS N285.5 Periodic Inspection Plan for Unit 0 and Units 1 to 4 Containment Components	NK21-PIP-03642-00001	Yes
	Bruce B Periodic Inspection Plan for Unit 0 and Units 5 to 8 Containment Components	NK29-PIP-03642-00001	Yes
Life Cycle Management Plan for Safety Related Civil Structures		B-LCM-20000-00001	Yes
Fuel Channel Life Cycle Management Plan		B-LCM-31100-00001	Yes
Steam Generator and Preheater Periodic Inspection Plan		B-PIP-33110-00001	Yes
PHT Feeder Piping Periodic Inspection Plan		B-PIP-33126-00001	Yes
On-Line Work Management Program		BP-PROG-11.02	No
Outage Work Management		BP-PROG-11.03	No
Chemistry Management		BP-PROG-12.02	No
Evaluation Process of Pressure Tube Fitness-for-Service Using CSA N285.8		B-REP-31100-00010	Yes

Licensee Documents

Document Title	Document #	Prior Notification
Systems Important to Safety List, e-Docs # 6028118[1]	B-REP-09034-00002	N/A

1. The Systems Important to Safety List, B-REP-09034-00002, was revised based on S-294, Probabilistic Safety Assessment compliant models on June 1, 2018.

Licensing Basis Publications

Org	Document Title	Document #	Revision #	Effective Date
CNSC	Reliability Programs for Nuclear Power Plants	REGDOC-2.6.1	2017	Oct. 1, 2018
CNSC	Maintenance Programs for Nuclear Power Plants	REGDOC-2.6.2	2017	Oct. 1, 2018
CNSC	Aging Management	REGDOC-2.6.3	2014	Dec. 31, 2016

FITNESS FOR SERVICE

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Periodic inspection of CANDU nuclear power plant components (see Note)	N285.4	2014	Aug. 17, 2020
CSA	Periodic inspection of CANDU nuclear power plant containment components	N285.5	2018	Jan. 1, 2023
CSA	Periodic inspection of CANDU nuclear power plant balance of plant systems and components	N285.7	2015	Program documents to be submitted for CNSC staff acceptance by Oct. 1, 2028
CSA	Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors	N285.8	2021	Feb. 3, 2023 [1]
CSA	In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants	N287.7	2008	Jun. 1, 2015
CSA	Requirements for safety-related structures for nuclear power plants	N291	2015	Oct. 1, 2018

References:
[1] CNSC letter, M. Hornof to M. Burton, "Bruce NGS A and B: Compliance Plan to CSA N285.8", February 3, 2023, e-Doc 6962455.

CSA N291-15, Requirements For Safety-related Structures for Nuclear Power Plants

Any gaps identified with respect to N291-15 are subject to the disposition and/or corrective actions described in the Bruce A and B Global Assessment Report and Integrated Implementation Plan. Specifically, with respect to Clause 4.3(f), Ontario Power Generation (not Bruce Power) is responsible for decommissioning.

Reliability of Systems Important to Safety

REGDOC-2.6.1, Reliability Program for Nuclear Power Plants outlines the requirements for a reliability program. This document has replaced RD/GD-98 in the regulatory framework in 2017.

Given that REGDOC-2.6.1 has no material changes to it, where RD/GD-98 is referenced in Bruce Power governing documents, it shall be taken to mean REGDOC-2.6.1. Bruce Power will update the references in their governance on the regular document review cycle.

Maintenance

A NPP maintenance program consists of policies, processes and procedures that provide direction for maintaining SSCs of the plant. The intent of a maintenance program is to ensure that the SSCs remain capable of performing their function as described in the safety analysis. A maintenance program uses organized activities, both administrative and technical, to keep SSCs in good operating condition, and to ensure that they function as per design.

CNSC regulatory document REGDOC-2.6.2, MAINTENANCE PROGRAMS FOR NUCLEAR POWER PLANTS outlines the requirements for a maintenance program. This document has replaced RD/GD-210 in the regulatory framework in 2017.

Given that REGDOC-2.6.2 has no material changes to it, where RD/GD-210 is referenced in Bruce Power governing documents, it shall be taken to mean REGDOC-2.6.2. Bruce Power will update the references in their governance on the regular document review cycle.

Management of Planned Outages

The maintenance program shall include provisions for the management of planned outages. Bruce Power's program related to management of planned outages is documented in the licensee's procedure BP-PROC-00342, "Planned Outage Management".

Accordingly, Bruce Power shall make outage-related information (including Levels 1 and 2 Outage Plans, detailing all major work on safety related SSCs to be carried out during the planned outage) available to CNSC staff. Levels 1 and 2 outage plans are defined in Appendix A – Acronyms and Definitions.

Planned outages represent a key activity that has a high regulatory significance. Therefore, a review is required to ensure proper scoping (of safety-related commitments), planning and execution of the commitments (e.g., for heat sinks, dose control, etc.).

Chemistry Control

The chemistry control program shall specify processes, specifications, overall requirements, parameter monitoring, data trending and evaluation to ensure effective control of plant chemistry during operational and lay-up conditions. Bruce Power shall maintain the implementing documents referenced in their chemistry management program that describe the design basis for chemistry control.

Aging Management

CNSC regulatory document REGDOC-2.6.3, AGING MANAGEMENT outlines the requirements related to aging management. SSC-specific aging management programs (also, in some cases, referred to as Life Cycle Management Plans (LCMPs)), shall be implemented in accordance with the overall integrated aging management program framework, and address the attributes of an effective aging management program as listed in REGDOC-2.6.3. The SSC-specific aging management programs (AMPs) or LCMPs are to include structured, forward looking inspection and maintenance schedules, requirements to monitor and trend aging effects, and any preventative actions necessary to minimize and control aging degradation of the SSCs.

Pressure Tube Fracture Toughness Models

Bruce Power submits evaluations for fuel channel components to support safe operation and satisfy compliance verification criteria in CSA N285.4-14 and CSA N285.8-21. These pressure tube core assessments for flaws rely on the fracture toughness models for axial through-wall flaws to assess risk of pressure tube failure from postulated flaws in uninspected pressure tubes. The fracture toughness is impacted by aging effects, most notably the increase in hydrogen equivalent concentration (Heq) and is the subject of ongoing research.

The Revision 2 fracture toughness model has been accepted for use subject to the conditions established in [1].

Bruce Power shall report, on a semi-annual basis, the following:

- status updates on the validation of the fracture toughness model
- updates to the fracture toughness test plan, which includes:
    - status of findings and outcomes from fracture toughness tests
    - additions and changes to the test plan i.e., schedule of fracture toughness tests
    - changes to the test strategy
    - results of fracture toughness tests including, as a minimum, material tested, test conditions, the results with comparisons to model predictions, whether the test objective has been met, and the tests planned for the next six months

Bruce Power shall submit an impact assessment for CSA N285.8-21 Clause 7 evaluations using fracture toughness as an input parameter, whenever a fracture toughness test result challenges the model's lower prediction bound.

Since the fracture toughness model requires further development, Bruce Power shall report the following information for each of the probabilistic pressure tube evaluations [2]:

a) For PCAs, the five tubes with the highest estimated number of through wall cracks and the five tubes with the highest estimated number of ruptures.
b) For Probabilistic Leak-Before-Break evaluations, the five tubes with the highest estimated conditional probability of Break Before Leak (BBL).
c) For Probabilistic Fracture Protection (PFP) evaluations, the five tubes with the highest estimated number of ruptures for each Service Level.

Along with this information, Bruce Power shall identify which of those pressure tubes have undergone full-length volumetric inspection. The disposition of inspection findings from higher risk tubes will further support the conclusions of the probabilistic evaluations.

References:

[1] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B: CNSC review of the revision 2 engineering fracture toughness model for pressure tubes", May 12, 2022, BP-CORR-00531-02808, e-Docs # 6795110.

[2] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B: CNSC Observations Regarding Revision 1 of the Cohesive Zone Model for Pressure Tube Fracture Toughness – New Action Item 2021-07-23141", June 3, 2021, BP-CORR-00531-01727, e-Docs # 6576383.

Operation of Fuel Channels Beyond the Specified Limits of Validity of Fitness for Service Evaluation Models

Bruce Power shall obtain approval from the Commission to operate any pressure tube beyond the established limits of validity of the fitness for service evaluation models specified in the CVC for LC 6.1. An approval request shall be accompanied by an evaluation of the impact of the exceedance of the validity limit on the safe operation of the reactor addressing the potential impact on the five Levels of Defence-in-Depth described in REGDOC-2.4.1.

For specific compliance verification criteria related to the operation of pressure tubes beyond 210,000 Effective Full Power Hour (EFPH) with the potential elevated hydrogen equivalent near the inlet and outlet rolled joint burnish marks, refer to Section 6.2.

Periodic Inspection and Testing

The purpose of a periodic inspection program (PIP) or an in-service inspection (ISI) program is to provide assurance that the likelihood of a failure that could endanger the environment and/or radiological health and safety of persons has not increased significantly since the plant was put into service. Periodic inspection and in-service inspection requirements include:

- General Nuclear Pressure Boundaries (CSA N285.4)
- Fuel Channel Pressure Tubes (CSA N285.4)
- Fuel Channel Feeder Pipes (CSA N285.4)
- Steam Generator Tubes (CSA N285.4)
- Containment Components (CSA N285.5)
- Concrete Containment Structures (CSA N287.7)
- Safety-related Structures (CSA N291)
- Balance of Plant Systems and Components

Periodic and in-service inspection programs are established to confirm that pressure-boundary components; containment structures and components, continue to meet their design requirements. The condition of safety significant balance of plant pressure retaining systems and components, as well as safety-related structures are monitored for degradation through in-service inspection programs.

Bruce Power shall carry out periodic inspections in accordance with CNSC-accepted PIP documents. If a deviation from the accepted PIP program is anticipated during inspection planning activities, Bruce Power shall obtain CNSC acceptance prior to conducting the affected inspection. However, for any findings, discoveries or deviations from the accepted PIP that are identified during an inspection, Bruce Power shall inform the CNSC and provide justification in the corresponding inspection report submission based on OPEX and Best Industry Practices. For permanently required exemptions to the requirements of CSA PIP standards, the licensee shall document these exemptions in a revised PIP document and submit to the CNSC for acceptance.

<u>Periodic Inspection</u>

CSA standards N285.4, Periodic Inspection of CANDU Nuclear Power Plant Components and N285.5, Periodic Inspection of CANDU Nuclear Power Plant Containment Components outline the requirements related to periodic inspections for nuclear pressure retaining and containment systems and components. CSA standard N287.7, In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants outlines the requirements for in-service examination and testing.

When the hydrogen equivalent concentration at a point along the length of a pressure tube is measured or predicted to exceed the limits specified in Clause 8.2(a) of CSA N285.8-21 during the evaluation period, the periodic inspection program shall include a selection of pressure tubes with the highest expected Heq and highest potential for crack initiation due to service induced flaws for volumetric examination and hydrogen measurement. Inspection of the selected tubes should include locations where Heq has exceeded or is expected to exceed the specified limits during the evaluation period. The justification for the selection of tubes and the scope and schedule of the inspections shall be submitted to CNSC staff for acceptance.

When PIP requirements are addressed exclusively within an aging management or LCMP document, only those elements of the document which directly address the PIP requirements of the governing CSA standard require acceptance from CNSC staff prior to implementation.

As indicated in the Bruce Design Manuals, the fuel channels were designed to meet the intent of Section III of ASME Boiler and Pressure Vessel Code. As a planning assumption, the fuel channels were designed and assembled to satisfy function and economic life requirements for at least the equivalent of 210,000 hours of full power operation (i.e., 30 years at a capacity factor of 80%). Demonstration that fuel channels continue to meet the intent of Section III of ASME Boiler and Pressure Vessel Code is part of the design basis, which in turn is part of the licensing basis. For operation beyond 210,000 EFPH, the licensee shall provide evidence to demonstrate that the predicted condition of pressure tubes continues to be sufficient to support safe operation.

In 2017, Bruce Power requested in its licence renewal application operation of Bruce NGS A and B up to 300,000 EFPH. As a result of the 2018 licence renewal hearing proceedings, the Commission authorized operation of Bruce NGS A and B up to a maximum of 300,000 EFPH as stated in the CNSC's *Record of Decision*, in the matter of "Bruce Power Inc.: Application to Renew the Power Reactor Operating Licence for Bruce A and Bruce B Nuclear Generating Stations", September 27, 2018. Operation of Bruce NGS A and B beyond 300,000 EFPH is not permitted unless approved by the Commission in accordance with LC G.1.

With respect to CSA N285.4 Clause 12.2.5.1.3, CNSC staff have reviewed and accepted in [1] Bruce Power's 2021 Compliance Plan submitted in [2] for the use of CSA N285.8-21 to evaluate inspection results. Bruce Power shall use the updated failure frequency for Probabilistic Core Assessments for flaws and Probabilistic Pressure Tube to Calandria Tube (PT-CT) core assessments. Furthermore, Bruce Power is expected to address the conditions in [3] concerning:

- Updates to PT-CT contact assessments when new Heq data is available
- Increases to the PT-CT contact/blister susceptibility assessment operating limit from two to three hot years

With respect to CSA N285.8 Clause C.3.3.4, CNSC staff restricted the use of the combined failure frequency approach for pressure tube core assessments [3, 4] in January 2020.

References:

[1] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B Compliance Plan to CSA N285.8", May 29, 2020, BP-CORR-00531-00607, e-Doc 6307648.
[2] Bruce Power letter, M. Burton to M. Hornof, "Bruce A and B: Compliance Plan to CSA N285.8", November 22, 2022, BP-CORR-00531-03438, e-Doc 6925055.
[3] CNSC letter, M. Hornof to M. Burton, "Bruce NGS A and B Compliance Plan to CNSC N285.8", February 3, 2023, e-Doc 6962455.
[4] CNSC letter, L. Sigouin to M. Burton, "Bruce A Unit 3: Component Disposition of Pressure Tube to Calandria Tube Contact", January 31, 2020, BP-CORR-00531-00233, e-Doc 6105457.

Selection Criteria for Pressure Tube Inspection

In reference to inspected pressure tubes, and to resolve probabilistic core assessment flaw removal assumptions, Bruce Power is to provide evidence that a sample of the pressure tubes with the highest cumulative probability of developing through-wall cracking determined from probabilistic core assessments is included in their pressure tube volumetric inspection program [1]. To validate probabilistic core assessment predictions, Bruce Power is to include consideration for higher risk tubes from the probabilistic core assessments in the selection criteria for fuel channel inspection campaigns.

Reference:

[1] CNSC letter, L. Sigouin to M. Burton, "Bruce A and B: Technical Basis for Safety Factors on Pressure for Probabilistic Fracture Protection Evaluation and Guidelines for Validating Probabilistic Computer Codes for Pressure Tube Integrity Evaluation", January 28, 2021, BP-CORR-00531-01338, e-Docs # 6475465.

PT Flaw Assessments (hydrided region overload)

With respect to CSA N285.8-21 Clause 5.4.3.1 (g), regarding the evaluation of the initiation of delayed hydride cracking of detected flaws during Service Level B transients due to fracture of hydrided region, Bruce Power has submitted a short term and long term plan. Bruce Power submitted the most recent Hydride Region Overload semi-annual R&D Update [1] which was assessed and found acceptable by CNSC staff.

Reference:

[1] Bruce Power letter, M. Burton to L. Sigouin, "Bruce A and B: Hydride Region Overload Semi-Annual Research and Development Update", March 1, 2021, BP-CORR-00531-01301, e-Docs # 6502390.

Feeders

With respect to CSA N285.4 Clause 8.2.1(d) and Clause 13.2.5.1.3, CNSC staff have accepted Bruce Power's request to use COG report COG-JP-4107-V06-R03, "Fitness-for-Service Guidelines for Feeders in CANDU Reactors" [1, 2, 3].

References:

[1] Bruce Power letter, F. Saunders to R. Lojk, "Bruce A and Bruce B: Request for Use of Feeder Fitness-for-Service Guidelines COG-JP-4107-V06 Rev 03", December 6, 2012, NK21-CORR-00531-09887 | NK29-CORR-00531-10343, e-Docs # 4050031.
[2] CNSC letter, R. Lojk to F. Saunders, "Bruce A and Bruce B: Request for Use of Feeder Fitness-for-Service Guidelines COG-JP-4107-V06 Rev.03", March 11, 2013, NK21-CORR-00531-10334/NK29-CORR-00531-10740, e-Docs # 4103896.
[3] COG Report, "COG-JP-4107-V06-R03, Fitness-for-Service Guidelines for Feeders in CANDU Reactors", March 2012, e-Docs # 3922170.

Steam Generators

With respect to CSA N285.4 Clause 14.2.5.1.3, CNSC staff have accepted the use of Bruce Power Procedure B-REP-33110-00001 R00, "Fitness-for-Service Guidelines for Steam Generators and Preheaters Tubes in CANDU Nuclear Power Plants" [1, 2].

References:

[1] Bruce Power letter, F. Saunders to K. Lafrenière, "Bruce A and B: Steam Generator and Preheater Aging Management Program", May 4, 2017, NK21-CORR-00531-13475 | NK29-CORR-00531-14052, e-Docs # 5245670.
[2] CNSC letter, K. Lafrenière to F. Saunders, "Bruce NGS A and B: Steam Generator and Preheater Aging Management Program", December 14, 2017, NK21-CORR-00531-14079/NK29-CORR-00531-14763, e-Docs # 5414771.

Inspection Personnel

Personnel conducting non-destructive examinations shall be certified in accordance with the edition of CAN/CGSB 48.9712/ISO 9712 currently adopted for use by the National Certification Body (NCB) of Natural Resources Canada for the appropriate examination method. For Steam Generator tube inspection, the use of personnel certified according to ASNT CP-189 for eddy current inspections is permitted provided they have received additional training, evaluation and qualification, in accordance with [1]. The final review and reporting of all significant indications is provided by CGSB certified personnel. Otherwise, if the NCB does not offer certification for a specific inspection method, the relevant alternate requirements of Clause 5 of CSA N285.4 or Clause 6 of CSA N285.5 shall apply to ensure that personnel are appropriately trained and qualified.

Reference:

[1] CNSC letter from J.D. Harvie to G.C. Andognini, "Use of ASNT Certified Eddy Current Inspection Personnel for OHN Steam Generator Inspections", February 12, 1999, N-CORR-00531-00263, e-Docs #s 404126.

Fuel channel annulus spacer surveillance

For the purposes of Clause 12.5 of CSA N285.4-14, Bruce Power is not required to remove fuel channels for specific purposes of fuel channel annulus space surveillance. Bruce Power shall recover spacers for material surveillance anytime a single fuel channel is replaced for pressure tube material surveillance in accordance with Clause 12.4 of CSA N285.4-14. If fuel channels are replaced for any other reason, Bruce Power should make reasonable effort to recover spacers for material surveillance.

Inspection of Balance of Plant

Bruce Power shall have adequate knowledge of the current state of balance-of-plant (BOP) pressure retaining systems, components and safety-related structures to ensure that they are capable of operating within their design intent and perform required safety functions if called upon. Bruce Power shall implement and maintain inspection program(s) and LCMPs for these systems in keeping with industry best practices.

Specifically, Bruce Power shall develop:

- an inspection program and LCMPs for safety-significant BOP pressure retaining systems and components; and
- an inspection program and LCMPs for BOP safety-related structures.

Implementation plan for CSA N285.7

CNSC staff accepted Bruce Power's March 28, 2019 Implementation Plan [1] for CSA standard N285.7, PERIODIC INSPECTION OF CANDU NUCLEAR POWER PLANT BALANCE OF PLANT SYSTEMS AND COMPONENTS. This standard will become effective on October 1, 2028. The next status update on the implementation plan will be submitted by March 31, 2022. As previously committed to in [1], Bruce Power submitted an update on the N285.7-15 implementation plan on March 14, 2022. The next status update on the implementation plan will be submitted by March 31, 2025. [2]

References:

[1] Bruce Power letter, M. Burton to L. Sigouin, "Bruce A and Bruce B: Implementation Plan Update for Incorporating CSA N285.7-15 into the Licensing Basis", March 28, 2019, NK21-CORR-00531-14905/NK29-CORR-00531-15649, e-Docs # 5868019.

[2] Bruce Power letter, M. Burton to L. Sigouin, "Bruce A and Bruce B: Implementation Plan for CSA N285.7-15," March 14, 2022, BP-CORR-00531-02439, e-Docs # 6755302.

Implementation of CSA N285.8-21, Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors

Probabilistic Fracture Protection (PFP) evaluations completed for pressure tubes in accordance with CSA N285.8 Clause 4.3.2.2 shall use the acceptance criteria and evaluation process documented in [1].

Reference:

[1] Bruce Power letter, M. Burton to M. Hornof, "Bruce A and B: Supplementary work to support application of the Probabilistic Fracture Protection Methodology and Response to CNSC Review of the Acceptance Criteria for Probabilistic Fracture Protection Evaluations, Action Item 2022-07-26513", August 17, 2023, BP-CORR-00531-04243, e-Docs # 7109112.

Station Containment Outage and Vacuum Building Outage

Vacuum Building (VB)

Station	Previous VB Outage	Next VB Outage	Extension Approval
Bruce A	May 2022	May 2034	N/A
Bruce B	May 2024	May 2036	N/A

VB Positive Pressure Test

Under the licensee's periodic inspection program for CSA N287.7, Bruce Power shall either:

1. carry out a test to measure the leakage rate at full design pressure of the Vacuum Building (VB) and inspect the VB concrete structure and components once every twelve (12) years; or
2. develop and carry out the test in accordance with a CNSC-accepted performance-based methodology.

Bruce Power submitted an industry performance-based methodology, developed by Bruce Power and Ontario Power Generation, in July 2010 [1]. CNSC staff reviewed and subsequently accepted the proposed methodology [2].

Station	Previous VB Positive Pressure Test	Next VB Positive Pressure Test	Extension Approval
Bruce A	August 2002	May 2034	[3]
Bruce B	April 2015	May 2036	[4]

Station Containment (SC)

In accordance with CSA N287.7, Bruce Power is to carry out a test to measure the leakage rate at full design pressure of station containment and inspect the associated concrete structures and components once every six (6) years.

Station	Previous SC Outage	Next SC Outage	Extension Approval
Bruce A	May 2022	May 2028	N/A
Bruce B	May 2024	May 2030	N/A

References:

[1] Attachment 2 of Bruce Power letter, F. Saunders to K. Lafrenière, "Action Item 090708: Testing and Inspection for Bruce A 2009 Station Containment Outage", NK21-CORR-00531-07994/NK29-CORR-00531-08849", July 13, 2010, e-Doc 3578173.
[2] CNSC letter, R. Lojk to F. Saunders, "Action Item 090708: Testing and Inspection for Bruce A 2009 Station Containment Outage", April 13, 2012, NK21-CORR-00531-09426, e-Doc 3916294.
[3] CNSC letter, L. Sigouin to M. Burton, "Bruce A: Performance-Based Vacuum Building Positive Pressure Leakage Rate Test Interval", January 24, 2022, e-Doc 6721410.
[4] CNSC letter, M. Hornof to M. Burton, "Bruce B: Performance-Based Vacuum Building Positive Pressure Leakage Rate Test and Dousing Test Extension", August 16, 2023, e-Doc 7107920.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Aging management for concrete containment structures for nuclear power plants	N287.8	2015
CSA	Reliability and maintenance programs for nuclear power plants	N290.9	2019
COG	Interim Implementation Guidelines for CANDU Nuclear Plant Reliability Programs	COG-05-9011	2006
COG	Fuel Channel Life Management – Third Party Review of Probabilistic Fracture Protection Evaluation Methodology Acceptance Criteria	COG-JP-4491-V197	2017

Reliability of Systems Important to Safety

The licensee should consider CSA N290.9, *Reliability and maintenance programs for nuclear power plants* for guidance when updating B-REP-09034-00002, “Systems Important to Safety List” or when issuing a subsequent report.

Outage Management

The outage program should have designated criteria that the licensee will follow to confirm that planned and discovery work has been satisfactorily completed during the planned outage, and that all safety-significant SSCs are available to ensure the continued safe operation of the facilities.

CNSC staff located at licensees’ site offices should be invited to the restart meetings in order to verify that all appropriate sign-offs for restart of the reactor have occurred.

Aging Management

Bruce Power should maintain a roadmap outlining the programs and procedures that ensure a well-documented overall integrated aging management framework exists.

The licensee should have an adequate knowledge of the current state of the SSCs and should document the knowledge in the SSC-specific AMP or LCMPs. The AMPs and/or LCMPs may include in-service inspections and preventative actions to minimize and limit the effects of aging on the operational reliability and the fitness for service of the SSCs and to effectively manage and maintain the SSCs to meet its intended design function until the end of life.

Whenever a revision to the AMP, SSC-specific AMP or LCMP is submitted to CNSC for review, the licensee should identify whether the revision(s), affects the previously planned inspection and maintenance activities, with supporting technical basis for the change.

The quantitative assessment of uncertainties in Revision 1 of the Cohesive Zone Model should utilize the approach in sections A.1, A.2 and A.5 of Appendix A to COG-JP-4491-V197, “Fuel Channel Life Management: Third Party Review of Probabilistic Fracture Protection Evaluation Methodology and Acceptance Criteria”.

Periodic Inspection and Testing

To satisfy the compliance verification criteria for the inclusion of high Heq pressure tubes in the periodic inspection program it may be necessary to increase the number of pressure tubes selected for inspection in the current periodic inspection program accepted by CNSC staff. Any substitutions of high Heq tubes for tubes previously selected for inspection during the periodic inspection interval will require technical justification. The inclusion of volumetric inspections for high Heq tubes in the periodic inspection program will not preclude the requirement to disposition the results of Heq measurements in accordance with the requirements of Clause 12.3.5 of CSA N285.4.

Inspection Programs for Balance of Plant

The licensee may document the inspection requirements for the safety-significant BOP pressure-retaining components and safety-related structures within AMPs or LCMPs, linking inspection requirements to potential degradation mechanisms of concern. For SSCs that do not have AMPs or LCMPs the licensee may develop SSC specific or degradation mechanism specific inspection programs. The licensee should apply a systematic and integrated approach to establish, implement and improve programs in keeping with industry best practices until full implementation of CSA N285.7 and CSA N291 programs is achieved.

6.2 Fitness for Service Program for Fuel Channels in Extended Operation

Licence Condition 6.2:

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

Preamble:

The fitness for service program requirements in Section 6.1 have been demonstrated to be effective for operation of pressure tubes for the original target operating life of 210,000 EFPH. However, many of the model and evaluation processes used to assess pressure tube fitness for service in CSA Standard N285.8 require further development for levels of Heq that may be experienced when extending the operation of pressure tubes beyond 210,000 EFPH.

Heq is a key input parameter to the models used to assess crack initiation, crack growth, fracture toughness and fracture initiation toughness. Recent operational experience has indicated that the Heq in regions of the pressure tube near the inlet and outlet rolled joints (referred to as regions of interest or ROIs) in some Bruce Power pressure tubes in extended operation have exceeded the values that were estimated prior to 2021 for the end-of-life conditions. Furthermore, the validity of the existing crack initiation, crack growth and fracture toughness models requires confirmation for the Heq levels in the regions of interest. Bruce Power has undertaken a R&D program to extend the Heq limits for the models used to demonstrate pressure tube fitness for service.

The enhanced fitness for service program incorporates alternate criteria to evaluate the impact of pressure tube aging on safe operation, modified reporting criteria and focused R&D activities to expand pressure tube fitness for service models to higher Heq limits.

Compliance Verification Criteria:

Applicable Heq Limits

The limits of applicability for Heq for the relevant fitness for service models addressed by this licence condition are:

- Fracture toughness: 100 ppm within 1.5 meters of the front end of a pressure tube and 140 ppm for the remainder of the length of the tube
- Delayed hydride cracking, hydrided region overload and fatigue crack initiation models: 120 ppm
- Delayed hydride cracking growth rate models: 120 ppm
- Fracture initiation toughness: 120 ppm

For regions of pressure tubes with Heq levels below these values, the CVC in Section 6.1 shall apply for fitness for service evaluations. The CVC in this section apply on an interim basis for the ROIs where these Heq values may be exceeded.

Based upon available information, the ROIs adopted for the interim evaluations of safe operability of pressure tubes are defined 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.

The definitions of the regions of interest may be modified as supported by results of the R&D program, subject to confirmation by CNSC staff. To modify the definitions, conservative bounds of the regions interest shall be established for the expected end of operational life of pressure tubes, accounting for the sensitivity of the defined regions to the influential parameters identified under the R&D program.

Research and Development Program

The licensee shall implement the R&D program described in [1] subject to the conditions in [2]. Progress report on the R&D program including modifications to the scope and schedule of the R&D program shall be submitted to CNSC staff on a semi-annual basis.

Interim Approach for Assessments of the Safe Operation of Pressure Tubes

In the progress reports for the R&D program, Bruce Power shall confirm that Levels 3 and 4 Defence-in-Depth (DiD) continue to be maintained. This confirmation should be supported by qualitative arguments that demonstrate the robustness of the systems required to mitigate the consequences of pressure tube failures.

For the OROI, Bruce Power shall continue to demonstrate a low likelihood of the existence of flaws that would lead to crack initiation in the inspection reports submitted in accordance with Clause 12.2.6 of CSA Standard N285.4-14.

These interim approaches to assess the safe operability of pressure tubes expire on December 31, 2025. By that time, it is expected that Bruce Power will return to the use of the CVC established in Section 6.1 based on the results of the R&D program specified in [1].

References:

[1] Bruce Power letter, M. Burton to A. Viktorov and D. Saumure, “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, e-Docs # 6844485.

[2] CNSC letter, M. Burton to M. Hornof, “Bruce NGS A and B: Detailed Plan to further Evaluate the Effect of Elevated Hydrogen Equivalent Concentration on Pressure Tube Fitness for Service – New Action Item 2023-07-27173”, March 10, 2023, BP-CORR-00531-03929, e-Docs # 6959554.

Guidance:

Not applicable to this LC.

7 SCA – RADIATION PROTECTION

7.1 Radiation Protection Program and Action Levels

Licence Condition 7.1:

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

Preamble:

The *Radiation Protection Regulations* require that the licensee implement a radiation protection program and also ascertain and record doses for each person who perform any duties in connection with any activity that is authorized by the NSCA or is present at a place where that activity is carried on. This program must ensure that doses to workers do not exceed prescribed dose limits and are kept As Low As Reasonably Achievable (the ALARA principle), social and economic factors being taken into account. Also, the program shall ensure that occupational exposures are ascertained and recorded in accordance with the *Radiation Protection Regulations* through the establishment of dosimetry requirements.

Note that the regulatory dose limits to workers and the general public are explicitly provided in the *Radiation Protection Regulations*.

Action Levels (Als) relate to the parameters of dose to workers and surface contamination levels. Als are designed to alert licensees before regulatory dose limits are reached. By definition, if an AL referred to in a licence is reached, a loss of control of some part of the associated radiation protection program may have occurred, and specific action is required, as defined in the *Radiation Protection Regulations* and the licence. Als are not intended to be static and are to reflect operating conditions in the station.

Administrative Dose Limits (ADLs) are the licensee's internal dose limits designed to ensure individuals do not exceed regulatory dose limits. ADLs that are exceeded without prior approval from the designated licensee authority are reported as AL exceedances in accordance with the *Radiation Protection Regulations*.

The *Radiation Protection Regulations* specify the requirements related to Als and indicate that the licence will be used to identify their notification timeframes. For this licence, the Als are provided in the CVC below.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Radiation Protection Program	BP-PROG-12.05*	Yes
ALARA Program	BP-RPP-00044	No
Dosimetry Requirements	BP-PROC-00280	Yes
Dose Limits and Exposure Control	BP-RPP-00009	Yes

* As this document provides the roles and responsibilities for an authorized health physicist, a designated position, as stated in section 2.4, any change to the roles and responsibilities of the authorized health physicist will be reviewed by CNSC staff to confirm they remain within the licensing basis, in consultation with the designated officer to certify and decertify workers referred to in sections 9 and 12 of the *Class I Nuclear Facilities Regulations* and the Director of the Personnel Certification Division.

The current ALs and ADLs for Bruce A and B (including the Central Storage Facility (CSF) and Central Maintenance Facility (CMF) are summarized in the tables below for convenience.

The Als shown in table 7.1 are taken from the “Actions Levels” appendix of Bruce Power’s document “Radiation Protection Program”:

Table 7.1: Bruce Power Action Levels					
Description	Bruce A and B	CSF	CMLF and Class II Nuclear Facility	Nuclear Substances and Radiation Devices	Notes
Unplanned External Exposure	2 mSv (200 mrem) or more above planned dose	0.5 mSv (50 mrem) or more above planned dose	250µSv (25 mrem) or more above planned dose	2 mSv (200 mrem) or more above planned dose	Unplanned external exposure is per shift and above the value of the Dose Control Device back-out level. For an individual that is not working on a Radiation Exposure Permit (i.e., a back-out limit has not been established), the back-out level is considered to be 0 millisievert (0 millirem).
Unplanned Internal Exposure – Tritium	Unplanned committed effective dose* of 2 mSv	Unplanned committed effective dose* of 0.5 mSv	N/A	N/A	Unplanned internal exposure from Tritium is per shift and above the planned tritium dose level. For an individual that is not working on a Radiation Exposure Permit, the planned

Table 7.1: Bruce Power Action Levels					
Description	Bruce A and B	CSF	CMLF and Class II Nuclear Facility	Nuclear Substances and Radiation Devices	Notes
	(200 mrem) or more	(50 mrem) or more			dose level is considered to be 0 millisievert (0 millirem).
Unplanned Internal Exposure – Non-Tritium	Unplanned committed effective dose* of 2 mSv (200 mrem) or more	Unplanned committed effective dose* of 0.5 mSv (50 mrem) or more	N/A	N/A	Internal exposure – Non-Tritium encompasses all other nuclear substances (e.g., fission products, activation products, transuranics) taken into the body that result in committed effective doses above the recordable level. Unplanned internal exposure – Non-Tritium is the total dose above an approved planned level during a 1 year dosimetry period. If a planned dose is not established in an approved Radiation Exposure Permit, then the back-out level is considered to be 0 millisievert (0 millirem). Both unplanned acute and unplanned chronic low level uptakes that exceed 2 mSv/y (0.5mSv/y for CSF) above an approved planned level are considered AL exceedances (e.g., four unplanned exceedances within a calendar year with a committed effective dose assignment 0.5 mSv/each would be considered an AL exceedance).
Accumulated Dose	Exceeding an ADL without prior approval				Accumulated doses that are to be compared with the ADLs include doses received at all places of employment during the dose period as defined in the table below. ADLs are defined in the Bruce Power document BP-RPP-00009, Dose Limits and Exposure Control.
Beta-Gamma surface Contamination in Zone 1	Total: Greater than 3.7 Bq/cm^2		N/A	N/A	Beta-gamma contamination that exceeds 3.7 Bq/cm^2 normally calculated over a 100 cm^2 reference area on any surface in

Table 7.1: Bruce Power Action Levels					
Description	Bruce A and B	CSF	CMLF and Class II Nuclear Facility	Nuclear Substances and Radiation Devices	Notes
					those areas deemed equivalent to the public domain (e.g., Zone 1) within the licensed facility.
Beta–Gamma Discrete Radioactive Particle in Public Domain	Greater than 100 nCi (3700 Bq)	N/A	N/A		Detected by portal monitors with alarm setpoint ≤ 100 nCi (3700 Bq) Cs-137 Action Level for Discrete Radioactive Particles (DRP) are defined in [1].
Alpha Surface Contamination in Zone 1	Total: Greater than 0.05 Bq/cm^2	N/A	N/A		Alpha contamination that exceeds 0.05 Bq/cm^2 (300 dpm/100 cm^2) normally calculated over a 100 cm^2 reference area on any surface in those areas deemed equivalent to the public domain (e.g., Zone 1) within the licensed facility.

**Committed Effective Dose is calculated from the time of intake.*

<u>Reference:</u>

[1] Bruce Power report, B-REP-09071-01APR2019, "Defining an Action Level for Discrete Radioactive Particles", April 1, 2019, e-Docs # 6242072.

The ADLs shown in table 7.2 are taken from the Bruce Power document BP-RPP-00009, Dose Limits and Exposure Control.

Table 7.2: Administrative Dose Levels (ADLs)			
Category of Worker	Dose Period	Employees	Contractors
Nuclear Energy Worker (NEW)	One-year dosimetry period	20 mSv	40 mSv
	Five-year dosimetry period	50 mSv	90 mSv
Pregnant NEW	Balance of pregnancy	0.5 mSv	0.5 mSv
Non-NEW	One calendar year	0.5 mSv	0.5 mSv

Estimated Dose to the Public

The *Radiation Protection Regulations* prescribe the radiation dose limits for the general public of 1 mSv per calendar year. The licensee reports the estimated dose to the public from the Bruce site annually, in accordance with REGDOC-3.1.1, REPORTING REQUIREMENTS FOR NUCLEAR POWER PLANTS (See LC 3.3), in the Environmental Protection report.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Radiation Protection	REGDOC-2.7.1	2021
CNSC	Ascertaining Occupational Dose, Volume I	REGDOC-2.7.2	2021

The licensee should conduct a documented review and, if necessary, revise the AIs specified above at least once per licence period in order to validate their effectiveness. The results of such reviews should be provided to CNSC staff.

8 SCA – CONVENTIONAL HEALTH AND SAFETY

8.1 Conventional Health and Safety Program

Licence Condition 8.1:

The licensee shall implement and maintain a conventional health and safety program.

Preamble:

The conventional health and safety program is used to manage workplace safety hazards and protect personnel and environment.

NPPs in Ontario are regulated by the *Ontario Occupational Health and Safety Act* and the *Labour Relations Act*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Health and Safety Management	BP-PROG-00.06	No

Bruce Power's "Health and Safety Management Program", a licensee document listed in the notification of change table, describes the occupational health and safety practices at the Bruce site. The *Ontario Occupational Health and Safety Act* contains the detailed regulatory requirements for workplace health and safety in Ontario.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Conventional Health and Safety	REGDOC-2.8.1	2019

Regulatory document REGDOC-2.8.1, CONVENTIONAL HEALTH AND SAFETY, sets out information regarding conventional health and safety (CHS) and the implementation and maintenance of a CHS program. This document applies to all CNSC-licensed activities. This document does not include any requirements, but is a source of CHS-related information for all applicants and licensees.

9 SCA – ENVIRONMENTAL PROTECTION

9.1 Environmental Protection Program

Licence Condition 9.1:

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

Preamble:

The *Radiation Protection Regulations* prescribe radiation dose limits for the general public of 1 mSv per calendar year.

Derived Release Limits (DRLs) are calculated or derived using environmental transfer modeling that describes transfer of radioactive materials through environmental pathways to humans. DRLs are required for the purpose of protecting members of the public from unreasonable risk resulting from releases of radionuclides into the environment from the normal operation of the licensed facility.

Licensees set Environmental Action Levels (EALs) and related parameters, so as to provide early warnings of any actual or potential losses of control of the Environmental Protection Program. EALs are precautionary levels and are set far below the actual DRLs. EALs are designed to alert licensees before DRLs are reached. They are required by regulations to be specific doses of radiation or other parameter that, if reached, may indicate a loss of control of the licensee's Environmental Protection Program.

The *Radiation Protection Regulations* specify requirements related to "Action Levels" and indicate that the licence will be used to identify the action levels and the notification timeframes.

The release of hazardous substances is regulated by both the Ministry of Environment, Conservation and Parks (MECP) and Environment Canada and Climate Change (ECCC) through various acts and regulations, as well as the CNSC.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Environmental Management	BP-PROG-00.02	Yes
Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station A	NK21-REP-03482-00002	Yes
Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station B	NK29-REP-03482-00003	Yes
Derived Release Limits and Environmental Action Levels for Central Maintenance and Laundry Facility	NK37-REP-03482-00001	Yes
Derived Release Limits and Environmental Action Levels for Central Storage Facility (CSF)	NK37-REP-03482-00002	Yes
Radiological Emissions and Effluent Monitoring	BP-STND-00049	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	REGDOC-2.9.1	2020	Apr. 1, 2021

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities	N288.1	2020	January 31, 2024
CSA	Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills	N288.4	2010	Dec. 31, 2018
CSA	Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills	N288.5	2011	Dec. 31, 2018
CSA	Environmental risk assessment at Class I nuclear facilities and uranium mines and mills	N288.6	2012	Dec. 31, 2018
CSA	Groundwater protection programs at Class I nuclear facilities and uranium mines and mills	N288.7	2015	Dec. 31, 2020
CSA	Establishing and implementing action levels for releases to the environment from nuclear facilities	N288.8	2017	Dec. 31, 2021

Environmental Management System (EMS)

The objective of the environmental protection policies, programs and procedures is to establish adequate provision for protection of the environment at Class I nuclear facilities and uranium mines and mills. This shall be accomplished through an integrated set of documented activities that are typical of an environmental management system (EMS).

Bruce Power has established and implemented an environmental management program to assess environmental risks associated with its nuclear activities, and to ensure these activities are conducted in such a way that adverse environmental effects are prevented or mitigated.

CNSC regulatory document REGDOC-2.9.1, ENVIRONMENTAL PROTECTION: ENVIRONMENTAL PRINCIPLES, ASSESSMENTS AND PROTECTIVE MEASURES outlines the requirements related for an environmental protection program. Bruce Power's governing document "Environmental Management" is the key document of the environmental protection program.

Bruce Power is in compliance with all requirements of REGDOC-2.9.1, Version 1.2.

Assessment and Monitoring

CSA standard N288.4, ENVIRONMENTAL MONITORING PROGRAMS AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS outlines the requirements for an environmental monitoring program. This document was revised in May 2010 to include radioactive and hazardous substances, physical stressors, potential biological effects, and pathways for both human and non-human biota. Note: CSA guidance N288.9, GUIDELINE FOR DESIGN OF FISH IMPINGEMENT AND ENTRAINMENT PROGRAMS AT NUCLEAR FACILITIES was issued in May 2018 and provides guidance for monitoring and assessment of fish impingement and entrainment which is a physical stressor.

An Environmental Monitoring Program (EMP) consists of a risk-informed set of integrated and documented activities to sample, measure, analyze, interpret, and report the following:

- the concentration of hazardous and/or nuclear substances in environmental media to assess one or both of
  - exposure of receptors to those substances; and
  - the potential effects on human health, safety, and the environment;
- the intensity of physical stressors and/or their potential effect on human health and the environment; and
- the physical, chemical, and biological parameters of the environment normally considered in design of the EMP.

CSA standard N288.7, GROUNDWATER PROTECTION PROGRAMS AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS provides requirements and guidance which facilitate groundwater protection at Class I nuclear facilities and uranium mines and mills. Compliance with N288.7 will allow facilities to demonstrate that they will not pose an unreasonable risk to the environment or the health and safety of humans and non-human biota from groundwater. N288.7 addresses the design, implementation, and management of a groundwater protection program that incorporates best practices in Canada and internationally.

Effluent and Emissions Control (Releases)

The licensee shall ensure effluent monitoring for nuclear and hazardous substances is designed, implemented and managed to respect applicable laws and to incorporate best practices. The effluent monitoring program shall incorporate airborne and waterborne effluents.

CSA standard N288.5, EFFLUENT MONITORING PROGRAMS AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS outlines the requirements for an effluent monitoring program. Bruce Power shall ensure effluent monitoring sub-program for nuclear and hazardous substances is designed, implemented and managed to respect applicable laws and to incorporate best practices. The effluent monitoring program shall incorporate airborne and waterborne effluents. Effluent monitoring is a risk-informed activity that is to quantify or estimate the nuclear and hazardous substances being released into the environment.

Bruce Power's Effluent Monitoring Program shall ensure compliance with CSA N288.5 in accordance with the implementation plan below.

<u>Nuclear Substances – Derived Release Limits (DRLs)</u>

Bruce Power shall control radiological emissions to ALARA, within the Derived Release Limits (DRLs), and take action to investigate cause(s) and correct the cause(s) of increased emissions.

CSA standard N288.1, GUIDELINES FOR MODELLING RADIONUCLIDE ENVIRONMENTAL TRANSPORT, FATE AND EXPOSURE ASSOCIATED WITH THE NORMAL OPERATION OF NUCLEAR FACILITIES outlines the requirements related to DRLs. Bruce Power shall ensure compliance with CSA N288.1-20.

The DRLs are considered part of the licensing basis. Changes to these limits are subject to LC G.1 and LC G.2. The DRLs for Bruce A and Bruce B nuclear facilities, the Central Maintenance Facility (CMF) and the Central Storage Facility (CSF) are summarized in table 9.1.

Table 9.1: Derived Release Limits					
		Bruce A	Bruce B	CMLF	CSF
Release Category	Radionuclide/Radionuclide Group[1]	DRL (Becquerel/year)			
Air	Tritium	3.34E+17	7.84E+17	3.05E+17	4.22E+17
	Carbon-14	2.26E+15	4.09E+15	N/A	2.20E+15
	Iodine (mixed fission products)	3.50E+12	3.87E+12	1.96E+12	N/A
	Noble Gases[2]	1.54E+17	3.77E+17	N/A	N/A
	Particulate (Alpha)	2.60E+11	7.12E+11	3.49E+11	4.11E+11
	Particulate (Beta/Gamma)	6.45E+11	1.37E+12	7.51E+11	9.03E+11
Water	Tritium	8.57E+17	7.50E+17	N/A	N/A
	Carbon-14	1.00E+14	2.12E+14	N/A	N/A
	Gross Alpha	1.55E+12	3.29E+12	N/A	N/A
	Gross Beta/Gamma	2.94E+12	6.38E+12	N/A	N/A

Notes:
[1] Individual DRLs are calculated for about 102 radionuclides and isotopes. Only the significant radionuclide groups which are given in the table are monitored and reported to the CNSC.
[2] The unit for Noble Gases DRLs is Bq-MeV/year.

These DRLs for radionuclides and radionuclide groups account for the most significant releases and are the focus of monitoring and reporting requirements.

Hazardous Substances

Bruce Power shall control hazardous substances releases according to the limits defined in the licensing basis in accordance with the applicable environmental compliance approvals and take action to investigate and correct the cause(s) of increased emissions. Under the jurisdiction of MECP and ECCC, Bruce Power prepares routine environmental reports at different frequencies.

Environmental Action Levels

Environmental Action Levels (EALs) are considered part of the licensing basis. Changes to these limits are subject to LC G.1 and LC G.2.

Bruce Power shall ensure compliance with CSA N288.8, ESTABLISHING AND IMPLEMENTING ACTION LEVELS FOR RELEASES TO THE ENVIRONMENT FROM NUCLEAR FACILITIES.

The EALs for Bruce A and Bruce B nuclear facilities, the Central Maintenance Facility (CMF) and the Central Storage Facility (CSF) once N288.8-17 is implemented are summarized in table 9.2.

Table 9.2: Environmental Action Levels (EALs)

Facility	Release Category	Radionuclide/ Radionuclide Group	Monitoring Points[1]	EAL (Bq/Week)[2,3]
Bruce A	Air	Tritium	CSA	1.97E+13
			U1-4 C	7.74E+13
			ASB	1.21E+13
			U1-4 NC	2.22E+13
		Carbon-14	CSA	1.45E+11
			U1-4 C	2.30E+11
		Iodine	CSA	1.00E+08
			U1-4 C	1.15E+06
		Noble Gases[2]	CSA	4.73E+12
			U1-4 C	5.23E+12
			U1-4 NC	5.83E+12
		Gamma	U1-4 C	1.59E+05
			ASB	1.38E+05
			CRB	1.64E+05
	Water[3]	Carbon-14	ALW	2.80E+09
Bruce B	Air	Tritium	CSA	2.01E+13
			U5-8 C	7.58E+13
			ASB	1.00E+13
			U5-8 NC	2.21E+13
		Carbon-14	CSA	8.51E+10
			U5-8 C	1.18E+11
		Iodine	CSA	4.76E+06
			U5-8 C	6.45E+05
		Noble Gases[2]	CSA	1.17E+12
			U5-8 C	3.19E+12
		Gamma	U5-8 C	1.67E+05
	Water[3]	Carbon-14	ALW	1.35E+10
CSF	Air	Beta-Gamma	Exhaust Stack	2.21E+05

Notes:

1. EALs are only presented for those radionuclide monitoring pairs that require an EAL based on the methodology in NK21-REP-03482-00002, NK29-REP-03482-00003, NK37-REP-03482-00001 and NK37-REP-03482-00002, which is based on CSA Standard N288.8-17. The following are acronyms for monitoring points:

   - CSA: Central Services Area Contaminated Exhaust Stack

- U1-4 C: Unit 1 to Unit 4 Contaminated Exhaust Stack
- U1-4 NC: Unit 1 to Unit 4 Non Contaminated Exhaust Stack
- U5-8 C: Unit 5 to Unit 8 Contaminated Exhaust Stack
- U5-8 NC: Unit 5 to Unit 8 Non Contaminated Exhaust Stack
- ASB: Ancillary Services Building Contaminated Exhaust Stack
- CRB: Construction Re Tube Building Contaminated Exhaust Stack
- ALW: Active Liquid Waste
- CSF: Central Storage Facility

2. The unit for Noble Gases EALs is Bq-MeV/week.
3. The unit for waterborne EALs is Bq/month.

Environmental Risk Assessment

CSA standard N288.6, ENVIRONMENTAL RISK ASSESSMENT AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS outlines the requirements for an environmental risk assessment. This specific area provides assessment of environmental risks associated with contaminants and physical stressors in the environment relevant to nuclear facilities, and to the short-term and long-term safety of human health and the environment.

The ERA provides the basis for the environmental monitoring program (CSA standard N288.4) and also the effluent monitoring program (CSA standard N288.5), including Radiological Environmental Monitoring Programs. The ERA shall be updated periodically with the results from the environmental and effluent monitoring programs in order to confirm the effectiveness of any additional mitigation measures needed.

Bruce Power submitted an updated ERA in June 2022, in accordance with the 5-year frequency requirement outlined in CSA N288.6. Bruce Power is expected to review the 2022 ERA findings and implement any revisions required to ensure continuous compliance with CSA N288.4 and N288.5. The next iteration of the Bruce Power ERA will occur in 2027 and it is expected to be in compliance with CSA N288.6:22.

Protection of the Public

See LCH Section 7.1, Radiation Protection under the sub-title Estimated Dose to the Public.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Performance testing of nuclear air-cleaning systems at nuclear facilities	N288.3.4	2013
CSA	Guideline for design of fish impingement and entrainment programs at nuclear facilities	N288.9	2018

10 SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

Licence Condition 10.1:

The licensee shall implement and maintain an emergency preparedness program.

Preamble:

Emergency preparedness allows preparation and management of resources for responding to emergencies, with the aim to reduce the harmful effects of emergency. Specific provisions for dealing with emergencies are required because normal processes are disrupted, and a different set of resources is needed to respond to and recover from the disruption.

In addition to the nuclear emergency plan, the licensee maintains a set of emergency operating procedures and abnormal plant operating procedures. This aspect is covered under LC 3.1.

A security response to malevolent acts is governed by a separate plan under the licensee's Nuclear Security program (LC 12.1) but provisions of the licensee's site security report apply to any associated potential threat of release of radioactive material – for example, the need for offsite notification, situation updates and confirmation of any radioactive releases.

Liquid emission response and radioactive materials transportation emergency response are also governed by separate plans (LCs 9.1 and 14.1).

CNSC regulatory document REGDOC-2.10.1, NUCLEAR EMERGENCY PREPAREDNESS AND RESPONSE replaced CNSC regulatory document RD-353, TESTING AND IMPLEMENTATION OF EMERGENCY MEASURES and CNSC regulatory guide G-225, EMERGENCY PLANNING AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES in October 2014.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Bruce Power Nuclear Emergency Response Plan	BP-STND-00001	Yes
Radioactive Material Transportation Emergency Response Plan	BP-PLAN-00005	No
Emergency Management and Fire Protection	BP-PROG-08.01	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Nuclear Emergency Preparedness and Response, Version 2	REGDOC-2.10.1	2016	Sep. 24, 2021

CNSC regulatory document REGDOC-2.10.1 outlines the requirements for an emergency preparedness program.

Clause 2.2.6(4) of REGDOC-2.10.1 is satisfied by the current location of Bruce Power's Emergency Management Centre with supporting procedures on security and communications arrangements as described in the clause.

The emergency preparedness program is documented in Bruce Power's Nuclear Emergency Response Plan. Bruce Power shall maintain equipment, procedures and staff to support offsite response activities for an accidental release. Infrastructures defined within may be used in planning and response to virtually all emergencies. Bruce Power's Nuclear Emergency Response Plan also represents a basis for controlling changes and modifications to the emergency preparedness program.

In accordance with section 2.3.3 of REGDOC-2.10.1, the licensee shall test all requirements listed in this regulatory document over a five-year period, with a full-scale integrated emergency testing exercise at least once every three years involving, at a minimum, regional and provincial offsite authorities. To meet this requirement, Bruce Power shall conduct emergency exercises and drills as described in their Nuclear Emergency Response Plan. In most areas, drills and/or exercises are required at least annually. A corporate exercise is held annually at either the Bruce A or B nuclear facility. A "site evacuation" is held every three years. Annual exercises are also conducted at other facilities, such as hospitals and offsite centres by mutual agreement. Participation by municipal and provincial emergency response groups is also scheduled by mutual agreement.

In accordance with section 2.1 of REGDOC-2.10.1, the licensee is required to provide regional and provincial offsite authorities with the necessary information to allow for effective emergency planning policies and procedures to be established and modified, if needed or on a periodic basis. This information to include an estimate of the associated radiological consequences, including isotopic release quantities (source term), possible release start time and duration and the geographical area potentially affected. See LCH Section 4.1 for more information on severe accident analysis.

The CNSC will inform federal authorities of updates to the licensee's Emergency Planning Technical Basis.

<u>NPP Automatic Data Transfer</u>

In order to align with international best practices, CNSC staff have determined in [1] that it is vital to have automated data sharing during a nuclear emergency. CNSC plans to incorporate these requirements in the next revision of REGDOC-2.10.1.

Based on this, Bruce Power shall implement and maintain an automated (collected and posted without human intervention) data sharing system for the CNSC EOC, with near real-time (at 15-minute intervals or less). Such data-sharing system shall allow posting of a set of pre-determined plant data, with web-based access for viewing and trending, to support the CNSC emergency response mandate.

The Bruce Power system is described in [2] and was implemented by the end of 2019. CNSC staff have accepted this solution [3] and Bruce Power continues to investigate and implement improvements to the solution.

References:

[1] CNSC letter, "Request pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations*: Bruce NGS – Nuclear Power Plant (NPP) Automatic Data Sharing Requirement during a Nuclear Emergency", August 18, 2017, NK21-CORR-00531-13784 / NK29-CORR-00531-14444 / NK37-CORR-00531-02827, e-Docs # 5240682.
[2] Bruce Power letter, "Nuclear Power Plant Automatic Data Sharing during a Nuclear Emergency", NK21-CORR-00531-15108 | NK29-CORR-00531-15869, August 1, 2019, e-Docs # 5963671.
[3] CNSC letter, L. Sigouin to M. Burton, "Automatic Data Sharing During Nuclear Emergencies", December 9, 2019, BP-CORR-00531-00062, e-Docs # 6066527.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	General requirements for nuclear emergency management programs	N1600	2016

The licensee should provide emergency communications outlining what surrounding community residents need to know and do before, during and after a nuclear emergency. Information should be in plain language, readily accessible and include the following:

- how the public is notified of an emergency;
- what protective actions may be required during an emergency;
- what the public is expected to do, and why, when directed to take protective actions;
- what the public can do now to be better prepared for an emergency;
- where can the public get more information on emergency plans.

10.2 Fire Protection Program

Licence Condition 10.2:

The licensee shall implement and maintain a fire protection program.

Preamble:

Licensees require a comprehensive fire protection program (the set of planned, coordinated, controlled and documented activities) to ensure the licensed activities do not result in unreasonable risk to the health and safety of persons and to the environment due to fire, and to ensure that the licensee is able to efficiently and effectively respond to emergency fire situations.

Fire protection provisions are applicable to all work related to the design, construction, operation, and maintenance of the nuclear facility, including systems, structures and components (SSCs) that directly support the plant and the protected area, and Centre of Site (CoS) facilities containing radioactive materials and as listed in BP-STND-00166. External events such as an aircraft crash or threats are dealt under LC 12.1.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Fire Safety Management	BP-STND-00166	No
Conventional Emergency Plan	BP-PLAN-00006	No

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Fire protection for nuclear power plants	N293	2012 (R2017)	June 30, 2023
CSA	Fire Protection for facilities that process, handle, or store nuclear substances	N393	2022	April 1, 2025

References:

[1] CNSC letter, A. Bulkan to M. Burton, "Bruce Site: Implementation of CSA N393-2022", October 15, 2024, e-Doc 7377321.

[2] Bruce Power letter, M. Burton to A. Bulkan, "Implementation of CSA N393-2022", June 13, 2024, BP-CORR-00531-05035, e-Doc 7300698.

CSA standard N293, FIRE PROTECTION FOR NUCLEAR POWER PLANTS outlines the requirements for a fire protection program for nuclear power plants, while CSA standard N393, FIRE PROTECTION FOR FACILITIES THAT PROCESS, HANDLE, OR STORE NUCLEAR SUBSTANCES outlines the requirements for relevant supporting buildings. The application of N393 is described in Reference 2.

Bruce Power shall arrange for third party audits of one industrial fire brigade fire drill once every two years, alternating between stations on an annual cycle. The purpose of a Third Party Audit is to provide an in-depth analysis of the Industrial Fire Brigade's (IFB) fire response performance against applicable regulatory criteria. A fire response is a planned, coordinated and controlled activity to provide emergency response to a fire. The audit is to analyze and ensure competencies of the IFB against CSA standard N293. The resulting audit report shall be submitted to CNSC staff for review.

An independent third party auditor is required to be an expert in their discipline, normally fire-fighting and qualified through specific education and relevant experience. The third party auditor is required to be independent or at "arm's length" from the facility to ensure total impartiality. The review shall be of sufficient depth and detail that the reviewer can attest with reasonable confidence on the competencies of the IFB at the facility.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
NEI	Guidance for Post Fire Safe Shutdown Circuit Analysis	NEI 00-01	Rev. 2 (2009)

Guidance Publications Pending Implementation				
Org	Document Title	Document #	Implementation Plan Submission Date	Version
CSA	Fire protection for facilities that process, handle, or store nuclear substances	N393	June 13, 2024	2022

Note: Bruce Power's current plan [2] is to implement CSA N393-22 by April 1, 2025.

The Nuclear Energy Institute NEI 00-01, GUIDANCE FOR POST FIRE SAFE SHUTDOWN CIRCUIT ANALYSIS is used by CNSC staff to help determine the adequacy of safe shutdown electrical circuit analysis.

Expectation for the Third Party Audit Report

The results of the audits will typically consist of reports that compare the requirements of the applicable codes and standards with the implementation of the Fire Protection Program and the Fire Response exercised. The report should identify any non-compliance and formulate a conclusion if the licensee's program and IFB meet the requirements of the standards referenced in the facilities licence. The format of the submission is not specified and can be tailored to the facility. However, as a guideline the following suggestions for the content and format of the written report are provided as follows:

1. Cover page with the name of the facility, date and signature of the authors;
2. Name, address, phone number, of the preparing agency or organization;
3. Names of review team members, including brief descriptions of experience and education;
4. Name, address, and phone number of licensee;
5. Title of report, date, and document number;
6. Introduction briefly describing the area of interest that is audited;
7. Statement of review scope specifically listing any exclusions;

8. Objectives of the review;
9. A list of applicable codes and standards;
10. Summary of the review methodology, including areas and documents reviewed;
11. Detailed observations with relation to standard requirements against the observed response;
12. Conclusions, including a statement that the program or the IFB response meet the requirements of the applicable standards, achieves their objectives, and a summary of any non-compliances;
13. Recommendations (if any); and
14. An issues tracking table.

Fire Protection Authority Having Jurisdiction

CNSC has, for an interim period, assumed the role of fire protection AHJ with respect to the application of the National Building Code of Canada (NBCC) and National Fire Code of Canada (NFCC) to Bruce Power-controlled Centre of Site buildings. The details of this agreement can be found in references 1 and 2.

References:

[1] Bruce Power Letter, M. Burton to M. Hornof, "Authority Having Jurisdiction for National Building and Fire Codes of Canada for Bruce Site Fire Protection", December 14, 2023, BP-CORR-00531-04935, e-Docs # 7187974.

[2] CNSC Letter, A. Bulkan to M. Burton, "Authority Having Jurisdiction for National Building and Fire Codes of Canada for Bruce Site Fire Protection", June 4, 2024, e-Docs # 7282711.

11 SCA – WASTE MANAGEMENT

11.1 Waste Management Program

Licence Condition 11.1:

The licensee shall implement and maintain a waste management program.

Preamble:

This LC covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. Topics include waste management, waste characterization, waste minimization and waste management practices.

CNSC Regulatory Document REGDOC-2.11, FRAMEWORK FOR RADIOACTIVE WASTE MANAGEMENT AND DECOMMISSIONING IN CANADA defines radioactive waste as any material (liquid, gaseous or solid) that contains a radioactive nuclear substance, as defined in section 2 of the *Nuclear Safety and Control Act*, and which the owner has declared to be waste. In addition to containing nuclear substances, radioactive waste may also contain non-radioactive hazardous substances, as defined in section 1 of the *General Nuclear Safety and Control Regulations*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Fuel Management	BP-PROG-12.03	No
Radiation Protection Program	BP-PROG-12.05	Yes

Licensing Basis Publications

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CSA	Management of low- and intermediate-level radioactive waste	N292.3	2014	October 1, 2018

The licensee shall implement and maintain a program for waste management that includes strategies for waste minimization, waste characterization and waste management practices. Low- and intermediate-level waste shall be managed in accordance with CSA N292.3, MANAGEMENT OF LOW AND INTERMEDIATE-LEVEL RADIOACTIVE WASTE.

Bruce Power shall:

- characterize its waste streams and minimize the production of all wastes taking into consideration the health and safety of workers and the environment;
- integrate waste management programs as a key element of the facility's safety culture; and
- audit on a regular basis its program to maximize its effectiveness and per the governance given in BP-PROG-15.01,*Compliance Internal Audit*.

In its 2018 licence renewal decision for Bruce A and B, the Commission directed that Bruce Power make available for public review in a single document all the information regarding the anticipated volume of waste that will be produced during the MCR outages of the six units at Bruce A and B.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	General principles for the management of radioactive waste and irradiated fuel	N292.0	2014
CSA	Wet storage of irradiated fuel and other radioactive materials	N292.1	2016
CSA	Interim dry storage of irradiated fuel	N292.2	2013
CSA	Guideline for the exemption of clearance from regulatory control of materials that contain, or potentially contain, nuclear substances	N292.5	2011 (R2021)
CSA	Long-term management of radioactive waste and irradiated fuel	N292.6	2018

With respect to the storage and management of spent nuclear fuel, it should reflect the fundamental safety concerns related to criticality, exposure, heat control, containment and retrievability. Namely, the systems that are designed and operated should assure subcriticality, control of radiation exposure, assure heat removal, assure containment and allow retrievability.

11.2 Decommissioning and Financial Guarantees

Licence Condition 11.2:

The licensee shall notify the Commission of any changes regarding the obligations of decommissioning and financial guarantees under the Lease Agreement with Ontario Power Generation Inc. as described in 15.1.

Preamble:

Paragraph 3(k) of the *Class I Nuclear Facility Regulations* requires that a licence application contain the proposed plan for decommissioning of the nuclear facility.

This licence condition requires that the licensee maintain a preliminary decommissioning plan (PDP). A PDP provides an overview of the proposed decommissioning approach that is sufficiently detailed to assure that the proposed approach is, in the light of existing knowledge, technically and financially feasible, and appropriate in the interests of health, safety, security and the protection of the environment. The PDP defines areas to be decommissioned and the general structure and sequence of the principle work packages. The PDP forms the basis for developing credible cost estimates for decommissioning and establishing and maintaining an adequate financial guarantee. It is expected that the PDP will be revised as the conditions at the facility change.

The PDP includes strategies for the management of low and intermediate level waste, reactor and waste storage facility decommissioning, and the used fuel arising from the operation of the nuclear facility.

The *General Nuclear Safety and Control Regulations* requires under paragraph 3(1)(l) that a licence application contain a description of any proposed financial guarantee relating to the activity to be licensed.

Financial guarantees for decommissioning show that sufficient financial resources are available to fund all approved decommissioning activities.

Ontario Power Generation Inc. (OPG) maintains a consolidated financial guarantee to cover the future decommissioning of all OPG- and Bruce Power-operated nuclear facilities in Ontario. The financial guarantee is based upon the most up-to-date preliminary decommissioning plans and cost estimates for decommissioning prepared by OPG for each facility. The financial guarantee must cover all costs of decommissioning including the long-term management of used fuel and low- and intermediate-level radioactive waste. The licensee is responsible for providing an adequate financial guarantee that is acceptable to the Commission.

OPG is required to revise the financial guarantee and the associated decommissioning plans at least every 5 years or when requested by the Commission. The most recent OPG consolidated financial guarantee covering the 2023-27 period was accepted by the Commission on December 6, 2022.

Compliance Verification Criteria:

The financial guarantee for decommissioning the nuclear facility shall be reviewed and revised every five years or when the Commission requires or following a revision of the preliminary decommissioning plan that significantly impacts the financial guarantee.

Ontario Power Generation Inc. (OPG) is responsible for preparing the decommissioning plan [1] and strategies of the Bruce nuclear facilities to the latest versions of CSA Standard N294, DECOMMISSIONING OF FACILITIES CONTAINING NUCLEAR SUBSTANCES and REGDOC-2.11.2, DECOMMISSIONING; however, Bruce Power shall provide a status update with the licence renewal application confirming that the preliminary decommissioning plan is current to the appropriate versions of the standards and REGDOCs. OPG is also responsible for all costs of decommissioning of the Bruce nuclear facilities following the requirements of REGDOC-3.3.1, FINANCIAL GUARANTES FOR DECOMMISSIONING OF NUCLEAR FACILITIES AND TERMINATION OF LICENSED ACTIVITIES. All such costs are included in the Decommissioning Cost Estimates and are covered by OPG's consolidated financial guarantee for decommissioning.

In terms of operational financial guarantees, Bruce Power Limited Partnership maintains an Investment Grade Credit Rating for the operation of the Bruce nuclear facilities. Bruce Power shall inform CNSC staff in writing **within forty-five days** of any changes to this credit rating.

Reference:

[1] C. Carmichael to N. Greencorn, K. Campbell, J. Burta and L. Sigouin, "Submission of Preliminary Decommissioning Plans", Jan. 25, 2022, N-CORR-00531-23047, e-Docs # 6726631.

Guidance:

Not applicable to this LC.

12 SCA – SECURITY

12.1 Nuclear Security Program

Licence Condition 12.1:

The licensee shall implement and maintain a security program.

Preamble:

The *Nuclear Security Regulations* require that a licence application contain specific information related to nuclear security, stipulates the requirements for high-security sites, and contains specific requirements pertaining to the transportation of Category I, II or III nuclear material.

The *Nuclear Security Regulations* require that a licensee of a high security site:
- maintain at all times a qualified onsite nuclear response force;
- obtain the applicable certifications, before issuing an authorization to a nuclear security officer;
- prevent and detect unauthorized entry into a protected area or inner area; and
- prevent unauthorized entry of weapons and explosive substances into a protected area or inner area.

The *Nuclear Security Regulations* require every licensee to: conduct, at least once every 12 months, a threat and risk assessment specific to a facility where it carries on licensed activities in order to determine the adequacy of its physical protection system; make modifications to its physical protection system, as necessary, to counter any credible threat identified as a result of the threat and risk assessment; keep a written record of each threat and risk assessment that it conducts and provide a copy of the written record, together with a statement of actions taken as a result of the threat and risk assessment, to the Commission upon request (within 60 days) after completion of the assessment.

CNSC regulatory document REGDOC-2.12.1 (Vol. I), NUCLEAR RESPONSE FORCE, Version 2 describes how, when required by a CNSC licence or order, a trained and equipped onsite nuclear response force shall be established and deployed at a nuclear facility.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Security	BP-PROG-08.02	Yes
Cyber Security	BP-PROC-00784	No
Site Security Plan	B-REP-08160-00001	Yes
Tactical Response Plan	N/A	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness	REGDOC-2.2.4	2018	July 1, 2020
CNSC	High-Security Facilities, Vol. I: Nuclear Response Force, Version 2	REGDOC-2.12.1	2018	July 1, 2020
CNSC	High-Security Facilities, Vol. II: Criteria for Nuclear Security Systems and Devices	REGDOC-2.12.1	2018	Sep. 1, 2018
CNSC	Site Access Security Clearance	REGDOC-2.12.2	2013	June 1, 2015

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Security of Nuclear Substances: Sealed Sources	REGDOC-2.12.3	2013	Oct. 1, 2018
CSA	Cyber security for nuclear power plants and small reactor facilities	N290.7	2014	Dec. 31, 2020

Nuclear Security Program

CNSC regulatory documents REGDOC-2.2.4 (Vol. III), REGDOC-2.12.1 (Vol. I version 2) and REGDOC-2.12.1 (Vol. II) outline the requirements related to a nuclear security program.

Bruce Power shall ensure the identified vital areas within the nuclear facilities are protected against design basis threats and any other credible threat identified in their Threat and Risk Assessment documentation. The prime functions that must be maintained to prevent unacceptable radiological consequences are those of control, cool, and contain.

Bruce Power shall maintain the operation, design and analysis provisions credited in the above assessments required to ensure adequate engineered safety barriers for the protection against malevolent acts. The provisions for the protection against malevolent acts shall be documented as part of a managed program or process within the management system. Bruce Power shall summarize changes in design, analysis or operational procedures which are credited for the protection against malevolent acts in the annual threat and risk assessment, and submit a copy to the Commission 60 days after completion of the assessment.

Bruce Power shall implement measures for the purpose of preventing and detecting unauthorized entry into a protected area or inner area at a high-security site, including:

- vehicle barriers and vehicle access control points;
- intrusion detection systems and devices;
- closed-circuit video systems/devices for applications in a protected area or inner area;
- the design and functioning of security monitoring rooms; and
- the security monitoring room systems and devices.

CNSC staff will assess the changes to the site security program to determine if a recommendation to update the Station Security Reports would be required.

The licensee shall meet the security measures for sealed sources as set out in Regulatory Document REGDOC-2.12.3, SECURITY OF NUCLEAR SUBSTANCES: SEALED SOURCES. CNSC staff expect for high-security nuclear sites that the licensee would provide the required details as to how they meet the applicable requirements of this regulatory document within the protected area. CNSC staff accepted in [1] Bruce Power's Site Security Plan, dated January 30, 2018 (e-Docs # 5449717) and found that it meets the requirements of REGDOC-2.12.3.

Reference:

[1] CNSC letter, M. Beaudette to N. Contartese, "Technical Assessment of Bruce Power Inc. Site Security Plan", Mar. 22, 2018, NK21-CORR-00531-14317 / NK29-CORR-00531-15007 / NK37-CORR-00531-02961, e-Docs # 5483719.

Cyber Security Program

Bruce Power's cyber security program shall be implemented and maintained to protect the cyber-essential assets for nuclear safety, physical protection, emergency preparedness and safeguards functions from cyber-attacks. CSA standard N290.7, CYBER SECURITY FOR NUCLEAR POWER PLANTS AND SMALL REACTOR FACILITIES outlines the requirements for a cyber security program.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	REGDOC-2.12.3	2020
Treasury Board of Canada Secretariat (TBS)	TBS Standard on Security Screening	N/A	2014
IAEA	Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage	IAEA Nuclear Security Series No. 4 Technical Guidance	2007
IAEA	Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)	IAEA Nuclear Security Series No. 13	2011
IAEA	Computer Security at Nuclear Facilities	IAEA Nuclear Security Series No. 17 Technical Guidance	2011
IAEA	Computer Security of Instrumentation and Control Systems at Nuclear Facilities	IAEA Nuclear Security Series No 33-T Technical Guidance	2018

REGDOC-2.12.3, Part B provides guidance for preparing, submitting and revising the Station Security Report and on how to prepare and submit a "written transportation security plan".

Guidance may be obtained in the IAEA Nuclear Security Series No. 4, Technical Guidance "Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage" and IAEA Nuclear Security Series No. 13 "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)" for developing and maintaining a security program.

Guidance may be obtained in the IAEA Nuclear Security Series No. 17, Technical Guidance "Computer Security at Nuclear Facilities" for developing and maintaining a cyber security program.

Guidance may be obtained in the IAEA Nuclear Security Series No. 33-T, Technical Guidance, "Computer Security of Instrumentation and Control Systems at Nuclear Facilities" for developing and maintaining a cyber security program.

13 SCA – SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

Licence Condition 13.1:

The licensee shall implement and maintain a safeguards program.

Preamble:

Safeguards is a system of inspection and other verification activities undertaken by the International Atomic Energy Agency (IAEA) in order to evaluate a Member State's compliance with its obligations pursuant to its safeguards agreements with the IAEA.

Canada has entered into a Safeguards Agreement and an Additional Protocol (hereinafter referred to as "safeguards agreements") with the IAEA pursuant to its obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons* (INFCIRC/140). The objective of the Canada-IAEA Safeguards Agreement is for the IAEA to provide assurance on an annual basis to Canada and to the international community that all declared nuclear materials are in peaceful, non-explosive uses and that there is no indication of undeclared nuclear materials or activities. This conclusion confirms that Canada is in compliance with its obligations under the following Canada-IAEA safeguards agreements:

- *Agreement Between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons; and*
- *Protocol Additional to the Agreement Between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.*

These are reproduced in information circulars INFCIRC/164, and INFCIRC/164/Add. 1.

The scope of the non-proliferation program for the PROL is limited to the tracking and reporting of foreign obligations and origins of nuclear material. In addition, the import and export of controlled nuclear substances, equipment and information identified in the *Nuclear Non-proliferation Import and Export Control Regulations* require separate authorization from the CNSC, consistent with section 3(2) of the *General Nuclear Safety and Control Regulations*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Safeguards Operating Manual (Bruce A) U0 F/H	NK21-OM-35370	No
Safeguards Operating Manual (Bruce B) U0 F/H	NK29-OM-35370	No

Licensing Basis Publications

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Safeguards and Nuclear Material Accountancy	REGDOC-2.13.1	2018	December 31, 2019

CNSC regulatory document REGDOC-2.13.1 sets out CNSC requirements and guidance for the establishment and maintenance of a safeguards program.

To avoid a potential non-compliance with REGDOC-2.13.1, section 8.1.1, when the Nuclear Material Accountancy Reporting (NMAR) e-business system is not available, Bruce Power is to contact the CNSC International Safeguards Division (safeguardsofficial-garantiesofficiel@cnsc-ccsn.gc.ca) to inform them of the issue and to seek guidance on how to fulfill reporting requirements. When Bruce Power inventory change documents and physical-key measurement point inventory summaries are submitted using an alternative method, Bruce Power will still be required to re-submit using the NMAR e-business system once the NMAR system becomes available. For additional information see CNSC letter [1].

Reference:

[1] CNSC letter, G. Frappier to M. Burton, "Submission of Nuclear Material Accountancy Reports Using the CNSC NMAR e-Business System", November 28, 2019, BP-CORR-00531-00078, e-Docs # 6032599.

Bruce Power shall not make changes to operation, equipment or procedures that would affect the implementation of safeguards measures, except with the prior written approval of the Commission or CNSC staff as follows:

- Director, International Safeguards Division
- Director General, Directorate of Security and Safeguards
- Vice-President, Technical Support Branch

With respect to the implementation of safeguards measures, changes made by the licensee to the operation, equipment or procedures as a result of the agreement between Bruce Power, the CNSC and the IAEA are considered routine.

If a requested change would adversely impact Canada's compliance with the agreement, CNSC staff do not have the authority to give the approval, as this would violate the obligations arising from the Canada-IAEA safeguards agreement.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Import and Export, Version 2	REGDOC-2.13.2	2018

14 SCA – PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

Licence Condition 14.1:

The licensee shall implement and maintain a packaging and transport program.

Preamble:

Every person who transports radioactive material, or requires it to be transported, shall act in accordance with the requirements of the *Transportation of Dangerous Goods Regulations* (TDGR) and the *Packaging and Transport of Nuclear Substances Regulations, 2015* (PTNSR 2015).

The TDGR and PTNSR 2015 provide specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Radioactive Material Transportation	BP-PROC-00188	No

Bruce Power shall implement and maintain a packaging and transport program that will ensure compliance with the requirements set out in the TDGR and PTNSR 2015 for all shipments of nuclear substances to and from the Bruce site. Shipments of nuclear substances within the nuclear facility where access to the property is controlled are exempted from the application of TDGR and PTNSR 2015.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Packaging and Transport: Information Incorporated by Reference in Canada's *Packaging and Transport of Nuclear Substances Regulations*, 2015, Volume I, Version 2	REGDOC-2.14.1	2021

15 NUCLEAR FACILITY-SPECIFIC

15.1 Lease Agreement

Licence Condition 15.1:

The licensee shall inform the Commission in writing of any amendments to the Amended and Restated Lease Agreement between Ontario Power Generation Inc., Bruce Power L.P., OPG-Huron A Inc./OPG-Huron B Inc./OPG-Huron Common Facilities Inc., British Energy PLC, Cameco Corporation, TransCanada Pipelines Limited, BPC Generation Infrastructure Trust and Ontario Municipal Employees Retirement Board dated February 14, 2003.

Preamble:

Bruce Power leases the Bruce A and B nuclear facilities from Ontario Power Generation Inc. (OPG).

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Renewal Notice for a renewal period of two years under the Second Amended and Restated Lease Agreement dated as of October 11, 2016, for the two- year period, Jan. 1, 2024 to Dec. 31, 2025.	BP-CORR-00531-02601 e-Docs # 6760954 Document dated February 28, 2022	N/A
Renewal Notice for a renewal period of two years under the Second Amended and Restated Lease Agreement dated as of October 11, 2016, for the two- year period, Jan. 1, 2026 to Dec. 31, 2027.	BP-CORR-00531-05032 e-Docs # 7206455 Document dated January 9, 2024	N/A

Bruce Power is responsible for informing the Commission of any change in the lease agreement with OPG. Bruce Power shall inform the Commission in writing no **later than 30 days** after the execution of any such amendments.

Bruce Power and OPG have consolidated and superseded all prior amendments to the lease into a Second Amended (February 14, 2003) and Restated Lease Agreement dated October 11, 2016 [1]. A Second Amendment to the Second Amended and Restated Lease Agreement was provided by Bruce Power, dated March 1, 2024 [2].

References:

[1] Bruce Power letter, F. Saunders to K. Lafrenière, “Bruce A and Bruce B: Notification of a Change to the Amended and Restated Lease Agreement”, October 20, 2016, NK21-CORR-00531-13144/NK29-CORR-00531-13629/NK37-CORR-00531-02633, e-Docs # 5109064.
[2] Bruce Power letter, J. Thompson to K. Lun, “Notification of Second Amendment to the Second Amended and Restated Lease Agreement with OPG”, March 13, 2024, BP-CORR-00531-05220, e-Docs # 7241587.

Guidance:

Not applicable to this LC.

15.2 Integrated Implementation Plan

Licence Condition 15.2:

The licensee shall implement the Integrated Implementation Plan.

Preamble:

The Integrated Implementation Plan (IIP) contains commitments, including the timeframes for implementation, from the Bruce A and B Periodic Safety Reviews (PSRs).

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Bruce A and B Global Assessment Report and Integrated Implementation Plan	B-GAR-09701-00001 R002 e-Docs # 5303331	N/A
Bruce A and B Integrated Implementation Plan Management	NK21-CORR-00531-14012 | NK29-CORR-00531-14693 e-Docs # 5435884	N/A

In implementing the commitments identified in the IIP (Bruce A and B Global Assessment Report and Integrated Implementation Plan, B-GAR-09701-00001 R002), Bruce Power committed to submitting to CNSC staff formal progress reports on the status of all IIP commitments on an annual basis by March 31st of each year during the licence period. All changes to the IIP will be managed in accordance with the IIP Communications Plan in [1].

Reference:

[1] Bruce Power letter, F. Saunders to L. Sigouin, "Bruce A and B Integrated Implementation Plan Management", January 18, 2018, NK21-CORR-00531-14012 / NK29-CORR-00531-14693, e-Docs # 5435884.

Guidance:

Not applicable to this LC.

15.3 (Removed)

15.4 Return-to-Service Plan

Licence Condition 15.4:

The licensee shall implement a return-to-service plan for Major Component Replacement.

Preamble:

Return to service (RTS) involves returning the reactor and associated nuclear and non-nuclear systems to commercial operation. The licensee must demonstrate that all regulatory requirements have been met and that the associated work has been done to the satisfaction of the CNSC.

Compliance Verification Criteria:

Licensee Documents		
Document Title	Document #	Prior Notification
Major Component Replacement Return to Service Program Management Plan	MCR-RTSMP-001	N/A

Bruce Power has notified CNSC of its intention to extend the operational lives of Bruce A Units 3 and 4 and Bruce B Units 5-8 including the replacement of major components [1].

Bruce Power shall develop and implement a project execution plan and a return-to-service plan for any refurbishment activities.

Reference:

[1] Bruce Power letter, F. Saunders to K. Lafrenière, “Bruce Power plans for Major Component Replacement, Units 3-8”, January 8, 2016, NK21-CORR-00531-12549/NK29-CORR-00531-12975, e-Docs # 4915888.

Guidance:

Not applicable to this LC.

15.5 Regulatory Hold Points for Return to Service and Continued Operation

Licence Condition 15.5:

The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.

Return to Service

Preamble:

CNSC have identified four (4) regulatory hold points for the return to service of each unit undergoing a Major Component Replacement (MCR) outage for which CNSC approval will be sought prior to proceeding to the subsequent commissioning phase. These hold points require regulatory verification to confirm operational readiness of the plant safety systems to satisfy regulatory requirements for staged progress through the commissioning phases up to full power operation. These regulatory hold points are consistent with the regulatory approach described in REGDOC-2.3.1, Conduct of Licensed Activity: Construction and Commissioning Programs.

Compliance Verification Criteria:

The licensee shall seek approval of the Commission or consent of a person authorized by the Commission prior to the removal of the following regulatory hold points for the return to service of each unit. The regulatory hold points that mark the completion of the commissioning phases are as follows:

1. Prior to **Fuel Load - Phase A**
2. Prior to removal of **Guaranteed Shutdown State - Phase B**
3. Prior to exceeding **1% Full Power - Phase C**
4. Prior to exceeding **35% Full Power - Phase D**

In its 2018 Record of Decision for Bruce A and B licence renewal, the Commission delegated the authority for this licence condition for the removal of regulatory hold points for the return to service of each unit undergoing a MCR outage to the Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch.

For each of the regulatory hold points, the licensee shall submit Completion Assurance Documents (CADs). In addition to these CADs, the licensee shall submit CADs following sustained operation at 100% full rated power that will specify activities that were completed between 35% and 100% full rated power. Each CAD shall present evidence that all pre-established conditions for removal have been met.

Prior to GSS removal, all plant personnel who work on the reactor that has undergone major component replacement shall have completed update training appropriate to the knowledge and skill requirements of the applicable position covering the changes to facility systems, equipment and procedures made during the Major Component Replacement outages.

For each ANO, CRSS and SM this includes, at a minimum:

- Principles of reactor operation with a pre-equilibrium core;

- Principles of nuclear safety relevant to the operation of the reactor unit with a pre-equilibrium core;
- Operating constraints and limits associated with the operation of the reactor unit with a pre-equilibrium core;
- The initial approach to criticality and power increase until control by the reactor regulating system is established, including the systems and equipment required and their operation; and
- Changes in fuel composition and core reactivity until reaching equilibrium fuel conditions.

This training shall include formal knowledge and performance evaluations that confirm and document that, at the time of GSS removal, the person has the required knowledge and skills to perform the duties of the applicable position.

Low power testing (Phase C) shall be carried out at the lowest possible power level, with a maximum of 1% of full power.

Prior to release of a regulatory hold point, CNSC staff will verify compliance of the licensee to the pre-requisites for release of a hold point and provide a report to the Commission or person authorized by the Commission. Based on the results of the review of this report, the CNSC's Regulatory Operations Branch will issue a record of decision.

Pre-requisites for Release of Hold Points

<u>Pre-requisites for Fuel Load</u>

1. All IIP commitments required prior to fuel load are complete;
2. All SSCs required for safe operation beyond fuel load are available for service;
3. Staffing levels to safely operate the unit are adequate;
4. Specified operating procedures for fuel load have been formally validated;
5. Specified training for fuel load is complete and staff qualified;
6. Specified SSCs meet the quality and completion requirements of CSA N286;
7. All non-conformances and open items identified as a pre-requisite to fuel load are addressed; and
8. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to fuel load have been successfully completed.

With respect to pre-requisite #3: Staffing levels refers to a sufficient number of qualified workers present at all times to ensure the safe operation of the nuclear facility and to ensure adequate emergency response capability. The licensee should have adequate staff available such that absences due to vacation, sick leave and training do not cause violations of the minimum shift complement levels.

<u>Pre-requisites for GSS Removal</u>

1. All IIP commitments required prior to GSS removal are complete;
2. All SSCs required for safe operation beyond GSS removal are available for service;
3. Specified operating procedures for GSS removal have been formally validated;
4. Specified training for GSS removal is complete and staff qualified;
5. All non-conformances and open items identified as a pre-requisite to GSS removal are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to GSS removal have been successfully completed.

Pre-requisites for Reactor Power Increases Prior to exceeding 1% Full Power

1. All IIP commitments required prior to increasing reactor power are complete;
2. All SSCs required for safe operation are available for service;
3. Specified operating procedures have been formally validated;
4. Specified training is complete and staff qualified;
5. All non-conformances and open items identified as a pre-requisite to reactor power increases above 1% power are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to increasing reactor power have been successfully completed.

Pre-requisites for Reactor Power Increases Prior to exceeding 35% Full Power

1. All IIP commitments required prior to normal operation are complete;
2. All SSCs required for safe operation are available for service;
3. Specified operating procedures have been formally validated;
4. Specified training is complete and staff qualified;
5. All non-conformances and open items identified as a pre-requisite to reactor power increases above 35% power are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to increasing reactor power have been successfully completed.

Operation Beyond 92.5% Full Power for Bruce A and 93% Full Power for Bruce B

CNSC have identified a regulatory hold point for operation beyond 92.5% full power (FP) for Bruce A units and 93% FP for Bruce B units.

Compliance Verification Criteria:

The licensee shall seek approval of the Commission or consent of a person authorized by the Commission prior to the removal of the following regulatory hold point for the power increase beyond 92.5% FP for each Bruce A unit and 93% FP for each Bruce B unit.

Pre-requisites for Release of Hold Point Prior to exceeding 92.5% full power for Bruce A units and 93% full power for Bruce B units:

1. Completion of all remaining safety analysis items are verified. All CNSC staff comments associated with safety analysis reviews will have been addressed such that any outstanding comments would be of low safety significance.
2. All required online and outage design modifications are installed to support operation up to the IPL and meet applicable regulatory requirements; the criteria to be used:

a. List and descriptions of all required design modifications are submitted, once identified, at least 90 days prior to uprate for each unit,
b. Prior to power uprate beyond 92.5% FP for Bruce A and 93%FP for Bruce B, up to 95.5% FP for Bruce A and 96%FP for Bruce B, notification of the completion of modifications identified in item 2. a. are submitted,
c. A commitment is provided prior to power uprate beyond 92.5% FP for Bruce A and 93%FP for Bruce B to submit notification of completion of commissioning activities within 90 days following power uprate to 95.5% FP for Bruce A and 96%FP for Bruce B.

3. Documentation has been updated to support operation at IPL;
   the criteria to be used: confirmation that change requests were initiated, document markups are completed and commitment provided to submit confirmation of document issuance for:
   a. Operating Policies and Principles updates
   b. Operational Safety Requirements updates
   c. Instrument Uncertainty Calculations updates
   d. Impairment Manuals updates
4. The required training to support operation at the IPL is completed;
   a. Change requests for initial training submitted.
   b. Specified training (e.g., gap training) to support operation at the IPL is completed and affected personnel are qualified.

Upon removal of this regulatory hold point, Bruce Power shall operate the reactor within the following limits as indicated in power limits table under LC 3.1

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Conduct of Licensed Activity: Construction and Commissioning Programs	REGDOC-2.3.1	2016
IAEA	Commissioning for Nuclear Power Plants	Specific Safety Guide Series No. SSG-28	2014
IAEA	Safety of Nuclear Power Plants: Commissioning and Operation	Specific Safety Requirements Series No. SSR-2/2	2011

Bruce Power should apply the concepts described in REGDOC-2.3.1, CONDUCT OF LICENSED ACTIVITY: CONSTRUCTION AND COMMISSIONING PROGRAMS, to the extent practicable, when commissioning and returning SSCs to service, as part of the MCR. CNSC staff will consider pertinent sections of REGDOC-2.3.1 when evaluating Bruce Power's commissioning and return to service activities related to MCR.

~~15.8~~15.6 Periodic Safety Review

Licence Condition 15.6:

The licensee shall conduct and implement a periodic safety review.

Preamble:

A periodic safety review (PSR) is a comprehensive evaluation of the design, condition and operation of a nuclear power plant. It is an effective way to obtain an overall view of actual plant safety and the quality of the safety documentation, and to determine reasonable and practical improvements to ensure safety until the next PSR or, where appropriate, until the end of commercial operation.

This licence condition pertains to the next PSR that Bruce Power shall submit during the licence period.

Compliance Verification Criteria:

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Periodic Safety Reviews	REGDOC-2.3.3	2015	June 1, 2015

The licensee shall conduct a PSR to obtain an overall view of actual plant safety and the quality of safety documentation and to determine reasonable and practical improvements to ensure safety. The PSR shall be conducted in accordance with CNSC regulatory document REGDOC-2.3.3, PERIODIC SAFETY REVIEWS.

Bruce Power shall submit the next PSR to CNSC staff for review approximately 18 months prior to the next licence application.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CSA	Periodic safety review for nuclear power plants	N290.18	2017
IAEA	Periodic Safety Review for Nuclear Power Plants	Specific Safety Guide No. SSG-25	2013

~~15.9~~15.7 End of Commercial Operations

Licence Condition 15.7:

The licensee shall inform the Commission of any reactor to be removed from commercial operation at Bruce A and B, and shall provide a plan describing the activities and timeline for transitioning from operations to safe storage.

Preamble:

Given that Bruce Power leases the Bruce A and Bruce B facilities, there is a need to ensure that when Bruce Power plans to take a reactor unit out of commercial service that there are adequate plans to ensure the safe transition from an operating unit into safe storage and the eventual transfer of the facility back to Ontario Power Generation.

Compliance Verification Criteria:

For any reactor that is to be removed from commercial operation, Bruce Power shall produce a strategy and plan of activities to manage and execute a safe process for removal from commercial service of a reactor unit at the nuclear facility. This plan shall cover:

- safe operation until end of commercial operation;
- transition to safe storage;
- staffing profiles;
- any required changes to Bruce Power programs covered in the operating licence;
- transition of the facility back to the owner for decommissioning.

Guidance:

The licensee should consider all units at a facility when developing the required plan. This is to take into consideration that units are likely to be removed from commercial service in a staggered approach such that the plan may need to cover several years.

~~15.10~~15.8 Booster Fuel

Licence Condition 15.8:

The licensee shall store and manage booster fuel assemblies at Bruce A in a manner that ensures their physical security.

Preamble:

This LC is required for Bruce A due to the booster fuel assemblies.

Compliance Verification Criteria:

Bruce Power shall ensure the inner areas within the nuclear facility at Bruce A are protected in accordance with section 14 of the *Nuclear Security Regulations* against design basis threats and any other credible threat identified in the Threat and Risk Assessment documentation.

Guidance:

Not applicable to this LC.

~~15.11~~15.9 Criticality Program

Licence Condition 15.9:

The licensee shall implement and maintain a nuclear criticality safety program.

Preamble:

This LC is required for Bruce A due to the booster fuel assemblies and for Bruce B due to the Low Void Reactivity Fuel (LVRF) Demonstration Irradiation. The booster fuel assemblies and LVRF bundles are currently in storage and only relevant sections of REGDOC-2.4.3, NUCLEAR CRITICALITY SAFETY are applicable. The other sections would apply only if Bruce Power proposes a change to the storage conditions.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Nuclear Criticality Safety Management	BP-PROC-00324	Yes

Licensing Basis Publications				
Org	Document Title	Document #	Revision #	Effective Date
CNSC	Nuclear Criticality Safety	REGDOC-2.4.3	2020	May 31, 2016

Bruce Power is to maintain their nuclear criticality safety program in accordance with certain sections of CNSC regulatory document REGDOC-2.4.3. Due to the presence of fissionable materials (as defined in section 2.3.1.3 of REGDOC-2.4.3) in the booster fuel assemblies at Bruce A and the LVRF bundles at Bruce B, several of the requirements listed in REGDOC-2.4.3 have been assessed as being applicable. The applicable requirements are:

Applicable Requirements in REGDOC-2.4.3	
Subject	Section
Nuclear criticality safety program relative to categorization	2.3.1.3, 2.3.1.4, 12.8
Responsibilities	2.3.2.1, 12.3.1, 12.3.2, 12.3.3
Quality Management program and procedures	2.3.2.3, 2.3.2.6
Materials control	2.3.2.4, 12.6
Operational control	2.3.2.7
Emergency procedures	2.3.2.9, 12.7
Nuclear criticality safety in the storage of fissile materials	6.0
Nuclear criticality safety training	13.0

Bruce Power is to maintain their nuclear criticality safety program in accordance with the Nuclear Criticality Safety Management procedure such that Upper Subcritical Limits established by the program will not be exceeded under both normal and credible abnormal conditions of operations with fissionable materials outside the reactors.

BP-PROC-00324 has been updated to meet the requirements of CSA standard N286-12.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Guidance for Nuclear Criticality Safety	GD-327	2010

~~15.12~~15.10 Cobalt-60 and Lutetium-177

Licence Condition 15.10:

The licensee shall implement and maintain a program for the production of the nuclear substances Cobalt-60 and Lutetium-177.

Preamble:

Bruce Power is limited to nuclear substances production at the following locations:

- Cobalt-60 at Bruce B
- Lutetium-177 at Bruce B, Unit 7

Bruce Power harvests Cobalt-60 during the removal of Cobalt adjusters from each of the Bruce B reactors. These cobalt rods are processed into cobalt bundles that are placed in sealed containers and transported to Nordion Inc. who reprocess the bundles into sealed sources. Due to decay, Cobalt-60 sealed sources cannot be used for commercial use after many years and are shipped to Bruce Power. The sealed sources are stored in the Secondary Irradiated Fuel Bay at Bruce B NGS and upon decommissioning; they will be placed in permanent dry storage.

An Isotope Production System (IPS) in Bruce B Unit 7 is used to produce Lutetium-177 (Lu-177) from Ytterbium-176 (Yb-176) oxide powder. The powder is encapsulated in a target consisting of a sealed quartz ampule and aluminum carrier. Two zircaloy target finger tube (TFT) assemblies have been installed via vacated vertical flux detector guide tube assemblies. Using a pneumatic system, targets in their aluminum carriers are inserted into and retrieved from the reactor through the TFT assemblies. The aluminum carriers (irradiated targets) are then discharged to transport containers and shipped to processing facilities. Bruce Power is authorized to use the IPS for the production of Lu-177 at Unit 7 only.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Cobalt Handling	BP-PROC-00003	Yes
Irradiation Services	BP-PROG-18.01	No
Management of Lutetium-177 Production	BP-PROC-01120	No

LC 15.10 provides the basis for regulatory oversight related to the licensed activity associated with the radioisotopes production program. The Bruce Power licence authorizes through the licensing basis the production and possession of Cobalt-60 in both sealed and unsealed forms at the Bruce B nuclear facility. Bruce Power shall ensure that handling, processing and accounting of Cobalt is in accordance with Bruce Power's procedure for Cobalt Handling.

The receipt of any Cobalt-60 sealed sources shall be reported to the CNSC via the Sealed Source Tracking System and in accordance with CNSC regulatory document REGDOC-3.1.1.

The Bruce Power licence authorizes through the licensing basis the production, possession, transfer, packaging, managing and storing of Lutetium-177. Furthermore, the licence also authorizes the possession, transfer, use, packaging, managing and storage of nuclear substances associated with the production of Lutetium-177: radioactive ytterbium oxide (Yb_2O_3) targets. Bruce Power will require up to 300 unirradiated targets in ampules containing Yb-169, with additional radionuclides having significantly lower activities. Bruce Power is authorized to receive ampules of up to the manufacturer's specification of 600 MBq/ampule, which is greater than the Exemption Quantity (EQ).

Prohibition of Human Use

The licensee is not authorized by the licence to conduct activities related to nuclear medicine and therefore it is prohibited to use nuclear substances in or on human beings.

CNSC staff will verify by whatever means available that the licensee is not using radioactive prescribed substances in or on humans.

Guidance:
Not applicable to this LC.

~~15.13~~15.11 Class II Nuclear Facility

Licence Condition 15.11:

The licensee shall implement and maintain a program for the operation of the Class II nuclear facility.

Preamble:

Bruce Power possesses Class II prescribed equipment and associated nuclear substances for the Class II nuclear facility as listed in B-LIST-67874-00001.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Management of Class II Nuclear Facilities	BP-PROC-00817	No
Leak Testing	BP-PROC-00143	No
Radiation Calibration Facility Safety Interlock Checks and Operation	NK29-CMP-67880-00001	No
Radiation Calibration Facility General Arrangement Drawing	NK29-DRAW-67880-10001	No
Radiation Calibration Facility Cable Block Diagram	NK29-DRAW-67880-10003	No
Nuclear Substances and Prescribed Equipment List	B-LIST-67874-00001	Yes

Licensee Documents		
Document Title	Document #	Prior Notification
Plans and Design of the Calibration Facility	NK29-CORR-00531-01343	N/A
Shielding Calculations for the Calibration Facility	NK29-CORR-00531-04839	N/A

Sealed Source Tracking

Unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission the licensee shall, in respect of a radioactive nuclear substance set out:

1) in table 15.11.1 column 1, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, export, or import of a sealed source whose corresponding activity is equal to or greater than the value set out in column 2; or
2) in B-LIST-67874-00001 section 4.0, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, import or export of any sealed source:
   (a) at least 24 hours before any transfer within Canada;
   (b) at least 7 days before any export; and
   (c) within 48 hours of any receipt of a transfer or import.

Table 15.11.1: Activity Limits

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

The written report shall be in a form acceptable to the Commission that includes:

1) on transfer or export of a sealed source(s),
   (a) the date of transfer or export,
   (b) the export licence number (where applicable),
   (c) the name of the recipient and licence number or the name of the importer,
   (d) the address of the recipient's or importer's authorized location,
   (e) the nuclear substance (radionuclide),
   (f) activity (radioactivity) (Bq) per sealed source on the reference date,
   (g) the reference date,
   (h) the number of sealed source(s),
   (i) the aggregate activity (Bq),
   (j) the sealed source unique identifiers (if available), and
   (k) where the sealed source is incorporated in a prescribed equipment,
      i. the name and model number of the equipment, and
      ii. the equipment serial number (if available)

2) on receipt or import of a sealed source(s),
   (a) the date of receipt of a transfer or import,
   (b) the name of the shipper and licence number or the name of the exporter,
   (c) the address of the shipper's or exporter's authorized location,
   (d) the nuclear substance (radionuclide),
   (e) activity (radioactivity) (Bq) per sealed source on the reference date,
   (f) the reference date,
   (g) the number of sealed source(s),
   (h) the aggregate activity (Bq),
   (i) sealed source unique identifiers (if available), and
   (j) where the sealed source is incorporated in a prescribed equipment,
      i. the name and model number of the equipment, and
      ii. the equipment serial number (if available)

Annual Compliance Report for a Class II Nuclear Facility

The licensee is required to submit to the Commission the annual compliance report by March 31 of each year. The report shall include activities covering the nuclear substances and prescribed equipment of the Class II nuclear facility as listed in this section of the LCH.

The report shall include:

- information on the activities conducted during the previous year, including a summary of workload;
- the current inventory of radiation devices, sealed sources, and unsealed sources; and
- information on any transfers or disposals.

Guidance:

Not applicable to this LC.

~~15.14~~15.12 Nuclear Substances and Prescribed Equipment

Licence Condition 15.12:

The licensee shall implement and maintain a program for nuclear substances and prescribed equipment.

Preamble:

Bruce Power has been authorized to use the types of nuclear substances and prescribed equipment listed in B-LIST-67874-00001 and B-LIST-67874-00002.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change		
Document Title	Document #	Prior Notification
Management of Nuclear Substances and Radiation Generating Equipment	BP-RPP-00043	No
Hopewell Designs BX-3-Box Calibrator Pre-Use Operational and Safety Interlock Checks	NK21-CMP-67870-00002	No
Hopewell Designs Inc. Model BX3 Gamma Irradiator Operations & Maintenance Manual (Version 1)	N/A	No
Hopewell Designs, Inc. Stand-Alone Irradiator Calibrator 3347-R2 User Manual	N/A	No
Instructions for the Removal/Replacement of Kinectrics KIN-FLS400 Sealed Source Assembly	N/A	No
Conduct of Radiography	BP-PROC-00036	No
Radiography Emergency Procedures	BP-PROC-00798	No
Leak Testing	BP-PROC-00143	No
Nuclear Substances and Prescribed Equipment List	B-LIST-67874-00001	Yes
Security Protected Nuclear Substances and Prescribed Equipment List	B-LIST-67874-00002	Yes

The licensee shall implement and maintain a nuclear substances and prescribed equipment program.

The licensee main support process document which describes the program for nuclear substances and prescribed equipment is BP-RPP-00043, *Management of Nuclear Substances and Radiation Generating Equipment*.

Nuclear substances and prescribed equipment are used throughout the Bruce site, subject to the requirements of the program for nuclear substances and prescribed equipment.

The licensee is authorized to conduct licensed activities with the nuclear substances and the prescribed equipment listed in B-LIST-67874-00001 and B-LIST-67874-00002 throughout the Bruce site. This includes use of the nuclear substances and the prescribed equipment to support dosimetry services authorized by CNSC licence 13152-6-27.5 and any subsequent amendments or renewals.

Prohibition of Human Use

The licensee is not authorized by the licence to conduct activities related to nuclear medicine and therefore it is prohibited to use nuclear substances in or on human beings.

CNSC staff will verify by whatever means available that the licensee is not using radioactive prescribed substances in or on humans.

List of areas, rooms and enclosures

The licensee shall maintain a list of all areas, rooms and enclosures in which more than one exemption quantity of a nuclear substance is used or stored. The allowable maximum quantities of radionuclides are found in B-LIST-67874-00001 sections 1.0 and 2.0 and B-LIST-67874-00002.

Posting of Safety Posters

The licensee shall post and keep posted, in a readily visible location in the areas, rooms or enclosures where nuclear substances are handled, a radioisotope safety poster approved by the Commission or a person authorized by the Commission, which corresponds to the classification of the area, room or enclosure.

Storage

The licensee shall:
- ensure that when in storage radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee;
- ensure that the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 microSv/h; and
- have measures in place that the dose limits in the *Radiation Protection Regulations* are not exceeded as a result of the substances or devices in storage.

Area Classification

The licensee shall classify each room, area or enclosure where more than one exemption quantity of an unsealed nuclear substance is used at a single time as:
- basic-level if the quantity does not exceed 5 Annual Limit on Intake (ALI);
- intermediate-level if the quantity used does not exceed 50 ALI;
- high-level if the quantity does not exceed 500 ALI; or
- containment-level if the quantity exceeds 500 ALI;

Except for the basic-level classification, the licensee shall not use unsealed nuclear substances in these rooms, areas or enclosures without written approval of the Commission or a person authorized by the Commission.

Contamination Meter Requirements

The licensee shall make available to workers at all times at the site of the licensed activity a properly functioning portable contamination meter.

Survey Meter Requirements

The licensee shall provide at all times where nuclear substances, except for Hydrogen-3 and Nickel-63, are handled or stored a radiation survey meter.

Contamination Criteria

The licensee shall ensure that for nuclear substances listed in table 15.12.1, Classes of Radionuclides, given below:

1) non-fixed contamination in all areas, rooms or enclosures where unsealed nuclear substances are used or stored does not exceed:
    a) 3 becquerels per square centimetre for all Class A radionuclides;
    b) 30 becquerels per square centimetre for all Class B radionuclides;
    c) 300 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres;

and

2) non-fixed contamination in all other areas does not exceed:
    a) 0.3 becquerels per square centimetre for all Class A radionuclides;
    b) 3 becquerels per square centimetre for all Class B radionuclides;
    c) 30 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres.

The most commonly licensed radionuclides have been grouped into Class A, Class B and Class C, based upon their radiological properties as shown in the table below.

Table 15.12.1: Classes of Radionuclides

Class	Radionuclide				
Class A	All alpha emitters and their daughter isotopes				
	Ag-110m	Bi-210	Co-56	Co-60	Cs-134
	Cs-137	I-124	Lu-177m	Mn-52	Na-22
	Po-210	Pu-238	Pu-239	Pu-240	Sb-124
	Sc-46	Sr-82	U-234	U-235	U-238
	V-48	Zn-65			
Class B	Au-198	Ba-133	Br-82	Ce-143	Co-58
	Cu-67	Fe-59	Hg-194	Hg-203	I-131
	Ir-192	La-140	Mo-99	Nb-95	Pa-233
	Ra-223	Re-186	Re-188	Ru-103	Sb-122
	Sm-153	Sr-90	Xe-127	Y-86	Y-90
	Yb-169	Zr-89	Zr-95		
Class C	C-11	C-14	Ca-45	Cd-109	Ce-141
	Cl-36	Co-57	Cr-51	Cu-60	Cu-61
	Cu-64	F-18	Fe-55	Ga-67	Ga-68
	Ge-68	H-3	I-123	I-125	In-111
	In-113m	In-114	K-42	Kr-85	Lu-177

Table 15.12.1: Classes of Radionuclides					
Class	Radionuclide				
	Mn-52m	Mn-56	N-13	Na-24	Nb-98
	Ni-63	O-15	P-32	P-33	Pd-103
	Pr-144	Pu-241	Rh-106	S-35	Sc-44
	Sn-113	Sr-89	Tc-94m	Tc-99	Tc-99m
	Te-127	Tl-201	V-49	W-181	W-188
	Xe-133	Zn-63			

When using more than one radionuclide in a room, the radionuclide with the lowest contamination limit must be used to determine the limit, Class A, Class B or Class C that applies to the room.

Extremity Dosimetry – Beta Emitters

The licensee shall ensure that any person who handles a container which contains more than 50 MBq of phosphorus 32, strontium 89, yttrium 90, samarium 153 or rhenium 186 wears an extremity dosimeter, such as, a ring dosimeter, a Thermoluminescent Dosimeter (TLD) chip taped to the middle finger or other acceptable dosimetry methods that may be developed in the future. The dosimeters must be supplied and read by a dosimetry service licensed by the Commission.

Internal Authorization

The licensee shall ensure that:
- internal authorizations are issued in accordance with the licensee's internal authorization policies and procedures approved by the Commission or a person authorized by the Commission;
- internal authorization forms are posted in a readily visible location in or near each room, area or enclosure where nuclear substances and radiation devices are used or stored; and
- the licensed activity is conducted in accordance with the terms and conditions of the internal authorization.

Project Approval

The licensee shall obtain written approval from the Commission or a person authorized by the Commission before starting any work requiring the use of more than 10,000 exemption quantities of a nuclear substance at a single time.

Disposal (General)

When disposing of unsealed nuclear substances set out in table 15.12.2 column 1, Disposal Limits to municipal waste, to sewer systems or to atmosphere, the licensee shall ensure that the concentration limit set out for each nuclear substance is not exceeded:

a) The concentration limits set out in column 2 apply to quantities of solid waste of less than three tonnes per building per year. Nuclear substances released to the municipal garbage system must be in solid form and uniformly distributed in the waste with a concentration that is less than the limits in column 2. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 2 shall not exceed one.
b) The limits set out in column 3 apply to the water soluble liquid form of each nuclear substance which may be disposed of per building per year. Where more than one nuclear substance is disposed of at

one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 3 shall not exceed one.

c) The concentration limits set out in column 4 may be averaged over a one-week period and apply to releases of less than 3 million cubic metres per year. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 4 shall not exceed one.

Table 15.12.2: Disposal Limits

Column 1 Nuclear Substance	Column 2 Solids to Municipal Garbage System (Qty per kg)	Column 3 Liquids (Water Soluble) to Municipal Sewer System (Qty per year)	Column 4 Gases to Atmosphere (Qty per cubic metre)
Americium 241	0.001 MBq	10 MBq	0.03 Bq
Antimony 124	0.37 MBq	0.1 MBq	N/A
Barium 133	0.037 MBq	1 MBq	N/A
Cadmium 109	0.37 MBq	10 MBq	N/A
Carbon 14	3.7 MBq	10000 MBq	N/A
Cerium 139	0.1 MBq	1 MBq	30 Bq
Cesium 134	0.01 MBq	0.1 MBq	N/A
Cesium 137	0.01 MBq	1 MBq	N/A
Chlorine 36	0.37 MBq	10000 MBq	N/A
Cobalt 57	0.37 MBq	1000 MBq	N/A
Cobalt 60	0.01 MBq	0.1 MBq	0.3 Bq
Hydrogen 3	37 MBq	1 TBq	37 kBq
Iron 55	3.7 MBq	10000 MBq	N/A
Mercury 203	0.1 MBq	10 MBq	N/A
Natural Uranium	0.01 MBq	1.4 kg	N/A
Nickel 63	0.1 MBq	10000 MBq	N/A
Niobium 95	0.01 MBq	N/A	N/A
Strontium 85	0.1 MBq	1 MBq	N/A
Strontium 90	0.1 MBq	1 MBq	0.3 Bq
Tin 113	1 MBq	N/A	N/A
Yttrium 88	0.01 MBq	0.1 MBq	3 Bq

Decommissioning

The licensee shall ensure that prior to decommissioning any area, room or enclosure where the licensed activity has been conducted:

1) the non-fixed contamination for nuclear substances listed in the licence application guide table titled "Classification of Radionuclides" does not exceed:
   a) 0.3 becquerels per square centimetre for all Class A radionuclides;
   b) 3 becquerels per square centimetre for all Class B radionuclides;
   c) 30 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres;
2) the release of any area, room or enclosure containing fixed contamination, is approved in writing by the Commission or person authorized by the Commission;
3) all nuclear substances and radiation devices have been transferred in accordance with the conditions of this licence; and
4) all radiation warning signs have been removed or defaced.

Sealed Source Tracking

Unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission the licensee shall, in respect of a radioactive nuclear substance set out:

1) in table 15.12.3 column 1, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, export, or import of a sealed source whose corresponding activity is equal to or greater than the value set out in column 2; or
2) in B-LIST-67874-00001 section 3.0 or B-LIST-67874-00002, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, import or export of any sealed source:
    a) at least 24 hours before any transfer within Canada;
    b) at least 7 days before any export; and
    c) within 48 hours of any receipt of a transfer or import.

Table 15.12.3: Activity Limits

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

The written report shall be in a form acceptable to the Commission that includes:

1) on transfer or export of a sealed source(s),
    a) the date of transfer or export,
    b) the export licence number (where applicable),
    c) the name of the recipient and licence number or the name of the importer,
    d) the address of the recipient's or importer's authorized location,
    e) the nuclear substance (radionuclide),
    f) activity (radioactivity) (Bq) per sealed source on the reference date,
    g) the reference date,
    h) the number of sealed source(s),
    i) the aggregate activity (Bq),
    j) the sealed source unique identifiers (if available), and
    k) where the sealed source is incorporated in a prescribed equipment,
        i. the name and model number of the equipment, and

ii. the equipment serial number (if available)

2) on receipt or import of a sealed source(s),
   a) the date of receipt of a transfer or import,
   b) the name of the shipper and licence number or the name of the exporter,
   c) the address of the shipper's or exporter's authorized location,
   d) the nuclear substance (radionuclide),
   e) activity (radioactivity) (Bq) per sealed source on the reference date,
   f) the reference date,
   g) the number of sealed source(s),
   h) the aggregate activity (Bq),
   i) sealed source unique identifiers (if available), and
   j) where the sealed source is incorporated in a prescribed equipment,
      i. the name and model number of the equipment, and
      ii. the equipment serial number (if available)

Annual Compliance Report for Nuclear Substances and Prescribed Equipment

The licensee is required to submit to the Commission the annual compliance report by March 31 of each year. The report shall include activities covering the nuclear substances and prescribed equipment listed in this section of the LCH.

The report shall include:
- information on the activities conducted during the previous year,
- the current inventory of radiation devices, sealed sources, and unsealed sources, and
- information on any transfers or disposals.

Import and Export Restrictions

The licensee shall not import or export any items described in the schedule, Parts A and B, to the *Nuclear Non-proliferation Import and Export Control Regulations,* without a valid import/export licence issued by the CNSC.

The import or export licence issued by the CNSC includes licence conditions to verify compliance with the *Nuclear Non-proliferation Import and Export Control Regulations*. CNSC inspectors can verify compliance by reviewing shipping documents pertaining to imports and exports.

Export Limitations – Sealed Sources

The licence does not authorize the licensee, in respect of a radioactive nuclear substance set out in table 15.12.4 column 1, to export a sealed source whose corresponding activity is equal to or greater than the value set out in column 2.

Table 15.12.4: Export Limitations

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6

Table 15.12.4: Export Limitations

Column 1 Nuclear Substance	Column 2 (TBq)
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

Import and Export of Nuclear Substances as Contamination on Equipment

The licensee is authorized to import and export nuclear substances present as contamination on equipment, subject to activity limits per package provided in table 15.12.5. It is not necessary to notify the CNSC of shipments, including destination.

Table 15.12.5: Authorized Import and Export of Nuclear Substances Present as Contamination

Unsealed Nuclear Substance	Maximum activity per package
Iron 55	400 GBq
Cobalt 60	40 GBq
Niobium 95	40 GBq
Antimony 124	40 GBq
Zirconium 95	40 GBq
Carbon 14	4 TBq
Natural Uranium	1 MBq
Activated materials	10 GBq
Fission products	10 GBq

Location Notification

The licensee shall, for any site where licensed activities are to be conducted for more than 90 consecutive days, notify the Commission in writing of the site within 7 days of starting to conduct the activities at the site. The licensee shall notify the Commission in writing within 7 days of the discontinuance of licensed activities at any site. The continuity of consecutive days is not broken during offsite use or offsite temporary storage.

Maintenance Limitations

The licence authorizes the cleaning and lubrication of the radiation devices listed in this section, in accordance with the manufacturer's operating manual.

Guidance:

Guidance Publications			
Org	Document Title	Document #	Version
CNSC	Import and Export, Version 2	REGDOC-2.13.2	2018

APPENDIX A – Acronyms and Definitions

A.1 Acronyms

The following is the list of acronyms used in the LCH:

ADL	Administrative Dose Limits
AIA	Authorized Inspection Agency
AL	Action Levels
ALARA	As Low As Reasonably Achievable
AMP	Aging Management Plan
ASME	American Society of Mechanical Engineers
BBL	Break Before Leak
BDBA	Beyond-Design-Basis Accident
BEAU	Best Estimate Analysis and Uncertainty
BOP	Balance of Plant
BPMS	Bruce Power Management System
BRPD	Bruce Regulatory Program Division
CANDU	Canadian Deuterium Uranium
CCW	Condenser Cooling Water
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
cUL/ULC	Underwriters Laboratory of Canada
CVC	Compliance Verification Criteria
CZM-R2	Cohesive Zone-based fracture toughness Model
DBA	Design-Basis Accident
DCR	Document Change Request
DiD	Defence-in-Depth
DG	Director General
DPRR	Directorate of Power Reactor Regulation
DRL	Derived Release Limits
EAL	Environmental Action Levels
ECCC	Environment and Climate Change Canada
EFPH	Equivalent Full Power Hours
EMS	Environmental Management System
EQ	Environmental Qualification
ERA	Environmental Risk Assessment
FFSG	Fitness for Service Guidelines
Heq	Hydrogen Equivalent Concentration
HTO	Hydrogenated Tritium Oxide (Tritium)
I&C	Instrumentation and control
IAEA	International Atomic Energy Agency
ICI	In-service Inspection
IFB	Industrial Fire Brigade
IIP	Integrated Implementation Plan
IUCs	Instrument Uncertainty Calculations
LC	Licence Condition
LCH	Licence Conditions Handbook
LCMP	Life Cycle Management Plans

LOE	Limit of Operating Envelope
LVRF	Low Void Reactivity Fuel
mfp	Mixed Fission Products
MECP	Ministry of Environment, Conservation and Parks
NCB	National Certification Body
NDE	Non-destructive Examination
NEW	Nuclear Energy Worker
NFPA	National Fire Protection Association
NGS	Nuclear Generating Station
NMAR	Nuclear Material Accountancy Reporting
NOP/ROP	Neutron Overpower Protection/Regional Overpower Protection
NPP	Nuclear Power Plant
NSCA	*Nuclear Safety and Control Act*
OP&P	Operating Policies and Principles
OPEX	Operating Experience
OPG	Ontario Power Generation Inc.
OSRs	Operational Safety Requirements
ppm	Parts per million
PBQA	Pressure Boundary Quality Assurance
PCA	Probabilistic Core Assessment
PFP	Probabilistic Fracture Protection
PIDP	Public Information and Disclosure Program
PIP	Periodic Inspection Program
PLBB	Probabilistic assessment of Leak-Before-Break
PROL	Nuclear Power Reactor Operating Licence
PSA	Probabilistic Safety Assessment
PSR	Periodic Safety Review
ROE	Realistic Operating Envelope
RPD	Regulatory Program Division
SAMGs	Severe Accident Management Guidelines
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SCC	Standards Council of Canada
SCO	Station Containment Outage
SFC	Single Failure Criterion
SOE	Safe Operating Envelope
SPOC	Single Point of Contact
SQ	Seismic Qualification
SSCs	Structures, systems and components
VB	Vacuum Building
WN	Written Notification [document]

A.2 Definitions

The following is a list of definitions of words or expressions used in the LCH that may need clarification. Unless a reference source is provided in parenthesis, the words or expressions have been defined for the purpose of the LCH. Additional definitions could be found in REGDOC-3.6, GLOSSARY OF CNSC TERMINOLOGY.

Accept/ed/able/ance

Meet regulatory requirements, which mean it is in compliance with regulatory documents or technical standards referenced in the licence.

Approval

Commission's permission to proceed, for situations or changes where the licensee would be:

- not compliant with a regulatory requirements set out in applicable laws and regulations; or
- not compliant with a licence condition; or
- not in the safe direction but the objective of the licensing basis is met.

Boundary conditions (context differs from REGDOC-3.6)

Procedural, administrative rules and operating limits for ensuring safe operation of the facility based on safety analysis. It also includes any applicable regulatory requirements.

Certified staff

Trained licensee staff, certified by the Commission to be competent in completing tasks identified in their respective roles.

Compliance verification criteria

Criteria used by CNSC staff to verify compliance with a licence condition. CVC provides the licensee and CNSC staff with detailed information to clarify regulatory requirements for compliance purposes.

Consent

Written permission to proceed, given by CNSC delegated authority, for situations or changes where the licensee would:

- comply with a regulatory requirements set out in applicable laws and regulations;
- comply with a licence condition; and
- not adversely impact the licensing basis.

Effective date

The date that a given document becomes incorporated into the licensing basis within the licensing period.

Extent of condition

Means an evaluation to determine if an issue has potential or actual applicability to other activities, processes, equipment, programs, facilities, operations or organizations.

Graduated enforcement

A process for escalating enforcement action. If initial enforcement action does not result in timely compliance, gradually more severe enforcement actions may need to be used. It takes into account such things as:

- the risk significance of the non-compliance with respect to health, safety, security, the environment and international obligations;
- the circumstances that lead to the non-compliance (including acts of willfulness);
- previous compliance record; and
- operational and legal constraints (for example, Directive on the Health of Canadians)
- industry specific strategies.

Levels 1 and 2 Outage Plans

A level 1 outage plan is a schedule which identifies the key components of the finalized critical path, major projects and programs. A level 2 outage plan is a schedule which identifies the system windows with durations.

Program(s)

A documented group of planned activities, procedures, processes, standards and instructions coordinated to meet a specific purpose.

Qualified staff

Trained licensee staff, deemed competent and qualified to carry out tasks associated to their respective positions.

Guidance

These are non-mandatory suggestions on how to comply with the licence condition. Guidance may include regulatory advice and/or recommended industry best practices to guide the licensee towards a higher level of safety and/or fully satisfactory performance/implementation of its programs.

Safe direction

Means changes in plant safety levels which would not result in:

- a reduction in safety margins,
- a breakdown of barrier,
- an increase (in certain parameters) above accepted limits,
- an increase in risk,
- impairment(s) of special safety systems,
- an increase in the risk of radioactive releases or spills of hazardous substances,
- injuries to workers or members of the public,
- introduction of a new hazard,
- reduction of the defense-in-depth provisions,
- reducing the capability to control, cool and contain the reactor while retaining the adequacy thereof, and
- causing hazards or risks different in nature or greater in probability or magnitude than those stated in the safety analysis of the nuclear facility.

Safety and control measures

Criteria used in assessing the compliance of a licence application with regulatory requirements. These measures or provisions demonstrate that the applicant:

(i) is qualified to carry on the licensed activities, and
(ii) has made adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and any measures required to implement international obligations to which Canada has agreed.

Shall

Is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the licence.

APPENDIX B – List of All Version-Controlled Documents

Table B.1 – All Canadian Standards Association (CSA) Documents			
Document #	Document Title	Issue Date	L.C.
N286	Management system requirements for nuclear facilities	2012	1.1
N290.15	Requirements for the safe operating envelope for nuclear power plants	2010 Update 1 (2016)	3.1
N286.7	Quality assurance of analytical, scientific, and design computer programs	2016	4.1
N290.12	Human factors in design for nuclear power plants	2014	5.1
N290.14	Qualification of digital hardware and software for use in instrumentation and control applications for nuclear power plants	2015	5.1
N291	Requirements for safety-related structures for nuclear power plants (2015)	2015	5.1, 6.1
N285.0	General requirements for pressure-retaining systems and components in CANDU nuclear power plants	2012 Update No. 1 (Sep. 2013) & Update No. 2 (Nov. 2014)	5.2
N289.1	General requirements for seismic design and qualification of CANDU nuclear power plants	2008	5.3
N289.2	Ground motion determination for seismic qualification of CANDU nuclear power plants	2010	5.3
N289.3	Design procedures for seismic qualification of CANDU nuclear power plants	2010	5.3
N289.4	Testing procedures for seismic qualification of nuclear power plant structures, systems, and components	2012	5.3
N289.5	Seismic instrumentation requirements for nuclear power plants and nuclear facilities	2012	5.3
N290.13	Environmental qualification of equipment for CANDU nuclear power plants	2018	5.3
N285.4	Periodic inspection of CANDU nuclear power plant components	2014	6.1
N285.5	Periodic inspection of CANDU nuclear power plant containment components	2018	6.1
N285.7	Periodic inspection of CANDU nuclear power plant balance of plant systems and components	2015	6.1
N285.8	Technical requirements for in-service evaluation of zirconium alloy pressure tubes in CANDU reactors	2021	6.1
N287.7	In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plant components	2008	6.1

Table B.1 – All Canadian Standards Association (CSA) Documents			
Document #	Document Title	Issue Date	L.C.
N288.1	Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities	2020	9.1
N288.4	Environmental monitoring program at Class I nuclear facilities and uranium mines and mills	2010	9.1
N288.5	Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills	2011	9.1
N288.6	Environmental risk assessments at Class I nuclear facilities and uranium mines and mills	2012	9.1
N288.7	Groundwater protection programs at Class I nuclear facilities and uranium mines and mills	2015	9.1
N288.8	Establishing and implementing action levels for releases to the environment from nuclear facilities	2017	9.1
N292.3	Management of low- and intermediate-level radioactive waste	2014	11.1
N290.7	Cyber security for nuclear power plants and small reactor facilities	2014	12.1
N293	Fire protection for nuclear power plants	2012 (R2017)	10.2
N393	Fire protection for facilities that process, handle, or store nuclear substances	2022	10.2

CSA standards are the proprietary of the Canadian Standards Association (CSA Group) and are covered by copyright law. The CNSC has an online subscription (licence agreement) with the CSA Group for CNSC staff to access the nuclear standards ("my subscription"). The public has read-only access through the following platform:

https://community.csagroup.org/community/nuclear

CNSC staff may access standards and codes via e-Access – folder #4021465 – maintained by the Regulatory Framework Division.

Table B.2 – All CNSC documents			
Document #	Document Title	Issue Date	L.C.
REGDOC-3.2.1	Public Information and Disclosure	May 2018	G.5
REGDOC-2.1.2	Safety Culture	April 2018	1.1
REGDOC-2.2.4	Fitness for Duty: Managing Worker Fatigue	March 2017	2.1
REGDOC-2.2.4	Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3	January 2021	2.1
REGDOC-2.2.2	Personnel Training, Version 2	Dec. 2016	2.3
REGDOC-2.2.3	Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2	Oct. 2023	2.4
REGDOC-2.3.2	Accident Management: Severe Accident Management Programs for Nuclear Reactors, Version 2	Sep. 2015	3.1
REGDOC-2.4.5	Nuclear Fuel Safety and Qualification	April 2024	3.2
REGDOC-3.1.1	Reporting Requirements: Nuclear Power Plants, Version 3	May 2024	3.3
REGDOC-2.4.1	Deterministic Safety Analysis	May 2014	4.1
REGDOC- 2.4.2	Probabilistic Safety Assessment (PSA) For Nuclear Power Plants	May 2014	4.1
REGDOC-2.6.1	Reliability Programs for Nuclear Power Plants	August 2017	6.1
REGDOC-2.6.2	Maintenance Programs for Nuclear Power Plants	August 2017	6.1
REGDOC-2.6.3	Aging Management	March 2014	6.1
REGDOC- 2.9.1	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	Sep. 2020	9.1
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response, V2	Feb. 2016	10.1
REGDOC-2.2.4	Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness	Sep. 2018	12.1
REGDOC-2.12.1	High-Security Facilities, Vol. I: Nuclear Response Force, Version 2	Sep. 2018	12.1
REGDOC-2.12.1	High-Security Facilities, Vol. II: Criteria for Nuclear Security Systems and Devices	April 2018	12.1
REGDOC-2.12.2	Site Access Security Clearance	April 2013	12.1
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources	May 2013	12.1
REGDOC-2.13.1	Safeguards and Nuclear Material Accounting	February 2018	13.1
REGDOC-2.3.3	Periodic Safety Reviews	April 2015	15.6
REGDOC-2.4.3	Nuclear Criticality Safety, Version 1.1	Sep. 2020	15.9

ALL CNSC REGULATORY DOCUMENTS CAN BE FOUND ON THE CNSC WEBSITE: https://www.cnsc-ccsn.gc.ca

Any superseded regulatory document may be requested through the email account: consultation@cnsc-ccsn.gc.ca

Table B.3 - Other Documents referenced in the LCH under CVC				
Document #	Document Title	Date	L.C.	e-Docs #
EG1	Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants	July 2005	2.3	3402702
EG2	Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants	June 2004	2.3	3402705
N/A	Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants	May 2009	2.3	3436327

APPENDIX C – List of Documents used as Guidance

Table C.1 – Other Codes or Standards to be used as guidance		
Document #	Document Title	L.C.
CSA N286.0.1	Commentary on N286-12, Management system requirements for nuclear facilities (2021)	1.1
CSA N290.11	Requirements for heat removal capability during outage of nuclear power plants (2013)	3.1
CSA N290.16	Requirements for beyond design basis accidents (2016)	3.1
COG-09-9030	Principles & Guidelines For Deterministic Safety Analysis, CANDU Owners Group, Safety Analysis Improvement Task Team	3.2
COG-12-2049	Fuel and Pressure Tube Fitness-For-Service Criteria for LOF, SBLOCA and Slow LORC	3.2
CSA N290.17	Probabilistic safety assessment for nuclear power plants (2017)	4.1
CSA N292.1	Wet storage of irradiated fuel and other radioactive materials (2016)	4.1
CSA N292.2	Interim dry storage of irradiated fuel (2013)	4.1
COG-09-9030	Principles & Guidelines For Deterministic Safety Analysis	4.1
COG-11-9023	Guidelines for Application of the LOE/ROE Methodologies to Deterministic Safety Analysis	4.1
COG-06-9012	Guidelines for Application of the Best Estimate Analysis and Uncertainty (BEAU) Methodology to Licensing Analysis	4.1
COG-08-2078	Principles and Guidelines for NOP/ROP Trip Setpoint Analysis for CANDU Reactors	4.1
CSA N286.10	Configuration management for high energy reactor facilities (2016, R2021)	5.1
CSA N287.1	General requirements for concrete containment structures for CANDU nuclear power plants (2014)	5.1
CSA N287.2	Material requirements for concrete containment structures for CANDU nuclear power plants (2008)	5.1
CSA N287.3	Design requirements for concrete containment structures for CANDU nuclear power plants (2014)	5.1
CSA N287.4	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants (2009)	5.1
CSA N287.5	Examination and testing requirements for concrete containment structures for CANDU nuclear power plants (2011)	5.1
CSA N287.6	Pre-operational proof and leakage rate testing requirements for concrete containment structures for CANDU nuclear power plants (2011)	5.1
CSA N290.0	General requirements for safety systems of nuclear power plants (2011)	5.1
CSA N290.1	Requirements for the shutdown systems of CANDU nuclear power plants (2013)	5.1
CSA N290.2	Requirements for emergency core cooling systems of nuclear power plants (2011)	5.1
CSA N290.3	Requirements for the containment system of nuclear power plants (2016)	5.1
CSA N290.4	Requirements for reactor control systems of nuclear power plants (2011)	5.1
CSA N290.5	Requirements for electrical power and instrument air systems of CANDU nuclear power plants (2016)	5.1

Table C.1 – Other Codes or Standards to be used as guidance		
Document #	Document Title	L.C.
CSA N290.6	Requirements for monitoring and display of nuclear power plant safety functions in the event of an accident (2009, R2014)	5.1
(USNRC) UFC-3-340-02	Unified Facilities Criteria – Structures to Resist the Effects of Accidental Explosions	5.1
ASME B31.1	Power Piping	5.2
ASME B31.3	Process Piping	5.2
ASME B31.5	Refrigeration Piping and Heat Transfer Components	5.2
ASME	Boiler and Pressure Vessel Code – Code Cases	5.2
CSA B51	Boiler, Pressure Vessel and Piping Code	5.2
CSA N285.0	General requirements for pressure-retaining systems and components in CANDU nuclear power plants (2017)	5.2
COG-05-9011	Interim Implementation Guidelines for CANDU Nuclear Plant Reliability Programs	6.1
CSA N285.4	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants (2014)	6.1
CSA N287.8	Aging management for concrete containment structures for nuclear power plants (2015)	6.1
CSA N290.9	Reliability and maintenance programs for nuclear power plants (2019)	6.1
CSA N288.3.4	Performance testing of nuclear air-cleaning systems at nuclear facilities (2013)	9.1
CSA N288.9	Guideline for design of fish impingement and entrainment programs at nuclear facilities (2018)	9.1
CSA N1600	General requirements for nuclear emergency management programs (2016)	10.1
NEI 00-01	Guidance for Post Fire Safe Shutdown Circuit Analysis	10.2
CSA N393-12	Fire protection for facilities that process, handle, or store nuclear substances	10.2
CSA N292.0	General principles for the management of radioactive waste and irradiated fuel (2014)	11.1
CSA N292.1	Wet storage of irradiated fuel and other radioactive materials (2016)	11.1
CSA N292.2	Interim dry storage of irradiated fuel	11.1
N/A	TBS Standard on Security Screening	12.1
CSA N292.5	Guideline for the exemption of clearance from regulatory control of materials that contain, or potentially contain, nuclear substances (2011, R2021)	11.1
CSA N292.6	Long-term management of radioactive waste and irradiated fuel	11.1
IAEA	IAEA Nuclear Security Series No. 4 Technical Guidance: Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage	12.1
IAEA	IAEA Nuclear Security Series No. 13 Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)	12.1
IAEA	IAEA Nuclear Security Series No. 17 Technical Guidance: Computer Security at Nuclear Facilities	12.1
IAEA	IAEA Nuclear Security Series No 33-T Technical Guidance: Computer Security of Instrumentation and Control Systems at Nuclear Facilities	12.1

Table C.1 – Other Codes or Standards to be used as guidance		
Document #	Document Title	L.C.
COG JP-4491-V197	Fuel Channel Life Management – Third Party Review of Probabilistic Fracture Protection Evaluation Methodology Acceptance Criteria (2017)	15.3
IAEA	Specific Safety Guide Series No. SSG-28 Commissioning for Nuclear Power Plants	15.5
IAEA	Specific Safety Requirements Series No. SSR-2/2 Safety of Nuclear Power Plants: Commissioning and Operation	15.5
CSA N290.18	Periodic safety review for nuclear power plants (2017)	15.6
IAEA	Specific Safety Guide No. SSG-25 Periodic Safety Review for Nuclear Power Plants	15.6

Canadian standards/codes and international documents can be found on the internet under the organization's website. CNSC staff may access standards and codes via e-Access folder #4021465 – maintained by the Regulatory Framework Division.

Table C.2 – Other CNSC documents referenced in the LCH		
Document #	Document Title	L.C.
REGDOC-3.5.3	Regulatory Fundaments, Version 3 (2023)	G.1
REGDOC-3.2.1	Public Information and Disclosure (2018)	G.5
REGDOC-3.2.2	Indigenous Engagement, Version 1.2 (2022)	G.5
REGDOC-2.1.1	Management System (2019)	1.1
REGDOC-2.2.1	Human Factors (2019)	2.1
REGDOC-2.2.5	Minimum Shift Complement (2019)	2.2
REGDOC-2.5.1	General Design Considerations: Human Factors	2.2, 5.1
REGDOC-2.5.2	Design of Reactor Facilities: Nuclear Power Plants (2014)	5.1
REGDOC-2.7.1	Radiation Protection (2021)	7.1
REGDOC-2.7.2	Dosimetry, Volume I: Ascertaining Occupational Dose	7.1
REGDOC-2.8.1	Conventional Health and Safety (2019)	8.1
REGDOC-2.12.1	High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices (2018)	12.1
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1 (2020)	12.1
REGDOC-2.13.2	Import and Export, Version 2 (2018)	13.1 15.12
REGDOC-2.14.1	Packaging and Transport: Information Incorporated by Reference in Canada's *Packaging and Transport of Nuclear Substances Regulations*, 2015, Volume I, Version 2 (2021)	14.1
REGDOC-2.3.1	Conduct of Licensed Activity: Construction and Commissioning Programs (2016)	15.5
GD-327	Guidance for Nuclear Criticality Safety (2010)	15.9

ALL CNSC REGULATORY DOCUMENTS CAN BE FOUND ON THE CNSC WEBSITE: https://www.cnsc-ccsn.gc.ca

APPENDIX D – List of Licensee Documents Requiring Written Notification

Table D – List of licensee documents requiring written notification

Document #	Document Title	Notification Requirements	L.C.
GENERAL			
BP-PROG-03.01	Document Management	At Implementation	G.2
BP-PROC-00166	Management of Program, Procedure and Internal Standard Documents	At Implementation	G.2
NK37-DRAW-10200-10001	Site Facilities Plan of the Bruce Nuclear Power Development Lots 11 to 28 and Part of 29 and 30	Prior to Implementation	G.3
NK21-SR-01320-00001	Bruce A Safety Report Part 1: Plant and Site Description	Prior to Implementation	G.3
NK29-SR-01320-00001	Bruce B Safety Report Part 1: Plant and Site Description	Prior to Implementation	G.3
BP-PROG-09.02	Stakeholder Engagement	At Implementation	G.5
MANAGEMENT SYSTEM			
BP-MSM-1	Management System Manual	Prior to Implementation	1.1
BP-PROG-16.01	Conduct of Business	Prior to Implementation	1.1
BP-PROG-05.01	Supply Chain	At Implementation	1.1
BP-PROG-15.01	Compliance Internal Audit	At Implementation	1.1
BP-PROG-14.01	Project Management and Construction	At Implementation	1.1
BP-PROG-14.02	Contractor Management	At Implementation	1.1
BP-PROC-00001	Organization Structure Change	At Implementation	1.1
BP-PROG-17.01	Quality Assurance Program	Prior to Implementation	1.1
HUMAN PERFORMANCE MANAGEMENT			
BP-PROC-00005	Limits to Hours of Work	Prior to Implementation	2.1
BP-PROG-16.01	Conduct of Business	Prior to Implementation	2.1
BP-PROC-00610	Fitness For Duty	At Implementation	2.1
GRP-OPS-00055	Fitness for Duty Considerations for Shift Complement Staff Held Over for More than 13 Hours	At Implementation	2.1

Table D – List of licensee documents requiring written notification

Document #	Document Title	Notification Requirements	L.C.
BP-STND-00152	Bruce Power Shift Complement and Fitness for Duty Standard for any complement staff exceeding a 12-hour shift	Prior to Implementation	2.2
BP-PROG-02.01	Human Resources Management	At Implementation	2.1
BP-PROG-02.02	Worker Learning and Qualification	At Implementation	2.3
BP-PROC-01071	Systematic Approach to Training Process	Prior to Implementation	2.3
BP-STND-00153	Bruce Power Shift Operations Role Descriptions and Certification Maintenance Requirements for Licence Related Positions	Prior to Implementation	2.4
BP-STND-00092	Certification Training – Development and Administration of Comprehensive Written and Oral Examinations for Certification Training	Prior to Implementation	2.4
BP-STND-00038	Certification Training Examinations – Standards for Development and Administration of Closed Reference Multiple Choice Questions for Initial General Certification Written Examinations EG1	Prior to Implementation	2.4
BP-STND-00093	Certification Testing & Examinations - Development and Administration of Comprehensive Simulator-Based Examinations for INITIAL Certification Training Programs	At Implementation	2.4
BP-STND-00085	Certifications Training Examinations - Standards for Initial Certification Comprehensive Simulator-Based Examinations (CTS, DTS, PCTS)	At Implementation	2.4
OPERATING PERFORMANCE			
BP-OPP-00001	Operating Policies and Principles – Bruce B	Prior to Implementation	3.1
BP-OPP-00002	Operating Policies and Principles – Bruce A	Prior to Implementation	3.1
BP-OPP-00003	Operating Policies and Principles – Central Maintenance and Laundry Facility	Prior to Implementation	3.1
BP-PROG-12.01	Conduct of Plant Operations	At Implementation	3.1
NK21-OSR-31000-00001	Operational Safety Requirements for Bruce A Fuel and Reactor Physics	At Implementation	3.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK21-OSR-32000-00001	Operational Safety Requirements for Bruce A Moderator System	At Implementation	3.1
NK21-OSR-33100-00001	Bruce A NGS: Operational Safety Requirements for Heat Transport System	At Implementation	3.1
NK21-OSR-34110-00001	Operational Safety Requirements for Bruce A End Shield Cooling System	At Implementation	3.1
NK21-OSR-34200-00004	Operational Safety Requirements for Bruce A Containment System	At Implementation	3.1
NK21-OSR-34340-00003	Operational Safety Requirements for Bruce A Emergency Coolant Injection System	At Implementation	3.1
NK21-OSR-34360-00001	Operational Safety Requirements for Bruce A Powerhouse Emergency Venting System	At Implementation	3.1
NK21-OSR-34700-00001	Operational Safety Requirements for Bruce A Shutdown and Maintenance Cooling Systems	At Implementation	3.1
NK21-OSR-34980-00001	Operational Safety Requirements for Bruce A Annulus Gas System	At Implementation	3.1
NK21-OSR-35000-00001	Operational Safety Requirements for Bruce A Fuel Handling	At Implementation	3.1
NK21-OSR-36100-00001	Operational Safety Requirements for Bruce A Main Steam Supply System	At Implementation	3.1
NK21-OSR-38330/21175-00001	Operational Safety Requirements for Bruce A Confinement	At Implementation	3.1
NK21-OSR-43200-00001	Operational Safety Requirements for Bruce A Feedwater and Condensate System	At Implementation	3.1
NK21-OSR-53000/55000-00001	Operational Safety Requirements for Bruce A Electrical System	At Implementation	3.1
NK21-OSR-54400-00001	Operational Safety Requirements for Bruce A Qualified Power Supply System	At Implementation	3.1
NK21-OSR-60060-00001	Operational Safety Requirements for Bruce A Critical Safety Parameter Monitoring	At Implementation	3.1
NK21-OSR-63710-00001	Operational Safety Requirements for Bruce A Reactor Regulating System	At Implementation	3.1
NK21-OSR-63720-63730-00001	Operational Safety Requirements for Bruce A Shutdown Systems	At Implementation	3.1
NK21-OSR-71310-00001	Operational Safety Requirements for Bruce A Service Water Systems	At Implementation	3.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK21-OSR-71910-00001	Operational Safety Requirements for Bruce A Emergency Boiler Cooling System	At Implementation	3.1
NK29-OSR-31000-00001	Operational Safety Requirements for Bruce B Fuel and Reactor Physics	At Implementation	3.1
NK29-OSR-32000-00001	Operational Safety Requirements for Bruce B Moderator System	At Implementation	3.1
NK29-OSR-33000-00001	Operational Safety Requirements for Bruce B Heat Transport System	At Implementation	3.1
NK29-OSR-34110-00001	Operational Safety Requirements for Bruce B End Shield Cooling System	At Implementation	3.1
NK29-OSR-34200-00001	Operational Safety Requirements for Bruce B Containment System	At Implementation	3.1
NK29-OSR-34340-00001	Operational Safety Requirements for Bruce B Emergency Coolant Injection System	At Implementation	3.1
NK29-OSR-34360-00001	Operational Safety Requirements for Bruce B Powerhouse Emergency Venting System	At Implementation	3.1
NK29-OSR-34700-00001	Operational Safety Requirements for Bruce B Shutdown and Maintenance Cooling Systems	At Implementation	3.1
NK29-OSR-34980-00001	Operational Safety Requirements for Bruce B Annulus Gas System	At Implementation	3.1
NK29-OSR-35000-00001	Operational Safety Requirements for Bruce B Fuel Handling	At Implementation	3.1
NK29-OSR-36100-00001	Operational Safety Requirements for Bruce B Main Steam Supply System	At Implementation	3.1
NK29-OSR-38330-21190-00001	Operational Safety Requirements for Bruce B Confinement	At Implementation	3.1
NK29-OSR-43200-00001	Operational Safety Requirements for Bruce B Feedwater and Condensate System	At Implementation	3.1
NK29-OSR-53000/55000-00001	Operational Safety Requirements for Bruce B Electrical System	At Implementation	3.1
NK29-OSR-54300-00001	Operational Safety Requirements for Bruce B Emergency Power Supply System	At Implementation	3.1
NK29-OSR-60060-00001	Operational Safety Requirements for Bruce B Critical Safety Parameter Monitoring	At Implementation	3.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK29-OSR-63710-00001	Operational Safety Requirements for Bruce B Reactor Regulating System	At Implementation	3.1
NK29-OSR-63720-63730-00001	Operational Safety Requirements for Bruce B Shutdown Systems	At Implementation	3.1
NK29-OSR-71310-00001	Operational Safety Requirements for Bruce B Service Water Systems	At Implementation	3.1
NK29-OSR-71380-00001	Operational Safety Requirements for Bruce B Emergency Water System	At Implementation	3.1
NK37-CORR-00531-02784	Bruce Power Safeguards Site Plan 2015	At Implementation	3.1
BP-STND-00222	Station Transient Operations	Prior to Implementation	3.2
BP-PROC-01139	Operational Decision Making	At Implementation	3.2
DIV-ENG-00004	Engineering Evaluation	At Implementation	3.2
BP-PROG-06.01	Nuclear Regulatory Affairs	At Implementation	3.3
SAFETY ANALYSIS			
NK21-SR-01320-00002, Part 2	Bruce A Safety Report Part 2: Plant Components and Systems	Prior to Implementation	4.1
NK29-SR-01320-00001, Part 2	Bruce B Safety Report Part 2: Plant Components and Systems	Prior to Implementation	4.1
NK21-SR-01320-00003, Part 3	Bruce A Safety Report Part 3: Safety Analysis	Prior to Implementation	4.1
NK29-SR-01320-00002, Part 3	Bruce B Safety Report Part 3: Safety Analysis	Prior to Implementation	4.1
BP-PROC-00659	Severe Accident Management	At Implementation	4.1
PHYSICAL DESIGN			
BP-PROG-10.01	Configuration Management	Prior to Implementation	5.1
BP-PROC-01081	Engineering Change Control	At Implementation	5.1
BP-QMAN-00002	Pressure Boundary Quality Assurance (PBQA) Manual	At Implementation	5.2
B-LIST-01900-00001	Index to Pressure Boundary Program Elements (CSA N285.0-12 Table N.1)	At Implementation	5.2
DIV-ENG-00017	System and Item Classification	Prior to Implementation	5.2
DIV-ENG-00018	Design Registration and Reconciliation	At Implementation	5.2
BP-STND-00126	Environmental Qualification Program Requirements	At Implementation	5.3
FITNESS FOR SERVICE			
BP-PROG-11.04	Plant Maintenance	At Implementation	6.1
BP-PROG-11.01	Equipment Reliability	At Implementation	6.1

Table D – List of licensee documents requiring written notification

Document #	Document Title		Notification Requirements	L.C.
NK21-PIP-21100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)	Prior to Implementation	6.1
NK21-PIP-25100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS A Vacuum Building	Prior to Implementation	6.1
NK29-PIP-21100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Concrete Containment Structures and Appurtenances (Excluding Vacuum Building)	Prior to Implementation	6.1
NK29-PIP-25100-00001	N287.7	CSA N287.7-08 Periodic Inspection Program for Bruce NGS B Vacuum Building	Prior to Implementation	6.1
BP-PROC-00815	N287.7	Visual Inspection of Containment Boundary Components	Prior to Implementation	6.1
NK21-PIP-03641.2-00001	N285.4	Bruce A Periodic Inspection Plan Units 1, 2, 3 and 4	Prior to Implementation	6.1
NK29-PIP-03641.2-00001	N285.4	Bruce B Periodic Inspection Plan Units 5, 6, 7 and 8	Prior to Implementation	6.1
B-PIP-31100-00002	N285.4	Bruce Nuclear Generating Station Fuel Channel Periodic Inspection Program	Prior to Implementation	6.1
NK21-PIP-03642-00001	N285.5	Bruce A NGS N285.5 Periodic Inspection Plan for Unit 0 and Units 1 to 4 Containment Components	Prior to Implementation	6.1
NK29-PIP-03642-00001	N285.5	Bruce B Periodic Inspection Plan for Unit 0 and Units 5 to 8 Containment Components	Prior to Implementation	6.1
B-LCM-20000-00001	Life Cycle Management Plan for Safety Related Civil Structures		Prior to Implementation	6.1
B-LCM-31100-00001	Fuel Channel Life Cycle Management Plan		Prior to Implementation	6.1

Table D – List of licensee documents requiring written notification

Document #	Document Title	Notification Requirements	L.C.
B-PIP-33110-00001	Steam Generator and Preheater Periodic Inspection Plan	Prior to Implementation	6.1
B-PIP-33126-00001	PHT Feeder Piping Periodic Inspection Plan	Prior to Implementation	6.1
BP-PROG-11.02	On-Line Work Management Program	At Implementation	6.1
BP-PROG-11.03	Outage Work Management	At Implementation	6.1
BP-PROG-12.02	Chemistry Management	At Implementation	6.1
B-REP-31100-00010	Evaluation Process of Pressure Tube Fitness-for-Service Using CSA N285.8	Prior to Implementation	6.1
RADIATION PROTECTION			
BP-PROG-12.05	Radiation Protection Program	Prior to Implementation	7.1, 11.1
BP-RPP-00044	ALARA Program	At Implementation	7.1
BP-PROC-00280	Dosimetry Requirements	Prior to Implementation	7.1
BP-RPP-00009	Dose Limits and Exposure Control	Prior to Implementation	7.1
CONVENTIONAL HEALTH AND SAFETY			
BP-PROG-00.06	Health and Safety Management	At Implementation	8.1
ENVIRONMENTAL PROTECTION			
BP-PROG-00.02	Environmental Management	Prior to Implementation	9.1
NK21-REP-03482-00002	Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station A	Prior to Implementation	9.1
NK29-REP-03482-00003	Derived Release Limits and Environmental Action Levels for Bruce Nuclear Generating Station B	Prior to Implementation	9.1
NK37-REP-03482-00001	Derived Release Limits and Environmental Action Levels for Central Maintenance and Laundry Facility	Prior to Implementation	9.1
NK37-REP-03482-00002	Derived Release Limits and Environmental Action Levels for Central Storage Facility (CSF)	Prior to Implementation	9.1
BP-STND-00049	Radiological Emissions and Effluent Monitoring	Prior to Implementation	9.1
EMERGENCY MANAGEMENT AND FIRE PROTECTION			
BP-STND-00001	Bruce Power Nuclear Emergency Response Plan	Prior to Implementation	10.1

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
BP-PLAN-00005	Radioactive Material Transportation Emergency Response Plan	At Implementation	10.1
BP-PROG-08.01	Emergency Management and Fire Protection	At Implementation	10.1
BP-STND-00166	Fire Safety Management	At Implementation	10.2
BP-PLAN-00006	Conventional Emergency Plan	At Implementation	10.2
WASTE MANAGEMENT			
BP-PROG-12.03	Nuclear Fuel Management	At Implementation	11.1
BP-PROG-12.05	Radiation Protection Program	Prior to Implementation	7.1, 11.1
SECURITY			
BP-PROG-08.02	Nuclear Security	Prior to Implementation	12.1
BP-PROC-00784	Cyber Security	At Implementation	12.1
B-REP-08160-00001	Site Security Plan	Prior to Implementation	12.1
N/A	Tactical Response Plan	Prior to Implementation	12.1
SAFEGUARDS			
NK21-OM-35370	Safeguards Operating Manual (Bruce A) U0 F/H	At Implementation	13.1
NK29-OM-35370	Safeguards Operating Manual (Bruce B) U0 F/H	At Implementation	13.1
PACKAGING AND TRANSPORT			
BP-PROC-00188	Radioactive Material Transportation	At Implementation	14.1
NUCLEAR FACILITY-SPECIFIC			
BP-PROC-00324	Nuclear Criticality Safety Management	Prior to Implementation	15.9
BP-PROC-00003	Cobalt Handling	Prior to Implementation	15.10
BP-PROG-18.01	Irradiation Services	At Implementation	15.10
BP-PROC-01120	Management of Lutetium-177 Production	At Implementation	15.10
BP-PROC-00817	Management of Class II Nuclear Facilities	At Implementation	15.11
BP-PROC-00143	Leak Testing	At Implementation	15.11, 15.12

Table D – List of licensee documents requiring written notification			
Document #	Document Title	Notification Requirements	L.C.
NK29-CMP-67880-00001	Radiation Calibration Facility Safety Interlock Checks and Operation	At Implementation	15.11
NK29-DRAW-67880-10001	Radiation Calibration Facility General Arrangement Drawing	At Implementation	15.11
NK29-DRAW-67880-10003	Radiation Calibration Facility General Arrangement Drawing	At Implementation	15.11
B-LIST-67874-00001	Nuclear Substances and Prescribed Equipment List	Prior to Implementation	15.11, 15.12
BP-RPP-00043	Management of Nuclear Substances and Radiation Generating Equipment	At Implementation	15.12
NK21-CMP-67870-00002	Hopewell Designs BX-3-Box Calibrator Pre-Use Operational and Safety Interlock Checks	At Implementation	15.12
BP-PROC-00036	Conduct of Radiography	At Implementation	15.12
BP-PROC-00798	Radiography Emergency Procedures	At Implementation	15.12
B-LIST-67874-00002	Security Protected Nuclear Substances and Prescribed Equipment List	Prior to Implementation	15.12