FORM-14159 R000*

Periodic Safety Review - Final Document Review Traveler

Bruce Power

Bruce Power Document #:	Revision:	Information Classification	Usage Classification
NK21-SFR-09701-00010	R000	Internal Use Only	Information
Bruce Power Document Title: Safety Factor 10 – Organization and Administration			
Bruce Power Contract/Purchase Order: 00193829	Bruce Power Project #: 38180		
Supplier's Name: CANDESCO	Supplier Document #: K-421231-00020	Revision: R00	
Supplier Document Title: Safety Factor 10 – Organization and Administration			

Accepted for use at Bruce Power by:	**Signature:**	**Date**
Name: Frank Saunders Title: Vice President, NORA		20 AUG 2018

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*Associated with BP-PROC-01024, Periodic Safety Reviews

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Bruce Power Document #:	NK21-SFR-09701-00010	Rev #: R000	**Information Classification:** Internal Use Only	**Usage Classification:** Information
Bruce Power Document Title:	Safety Factor 10 – Organization and Administration	Suppliers Name:	CANDESCO	
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Division of Kinectrics Inc.

Title: Safety Factor 10 - Organization and Administration

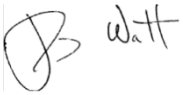
File: K-421231-00020-R00

NK21-SFR-09701-00010

A Report Submitted to Bruce Power

June 30, 2015

Issue R00D0	**Reason for Issue:** For first internal Candesco review				
	Author: T. Mellors Y. Dadashi S. McGee P. West	Verifier: Not Applicable	Reviewer: G. Archinoff T. Kapaklili	Approver: Not Applicable	Date: Dec 19, 2014
Issue R00D1	**Reason for Issue:** For harmonization, which incorporates internal Candesco review comments				
	Author: J. Sobolewski Y. Dadashi	Verifier:	Reviewer: G. Archinoff T. Kapaklili	Approver:	Date: Feb 9, 2015
Issue R00D2	**Reason for Issue:** For final internal Candesco review				
	Author: J. Sobolewski Y. Dadashi	Verifier:	Reviewer: G. Archinoff L. Watt	Approver:	Date: Mar 3, 2015
Issue R00D3	**Reason for Issue:** Issued to Bruce Power for review				
	Author: J. Sobolewski Y. Dadashi	Verifier: G. Buckley	Reviewer: G. Archinoff L. Watt	Approver:	Date: Mar 13, 2015

Issue R00D4	**Reason for Issue:** Incorporates changes from Bruce Power review				
	Author: J. Sobolewski Y. Dadashi	Verifier: G. Aldev	Reviewer: G. Archinoff L. Watt	Approver:	Date: June 19, 2015
Issue R00	**Reason for Issue:** For use				
	Author: J. Sobolewski  Y. Dadashi 	Verifier: G. Aldev  C. Stallman 	Reviewer: G. Archinoff  L. Watt 	Approver: L. Watt 	Date: June 30, 2015
Document Classification: Report			Security Classification: Client Proprietary		

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Acronyms and Abbreviations

AFI	Area for Improvement
ALARA	As Low As Reasonably Achievable
ANO	Authorized Nuclear Operator
A/R	Action Request
BP	Bruce Power
BPMS	Bruce Power Management System
CANDU	CANada Deuterium Uranium
CARB	Corrective Action Review Board
CFAM	Corporate Functional Area Manager
CM	Configuration Management
CMLF	Central Maintenance and Laundry Facility
CNS	Convention on Nuclear Safety
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DCR	Document Change Request
EA	Environmental Assessment
EFPH	Equivalent Full Power Hours
EMS	Environmental Management System
FASA	Focus Area Self-Assessment
GOSP	Governance, Oversight, Support, Perform model
HU	Human Performance
IAEA	International Atomic Energy Agency
INPO	Institute of Nuclear Power Operation
ISO	International Organization for Standardization
ISR	Integrated Safety Review
ITP	Inspection and Test Plan
LCH	Licence Conditions Handbook
LTEP	Long Term Energy Plan

MCR	Major Component Replacement
MSM	Management System Manual
NEI	Nuclear Energy Institute
NIEP	Nuclear Industry Evaluation Program
NORA	Nuclear Oversight and Regulatory Affairs
NPI	Nuclear Performance Index
NPP	Nuclear Power Plant
NSA	Nuclear Safety Assessment
NSAPI	Nuclear Safety Analysis and Program Integration
NSASD	Nuclear Safety Analysis and Support Department
NSCA	Nuclear Safety and Control Act
NSCMP	Nuclear Safety Culture Monitoring Panel
OEF	Operational Experience Feedback
OFI	Opportunities for Improvement
OPEX	Operating Experience
PE	Procurement Engineering
PEL	Program Element
PO&C	Performance Objectives and Criteria
PROL	Power Reactor Operating Licence
PSR	Periodic Safety Review
PWU	Power Workers Union
QA	Quality Assurance
RP	Radiation Protection
SBR	Safety Basis Report
SCA	Safety Control Area
SCR	Station Condition Record
SFR	Safety Factor Report
SLT	Senior Leadership Team
SOE	Safe Operating Envelope
SOFA	State of the Functional Area
SPHC	Station Plant Health Committee

TPO&C	Training Performance Objectives and Criteria
VMB	Visual Management Board
WANO	World Association of Nuclear Operators

1. Objective and Description

Bruce Power (BP), as an essential part of its operating strategy, is planning to continue operation of Units 3 and 4 as part of its contribution to the Long Term Energy Plan (LTEP) (http://www.energy.gov.on.ca/en/ltep/). Bruce Power has developed plant life integration management plans in support of operation to 247,000 Equivalent Full Power Hours (EFPH). A more intensive Asset Management program is under development, which includes a Major Component Replacement (MCR) approach to replace pressure tubes, feeders and steam generators, so that the units are maintained in a fit for service state over their lifetime. However, due to the unusually long outage and de-fuelled state during pressure tube replacement, there is an opportunity to conduct other work, and some component replacements that could not be done reasonably in a maintenance outage will be scheduled concurrently.

To support the definition and timing of practicable opportunities for enhancing the safety of Units 3 and 4, and the ongoing operation of Units 1 and 2, which have already been refurbished, Bruce Power is conducting a station-wide review of safety for Units 0A and 1-4, to be termed an Integrated Safety Review (ISR) [1]. This ISR supersedes the Bruce A portion of the interim Periodic Safety Review (PSR) that was conducted for the ongoing operation of the Bruce A and B units until 2019 [2]. This ISR is conducted in accordance with the Bruce A ISR Basis Document [1], which states that the ISR will meet or exceed the international guidelines given in International Atomic Energy Agency (IAEA) Guide SSG-25, Periodic Safety Review for Nuclear Power Plants [3]. The ISR envelops the guidelines in Canadian Nuclear Safety Commission (CNSC) Regulatory Document RD-360 [4], Life Extension for Nuclear Power Plants, with the exception of those related to the Environmental Assessment (EA), which has already been completed for Bruce A [5].[1]

1.1. Objective

The overall objective of the Bruce A ISR is to conduct a review of Bruce A against modern codes and standards and international safety expectations and provide input to a practicable set of improvements to be conducted during the Major Component Replacement in Units 3 and 4, and during asset management activities to support ongoing operation of all four units, including U0A, that will enhance safety to support long term operation. The look-ahead period will be longer than that in the interim PSR performed for Units 1-8 [2]. It will cover a 10-year period, since there is an expectation that a PSR will be performed on approximately a 10-year cycle, given that all units are expected to be operated well into the future. Nuclear Safety is a primary consideration for Bruce Power and the management system must support the enhancement

[1] RD-360 [4] was superseded by CNSC REGDOC-2.3.3 [6] in April 2015. CNSC REGDOC-2.3.3 was in draft at the time that the ISR Basis Document [1] was prepared. The draft version of CNSC REGDOC-2.3.3 stated that it was consistent with IAEA SSG-25, and the assessments in the Safety Factor Reports were performed on that basis. The issued version of CNSC REGDOC-2.3.3 also states that it is consistent with IAEA SSG-25, and therefore it is considered that the ISR envelops the guidelines in CNSC REGDOC-2.3.3.

and improvement of safety culture and the achievement of high levels of safety, as well as reliable and economic performance.

The specific objective of the review of this Safety Factor is to determine whether the organization and administration are adequate for the safe operation of the nuclear power plant.

1.2. Description

The review is conducted in accordance with the Bruce A ISR Basis Document [1], which states that the review tasks are as follows:

1. The review of the organization and management system will include a review of the following elements or programs against national and international standards:
    a. Policy statements of the operating organization;
    b. The documentation of the management system;
    c. The adequacy of arrangements for managing and retaining responsibility for activities or processes important to safety that have been outsourced (for example, maintenance and engineering services and safety analysis);
    d. The roles and responsibilities of individuals managing, performing and assessing work; and
    e. The processes and supporting information that explain how work is to be specified, prepared, reviewed, performed, recorded, assessed and improved.
2. In addition, the review of the organization and management system will verify the following:
    a. There are adequate processes in place for managing organizational change;
    b. There is a human resource management process in place that ensures the availability of adequate, qualified human resources, including succession planning;
    c. There is adequate control of documents, products and records and this information is readily retrievable;
    d. There is adequate control of purchasing of equipment and services where this affects plant safety;
    e. There are adequate processes in place to check the quality of suppliers' management systems that are intended to ensure that equipment and services supplied to the nuclear power plant are fit for purpose and provided in an effective and efficient manner;
    f. There are adequate communication policies in place;
    g. There are adequate facilities for training and training programs are well structured;
    h. There are formal arrangements in place for employing suitably qualified internal and external technical, maintenance or other specialized staff;
    i. There are adequate processes in place for feedback of operating experience to the staff, including experience relating to organizational and management failures;
    j. There are suitable arrangements in place for maintaining the configuration of the

nuclear power plant and operations are carried out in accordance with the safety analysis of the plant; and

k. There are programs in place for ensuring continuous improvement, including self-assessment and independent assessment.

3. The review of the safety culture will include the following:

   a. A review of the safety policy to verify that it states that safety takes precedence over production and to confirm that this policy is effectively implemented;
   b. A review of procedures to ensure that nuclear and radiation safety are properly controlled and that appropriate measures are applied consistently and conscientiously by all staff;
   c. An assessment of the extent to which a questioning attitude exists and conservative decision making is undertaken in the organization;
   d. Verification that there is a strong drive to ensure that all events that may be instructive are reported and investigated to discover root causes and that timely feedback is provided to appropriate staff on findings and remedial actions;
   e. Verification that unsafe acts and conditions are identified and challenged in a constructive manner wherever and whenever they are encountered by plant employees and external staff (contractors);
   f. Verification that the organization has a learning culture and that it strives continuously for improvements and new ideas, and benchmarks against and searches out best practices and new technologies;
   g. Verification that there is an established and effective process for communication of safety issues;
   h. Verification that there is a process in place for prioritization of safety issues, with realistic objectives and timescales, that ensures that these issues receive proper resources;
   i. Verification that there is a method in place for achieving and maintaining clarity of the organizational structure and managing changes in accountability for matters affecting safety; and
   j. Verification that there is adequate training in safety culture, particularly for managers.

2. Methodology of Review

As discussed in the Bruce A ISR Basis Document [1], the methodology for an ISR should include making use of safety reviews that have already been performed for other reasons. Accordingly, the Bruce A ISR makes use of previous reviews that were conducted for the following purposes:

- Return to service of Bruce Units 3 and 4 (circa 2001) [7];
- Life extension of Bruce Units 1 and 2 (circa 2006) [8] [9];
- Proposed refurbishments of Bruce Units 3 and 4 (circa 2008) [10] [11] [12]; and

- Safety Basis Report (SBR) and Periodic Safety Review (PSR) for Bruce Units 1 to 8 (2013) [2].

These reviews covered many, if not all, of the same Safety Factors that are reviewed in the current ISR. A full chronology of Bruce Power safety reviews is provided in Appendix F of [13].

The Bruce A ISR Safety Factor review process comprises the following steps:

1. **Interpret and confirm review tasks:** As a first step in the Safety Factor review, the Safety Factor Report author(s) confirm the review tasks identified in the ISR Basis and repeated in Section 1.2 to ensure a common understanding of the intent and scope of each task. In some cases, this may lead to elaboration of the review tasks to ensure that the focus is precise and specific. Any changes to the review tasks are identified in Section 5 of the Safety Factor Report (SFR) and a rationale provided.
2. **Confirm the codes and standards to be considered for assessment:** The Safety Factor Report author(s) validates the list of codes and standards presented in the ISR Basis Document against the defined review tasks to ensure that the assessment of each standard will yield sufficient information to complete the review tasks. Additional codes and standards are added if deemed necessary. If no standard can be found that covers the review task, the assessor may have to identify criteria on which the assessment of the review task will be based. The final list of codes and standards considered for this Safety Factor is provided in Section 3.
3. **Determine the type and scope of assessment to be performed:** This step involves confirming or modifying the assessment type for each of the codes and standards and guidance documents identified for consideration. The ISR Basis Document provides an initial assignment for the assessment type, selecting one of the following review types:
    - Programmatic Clause-by-Clause Assessments;
    - Plant Clause-by-Clause Assessments;
    - High-Level Programmatic Assessments;
    - High-Level Plant Assessments;
    - Code-to-Code Assessments; or
    - Confirm Validity of Previous Assessment.

    The final assessment types are identified in Section 3, along with the rationale for any changes relative to the assignment types listed in the ISR Basis Document.
4. **Perform gap assessment against codes and standards:** This step comprises the actual assessment of the Bruce Power programs and the Bruce A plant against the identified codes and standards. In general, this involves determining from available design or programmatic documentation whether the plant's design or programs meet the provisions of the specific clause of the standard or of some other criterion, such as a summary of related clauses. Each individual deviation from the provisions of codes and standards is referred to as a Safety Factor "micro-gap". The assessments, performed in Appendix A and Appendix

B, include assessor's arguments conveying reasons why the clause is considered to be met or not met, while citing appropriate references that support this contention.

5. **Assess alignment with the provisions of the review tasks:** The results of the gap assessment against codes and standards are interpreted in the context of the review tasks of the Safety Factor. To this end, each assessment, whether clause-by-clause, high-level or code-to-code, is assigned to one or more of the review tasks (Section 5). Assessment against the provision of the review task involves formulating a summary assessment of the degree to which the plant or program meets the objective and provisions of the particular review task. This assessment may involve consolidation and interpretation of the various compliance assessments to arrive at a single compliance indicator for the objective of the review task as a whole.
6. **Perform program assessments:** The most pertinent self-assessments, audits and regulatory evaluations are assessed, and performance indicators relevant to the Safety Factor identified. The former illustrates that Bruce Power has a comprehensive process of reviewing compliance with Bruce Power processes, identifying gaps, committing to corrective actions, and following up to confirm completion and effectiveness of these actions. The latter demonstrates that there is a metric by which Bruce Power assesses the effectiveness of the programs relevant to the Safety Factor in Section 7. Taken as a whole, these provide a cross section, intended to demonstrate that the processes associated with this Safety Factor are implemented effectively (individual findings notwithstanding). Thus, program effectiveness, if not demonstrated explicitly in the review task assessments in Step 5, can be inferred if Step 5 shows that Bruce Power processes meet the Safety Factor requirements and if this step shows there are ongoing processes to ensure compliance with Bruce Power processes.
7. **Identification of findings:** This step involves the consolidation of the findings of the assessment against codes and standards and the results of executing the review tasks into a number of definitive statements regarding positive and negative findings of the assessment of the Safety Factor. Positive findings or strengths are only identified if there is clear evidence that the Bruce A plant or programs exceed compliance with the provision of codes and standards or review task objectives. Each individual negative finding or deviation is designated as a Safety Factor micro-gap for tracking purposes. Identical or similar micro-gaps are consolidated into comprehensive statements that describe the deviation known as Safety Factor macro-gaps, which are listed in Section 8 of the Safety Factor Reports, as applicable.

3. Applicable Codes and Standards

This section lists the applicable regulatory requirements, codes and standards considered in the review of this Safety Factor. The list also includes any new codes or standards that came into effect after the completion of the 2013 PSR, as well as those that supersede codes or standards previously assessed. Regulatory codes and standards issued after the code effective date of August 31, 2014 were not part of the detailed review.

3.1. Acts and Regulations

The *Nuclear Safety and Control Act* (NSCA) [14] establishes the Canadian Nuclear Safety Commission and its authority to regulate nuclear activities in Canada. The NSCA has been amended on July 3, 2013 to provide the CNSC with the authority to establish an administrative monetary penalty system. The Administrative Monetary Penalties Regulations were introduced in 2013, and set out the list of violations that are subject to administrative monetary penalties, as well as the method and criteria for penalties administration. However, these changes do not impact this Safety Factor. Furthermore, following the Fukushima nuclear events of March 2011, the Fukushima Omnibus Amendment Project was undertaken and completed in 2012, and resulted in amendments to regulatory documents to reflect lessons learned from these events. Bruce Power has a process to ensure compliance with the NSCA [14] and its Regulations. Therefore, the NSCA and Regulations were not considered further in this review.

3.2. Power Reactor Operating Licence

The list of codes and standards related to organization and administration that are referenced in the Bruce Power Reactor Operating Licence (PROL) [15] and Licence Conditions Handbook (LCH) [16] noted in Table C-1 of the ISR Basis document [1] are identified in Table 1.[2] The edition dates referenced in the third column of the table are the modern versions used for comparison.

The following licence conditions are applicable to Organization and Administration:

- Licence Condition 1.4: Management System Requirements;
- Licence Condition 1.5: Bruce Power's Management System Manual – Process Changes (including Table 1: List of Level 2 Processes [15]);
- Licence Condition 1.7: S-99: Reporting Requirements for Operating Nuclear Power Plants;
- Licence Condition 2.1: Minimum Shift Complement; and
- Licence Condition 2.2: Control Room Staffing.

[2] PROL 18.00/2020 [17] and LCH-BNGS-R000 [18] came into effect on June 1, 2015. However, PROL 15.00/2015 [15] and LCH-BNGSA-R8 [15] are the versions referred to in this ISR, as these were in force when the assessments in the Safety Factor Reports were performed.

Table 1: Codes, Standards, and Regulatory Documents Referenced in Bruce A PROL and LCH

Document Number	Document Title	Modern Version Used for ISR Comparison	Type of Review
CNSC S-99	Reporting Requirements for Operating Nuclear Power Plants	CNSC REGDOC-3.1.1 [19]	NR
CNSC RD-204 (2008)	Certification of Persons Working at Nuclear Power Plants	CNSC RD-204 (2008) [20]	NR
CNSC S-210 (2006)	Maintenance Programs for Nuclear Power Plants	CNSC RD/GD-210 (2012) [21]	NR
CNSC G-323 (2007)	Ensuring the Presence of Sufficient Qualified Staff at Class I Nuclear Facilities – Minimum Staff Complement	CNSC G-323 (2007) [22]	NR
CNSC RD-360	Life Extension of Nuclear Power Plants	CNSC RD-360 [4]	NR
CNSC Internal Guide, 2010/08	CNSC Expectations for Licensee Hours of Work Limits - Objectives and Criteria	2010/08	NR
CNSC Internal Guide, 2009/05	Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants	2009/05	NR
Examination Guide EG-1 (2005/07)	Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants	Examination Guide EG-1 (2005/07)	NR
Examination Guide EG-2 (2004/06)	Requirements and Guidelines for Simulator-Based Certification Examinations for Shift Personnel at Nuclear Power Plants	Examination Guide EG-2 (2004/06)	NR

Document Number	Document Title	Modern Version Used for ISR Comparison	Type of Review
CSA N286-05 [23]	Management System Requirements for Nuclear Power Plants	CSA N286-12 [24]	NR
Assessment type: Clause-by-Clause (CBC); Code-to-Code (CTC); High Level (HL); No Assessment Required (NR); Confirm Validity of Previous Assessments (CV)			

CNSC REGDOC-3.1.1: Table C-1 of the ISR Basis Document [1] calls for a code-to-code assessment of CNSC REGDOC-3.1.1 to CNSC S-99. CNSC S-99 (2003) [25], "Reporting Requirements for Operating Nuclear Power Plants", was included in PROL 15.00/2015 and was the basis document the CNSC used to assess past refurbishments at Bruce A, as Bruce Power has had an obligation to meet this Regulatory Document since before 2008. CNSC REGDOC-3.1.1 [19], Reporting Requirements for Nuclear Power Plants, which replaced S-99 [25] in May 2014, is listed as condition 1.7 in PROL 18.00/2020 [17] and sets reporting requirements for nuclear power plants. Bruce Power switched over to CNSC REGDOC-3.1.1 at the beginning of 2015[3], as committed in a letter submitted to the CNSC [26]. Line-by-line compliance with this regulatory document is verified on an ongoing basis to ensure compliance with the PROL, and therefore it was not assessed as part of this Safety Factor.

CNSC RD-204: CNSC RD-204 [20] defines requirements regarding certification of persons who work at Canadian Nuclear Power Plants (NPPs) in positions that have a direct impact on nuclear safety. The document specifies the requirements to be met by persons working, or seeking to work, in positions where certification by the Canadian Nuclear Safety Commission is required. It specifies the requirements regarding the programs and processes supporting certification of the workers that NPP licensees must implement to train and examine persons seeking or holding a certification delivered by the CNSC. CNSC RD-204 remains part of the licence and has not been revised, and therefore has not been assessed as a part of this ISR.

CNSC RD/GD-210: Regulatory document RD/GD-210 [21], Maintenance Programs for Nuclear Power Plants, sets out the requirements of the CNSC with regard to maintenance programs for nuclear power plants. It specifies that a maintenance program consists of policies, processes and procedures that provide direction for maintaining Structures, Systems and Components (SSCs) of the plant. RD/GD-210 [21] replaces regulatory standard S-210 (published in 2007). RD/GD-210 will be listed in the PROL and line-by-line compliance with this regulatory document is verified on an ongoing basis to ensure compliance with the PROL. Therefore, assessment of RD/GD-210 is not included in this ISR.

[3]Reporting is performed under S-99 up to the end of 2014, and under CNSC REGDOC-3.1.1 for periods thereafter.

CNSC G-323: Table C-1 of the ISR Basis Document [1] calls for the confirmation of validity of the CNSC guidance document G-323 [22]. CNSC G-323 ensures the presence of sufficient qualified staff at Class I Nuclear Facilities – minimum staff complement has not been updated since its previous consideration in 2008. This is addressed in Safety Factor 12.

CNSC RD-360: This ISR is being conducted as part of ongoing operation for Units 1 and 2 and to support Major Component Replacement of Units 3 and 4, so it also envelops the guidelines in RD-360, Life Extension for Nuclear Power Plants, issued February 2008. Therefore, RD-360 [4] *de facto* continues to provide guidance on how this review should be conducted. However, RD-360 [4] was superseded by CNSC REGDOC-2.3.3 [6] in April 2015, which was in draft at the time that the ISR Basis Document [1] was prepared. The draft version of CNSC REGDOC-2.3.3 stated that it was consistent with SSG-25, and the assessments in the Safety Factor Reports were performed on that basis. The issued version of CNSC REGDOC-2.3.3 also states that it is consistent with SSG-25, and therefore it is considered that the ISR envelops the guidelines in CNSC REGDOC-2.3.3.

CNSC Internal Guidance: Table C-1 of the ISR Basis Document [1] identifies CNSC internal Guidance regarding the "CNSC Expectation for Licensee Hours of Work Limits – Objectives and Criteria" and "Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants". The ISR Basis Document states that these internal guidance documents will not be assessed as a part of this ISR.

CNSC Examination Guide EG-1: Table C-1 of the ISR Basis Document [1] identifies Examination Guide EG-1, "Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants". The ISR Basis Document states that EG-1 will not be assessed as a part of this ISR.

CNSC Examination Guide EG-2: Table C-1 of the ISR Basis Document [1] identifies Examination Guide EG-1, "Requirements and Guidelines for Simulator-Based Certification Examinations for Shift Personnel at Nuclear Power Plants". The ISR Basis Document states that EG-2 will not be assessed as a part of this ISR.

CSA N286-12: Canadian Standards Association (CSA) standard CSA N286-05. CNSC staff have stated that in their view the CSA N286-12 version of CSA N286 "does not represent a fundamental change to the current Bruce Power Management System" and have acknowledged that "the new requirements in CSA N286-12 are already addressed in Bruce Power's program and procedure documentation" [30].

Bruce Power had agreed to perform a Gap Analysis and to prepare a detailed Transition Plan, and to subsequently implement the necessary changes in moving from the CSA N286-05 version of the code to the CSA N286-12 version, during the next licensing period [31]. This timeframe will facilitate the implementation of N286 changes to the management system, and enable the gap analysis results from the large number of new or revised Regulatory Documents or Standards committed in the 2015 operating licence renewal. Bruce Power has also proposed that in the interim, CSA N286-05 be retained in the PROL to enable it to plan the transition to CSA N286-12, and committed to develop the transition plan and communicate the plan to the CNSC by January 30, 2016 [32]. Bruce Power further stated CSA N286-12 does not establish any significant or immediate new safety requirements that would merit a more accelerated

implementation. This Safety Factor therefore has not performed a code-to-code assessment between CSA N286-05 and CSA N286-12 and will not be performing a clause-by-clause assessment of CSA N286-05, since it is in the current licence.

3.3. Regulatory Documents

The Regulatory Document in Table 2 was considered for application to review tasks of this Safety Factor.

Table 2: Regulatory Documents

Document Number	Document Title	Reference	Type of Review
CNSC REGDOC-2.2.2 (2014)	Personnel Training	[33]	NR
Assessment type: Clause-by-Clause (CBC); Code-to-Code (CTC); High Level (HL); No Assessment Required (NR); Confirm Validity of Previous Assessments (CV)			

CNSC REGDOC-2.2.2: Table C-1 of the ISR Basis document [1] calls for a clause-by-clause assessment of CNSC REGDOC-2.2.2 [33]. CNSC REGDOC-2.2.2 sets out the CNSC's requirements for the development of a training system at nuclear facilities, and provides guidance on how these requirements should be met. The majority of CNSC REGDOC-2.2.2 is applicable to Safety Factor 12, and as such is assessed in that Safety Factor.

3.4. CSA Standards

There were no additional CSA standards identified in Table C-1 of the ISR Basis document [1] considered for application to review tasks of this Safety Factor beyond those identified in the PROL [15] and LCH [16].

3.5. International Standards

As applicable, international guidance considered for application to review tasks of this Safety Factor are included in Table 3.

Table 3: International Standards

Document Number	Document Title	Reference	Type of Review
IAEA SSG-25 (2013)	Periodic Safety Review for Nuclear Power Plants	[3]	NR
IAEA SSR-2/2 (2011)	Safety of Nuclear Power Plants: Commissioning and Operation Specific Safety Requirements	[34]	CBC
Assessment type: Clause-by-Clause (CBC); Code-to-Code (CTC); High Level (HL); No Assessment Required (NR); Confirm Validity of Previous Assessments (CV)			

IAEA SSG-25: IAEA SSG-25 [3] addresses the periodic safety review of nuclear power plants and is the governing document for the review of the ISR, as identified in the Bruce A ISR Basis Document [1]. It defines the review tasks that should be considered for this Safety Factor. However, no assessment is performed specifically on IAEA SSG-25.

IAEA SSR-2/2: Table C-1 of the ISR Basis document [1] calls for a clause-by-clause assessment of IAEA SSR-2/2 [34] as part of the review performed for Safety Factor 11, but does not explicitly cite it for Safety Factor 10. The code describes the requirements to ensure the safe operation of nuclear power plants including commissioning. Recent developments in areas, such as long term operation, plant ageing, periodic safety review, probabilistic safety analysis and risk informed decision making processes required revisions to this IAEA Safety Standards Series to correct and/or improve the publication and apply, the safety objective and safety principles that are established in the Fundamental Safety Principles. The results of the clause-by-clause assessment of IAEA SSR-2/2 in Safety Factor 11 are applied in the assessment of the review tasks in the current Safety Factor Report.

3.6. Other Applicable Codes and Standards

The codes and standards discussed in the previous sub-sections have been determined to be sufficient for the completion of the review tasks of this Safety Factor. Accordingly, additional codes and standards are not considered in this Safety Factor Report.

4. Overview of Applicable Bruce A Station Programs and Processes

Section 4.1 provides an overview of Bruce Power programs, procedures, and practices related to this Safety Factor.

4.1. Key Implementing Documents

CSA N286-05 identifies specific requirements that must be met relating to the Management System of a nuclear power plant, including specific requirements for design, purchasing, commissioning, construction, operation and decommissioning. The key Bruce Power documents related to implementation of the Organization and Administration elements are indicated in Table 4.[4]

Table 4: Key Implementing Documents

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
BP-MSM-1: Management System Manual [35] BP-MSM-1 Sheet 0001: MSM – Bruce Power Program Matrix [36] BP-MSM-1 Sheet 0002: MSM - Approved Reference Chart Authorities and Responsibilities [37] BP-MSM-1 Sheet 0003: MSM - List of Applicable Governing Acts,	BP-OPP-00002: Operating Policies and Principles – Bruce A [40]		
	BP-PROG-00.02: Environmental Safety Management [41]		
	BP-PROG-00.04: Pressure Boundary Quality Assurance Program [42]		
	BP-PROG-00.07: Human Performance Program [43]	BP-PROC-00794: Monitoring Human Performance [44]	

[4] Table 4 lists the key governance documents used to support the assessments of the review tasks for this Safety Factor Report. There is a continual process to update the governance documents; document versions may differ amongst individual Safety Factor Reports depending on the actual assessment review date. A full set of current sub-tier documents is provided within each current PROG document.

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
Regulations, Codes & Standards [38] BP-MSM-1 Sheet 0004: MSM - Program Summaries [39]		BP-PROC-00617: Human Performance Tools for Workers [45]	
		BP-PROC-00795: Human Performance Tools for Knowledge Workers [46]	
	BP-PROG-01.01: Business Plan Management [47]	BP-PROC-00162: Business Risk Management – Business Risk Register [48]	
	BP-PROG-01.02: Bruce Power Management System (BPMS) Management [49]	BP-PROC-00016: Business Assessment Process [50]	
		BP-PROC-00166: General Procedure and Process Requirements [51]	
		BP-PROC-00703: Change Management Guidance [52]	BP-PROC-00001: Organizational Structural Change [53]
		BP-PROC-00774: Program Requirements [54]	BP-PROC-00788: Manage Process Change [55]
		B-HBK-08130-00001: GOSP Implementation Handbook [56]	
	BP-PROG-01.04: Leadership Talent Management [57]	BP-PROC-00221: Succession Management [58]	

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
	BP-PROG-01.06: Operating Experience Program [59]	BP-PROC-00062: Processing External and Internal Operating Experience [60]	
		BP-PROC-00137: Focus Area Self-Assessment [61]	
		BP-PROC-00147: Benchmarking and Conference Activities [62]	
		BP-PROC-00892: Nuclear Safety Culture Monitoring [63]	
	BP-PROG-01.07: Corrective Action [64]	BP-PROC-00059: Event Response and Reporting [65]	
		BP-PROC-00019: Action Tracking [66]	
		BP-PROC-00060: Station Condition Record Process [67]	
		BP-PROC-00518: Root Cause Investigations [68]	
		BP-PROC-00519: Apparent Cause Evaluation [69]	

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
	BP-PROG-02.01: Worker Staffing [70]	BP-PROC-00355: Hiring Process (Contractors) [71]	
		BP-PROC-00468: Workforce Planning Process [72]	
	BP-PROG-02.02: Worker Learning and Qualification [73]	SEC-SIMM-00001: Simulator Validation [74]	
		SEC-SIMM-00002: Simulator Change Control [75]	
		SEC-CST-00001: General Field Guidelines at Bruce Learning Centre Fire Training Area [76]	
		Certification Training Handbook B-HBK-09510-00005 [77]	
	BP-PROG-02.04: Worker Development and Performance Management [78]		
	BP-PROG-02.06: Worker/Labour Relations [79]		
	BP-PROG-02.07: Employee Communications [80]	BP-PROC-00868: Employee Communications Processes, Vehicles and Standards [81]	

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
	BP-PROG-03.01: Document Management [82]	BP-PROC-00098: Records Management [83]	BP-PROC-00068: Controlled Document Life Cycle Management [84]
	BP-PROG-05.01: Supply Chain [85]	BP-PROC-00041: Contract Management [86]	
		BP-PROC-00854: Quality Oversight [87]	BP-PROC-00753: Supplier Audits [88]
	BP-PROG-06.03: CNSC Interface Management [89]		
	BP-PROG-07.04: Scheduling and Dispatch of Plant[5]	BP-PROC-00013: Generation Communication [90]	
	BP-PROG-08.01: Emergency Management Program [91]		
	BP-PROG-09.02: Stakeholder Interaction [92]		

[5] BP-PROG-07.04 is confidential and has only been listed here for information.

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
	BP-PROG-10.01: Plant Design Basis Management [93]	BP-PROC-00363: Nuclear Safety Assessment [94]	DPT-NSAS-00003: Guidelines for Evaluating and Prioritizing Safety Report Issues [95] DPT-NSAS-00008: Management of External Work for Nuclear Safety Analysis and Support [96] DPT-NSAS-00011: Configuration Management of Safety Analysis Software [97], DPT-NSAS-00012: Preparation and Maintenance of Operational Safety Requirements [98], DPT-NSAS-00015: Planning and Execution of Nuclear Safety Assessments [99], and DPT-NSAS-00016: Integrated Aging Management for Safety Assessment [100]
		BP-PROC-00335: Design Management [101]	DPT-PDE-00008: Interface with Design Contractors Performing Design Activities for Bruce Power [102]

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
		BP-PROC-00582: Engineering Fundamentals [103]	
		DIV-ENG-00009: Design Authority [104]	
		DIV-ENG-00004: Engineering Evaluations [105]	
	BP-PROG-10.02: Engineering Change Control [106]	BP-PROC-00539: Design Change Package [107]	
		BP-PROC-00542: Configuration Information Change [108]	
	BP-PROG-10.03: Configuration Management [109]	BP-PROC-00786: Margin Management [110]	
	BP-PROG-11.01: Equipment Reliability [111]	BP-PROC-00782: Equipment Reliability Problem Identification and Resolution [112]	BP-PROC-00559: Station Plant Health Committee [113]
		BP-PROC-00779 Continuing Equipment Reliability Improvement [114]	BP-PROC-00498 Condition Assessment of Generating Units in Support of Life Extension [115]
	BP-PROG-11.02: On-Line Work Management [116]		

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
	BP-PROG-11.03: Outage Work Management [117]		
	BP-PROG-11.04: Plant Maintenance [118]	BP-PROC-00696: Maintenance Organization [119]	BP-PROC-00580: Maintenance Fundamentals [120]
	BP-PROG-12.01: Conduct of Plant Operations [121]	BP-PROC-00561: Operator Fundamentals [122]	
		DIV-OPA-00001: Station Shift Complement – Bruce A [123]	
		GRP-OPS-00038: Bruce A and B Operations Standards and Expectations [124]	GRP-OPS-00030: Operational Decision Making [125]
	BP-PROG-12.05: Radiation Protection Program [126]	BP-RPP-00001: Radiation Protection Policies and Principles [127]	
	BP-PROG-14.02: Contractor Management [128]	BP-PROC-00547: Management of Contractors [129]	
	BP-PROG-15.01: Nuclear Oversight Management [130]	BP-PROC-00295: Audit Basis and Approach [131]	

First Tier Documents	Second Tier Documents	Third Tier Documents	Fourth Tier Documents
		BP-PROC-00136: Plant Operational Review Committee[6] [132]	

BP-MSM-1, Management System Manual [35], defines and documents Bruce Power's Management System.

The Management System Manual [35] contains the company's vision, mission, values, behaviours, policies, key results areas, summary of the Board structure and a statement of commitment from the Chief Executive to the management system. It includes Sheets covering a summary of the complete list of Programs, a listing of Program owners and approvers, as well as functional area (process) groupings, the responsibilities and authorities of all section managers and above positions at Bruce Power and a summary of regulatory, legal and business requirements. The sheets include:

- BP-MSM-1 Sheet 0001 [36], MSM - Bruce Power Program Matrix;
- BP-MSM-1 Sheet 0002 [37], MSM - Approved Reference Chart Authorities and Responsibilities;
- BP-MSM-1 Sheet 0003 [38], MSM - List of Applicable Governing Acts, Regulations, Codes & Standards; and
- BP-MSM-1 Sheet 0004 [39], MSM - Program Summaries.

The BP-MSM-1 provides a high level description of the way the business is managed including the leadership direction defining how it is integrated. Nuclear safety is a primary consideration and the BPMS supports the enhancement and improvement of safety culture and the achievement of high levels of safety as well as business performance, and is designed to ensure the leadership team can consistently deliver expected results and satisfy its stakeholders, such as the regulator, the public, its shareholders and employees. It ensures that Bruce Power meets the stipulations of its operating licences, other applicable codes, standards, legal and business requirements.

The BPMS covers six components and applies to the entire business at all locations managed by the organization. The components which form the basis of the structure are:

- Strategic Direction;
- Plan - Policy, Program and Process Controls;
- Do - Process Management;

[6] BP-PROC-00136 Section 5.2 does not identify the PROG where it takes its authority. This gap is identified as SF10-4 in Table 10.

- Check - Monitoring for Results;
- Act - Continuous Learning; and
- Leadership and Organizational Accountability.

Nuclear Safety at Bruce Power is based on the following four pillars of: reactor safety; industrial safety; radiological safety; and environmental safety. These are referred to and covered in different programs and procedures.

4.1.1. Environment – Environmental Safety Management

BP-PROG-00.02 [41], Environmental Safety Management Program provides the overall framework to manage the environmental aspects of the Station operations, consistent with its Management System Manual, safety, environment, quality, economic and other requirements putting safety as the overriding priority.

The Bruce Power Environmental Safety Management Program is structured to address the Environmental Management System (EMS) requirements of the International Organization for Standardization (ISO) 14001 standard. The Program defines the requirements and elements of environmental protection and oversees the planning, implementation and control of activities to minimize potential adverse impacts of operations on the natural environment. It conforms to S-296, CSA N286-05 clauses 6.28 and 6.29, as well as ISO 14001. Programs, processes, and procedures, at a minimum, assure compliance with regulatory and statutory requirements and facilitate continual improvement in environmental performance, and provide a system-based approach to managing environmental aspects.

4.1.2. BPMS – Bruce Power Management System (BPMS) Management

BP-PROG-01.02 [49], the Bruce Power Management System (BPMS) Management Program coordinating the business framework needed to satisfy corporate governance and licence requirements at a level and to an extent that will ensure commitment to reactor safety, radiological safety, industrial safety and environmental safety. It implements the management system and it controls changes to the interdependent processes, organization and document structures that are essential to managing business. BP-PROG-01.02 establishes the governance, provides oversight, support and enables the maintenance of an integrated management system framework for Bruce Power and establishes the framework for the planning, implementation, maintenance, and continual improvement of business processes, activities, and human behaviors which contribute to the achievement of Bruce Power's objectives. This Program supports the implementation of the BPMS in such a way that it is known, understood and followed. The BPMS serves as the overall quality assurance program, which complies with CSA N286 the standard required by the PROL. Nuclear Safety is a primary consideration of the management system including the enhancement and improvement of safety culture and the achievement of high levels of safety as well as business performance.

BP-PROC-00166 [51], General Procedure and Process Requirements specifies the requirements for administrative process and procedure document formatting and presentation. It

establishes standards, methodology and processes necessary to ensure Bruce Power practices reflect a strong commitment to nuclear safety and a consistent approach to procedure quality. Well written procedures that use consistent structures, styles and language help reduce human error and promote consistent results.

BP-PROC-00892 [63], Nuclear Safety Culture Monitoring provides the framework for Bruce Power to monitor nuclear safety culture between formal assessment activities, in particular to have mechanisms to identify and correct potential gaps in nuclear safety culture.

This procedure introduces a four step approach based on the Plan, Do, Check, Act concept for monitoring nuclear safety culture using the framework described in Institute of Nuclear Power Operation INPO 12-012: Traits of a Healthy Nuclear Safety Culture and based on the approach described in Nuclear Energy Institute NEI 09-07 R0: Fostering a Strong Nuclear Safety Culture (November 2010). This approach consists of the following steps:

- PLAN – Schedule and prepare for Nuclear Safety Culture Monitoring Panel (NSCMP) and Senior Leadership Team (SLT) Reflection Session meetings;
- DO – Conduct NSCMP and SLT Reflection Session meetings;
- CHECK – Provide oversight of the nuclear safety culture monitoring process; and
- ACT – Continuously improve nuclear safety culture and nuclear safety culture monitoring practices and process.

Other implementing procedures of BP-PROG-01.02 include: BP-PROC-00703 Change Management Guidance [52], BP-PROC-00774 Program Requirements [54], B-HBK-08013-00001 GOSP Implementation Handbook [56] and BP-PROC-00016 Business Assessment Process [50]. These are discussed further in Section 5.

4.1.3. Human Resources – Leadership Talent Management, Worker Staffing

BP-PROG-01.04 [57], Leadership Talent Management defines the approaches and responsibilities associated with the Talent Management process for managers. The program defines how leadership is defined, how managers are selected for both their leadership and technical skills, and then how managers are on-boarded, managed and developed. It defines how Bruce Power ensures a sufficient number of managers with the right leadership and technical skills are available to deliver the business plan.

BP-PROG-02.01 [70], Worker Staffing requirements and responsibilities associated with the Worker Staffing processes and activities of recruitment, orientation, and deployment of staff that possess the competencies required for maintaining staffing levels consistent with the requisite organization structure, including the requirements of staff departure. The program ensures these activities are conducted in a manner consistent with the established values. The Bruce Power talent management activities result in attracting highly skilled and motivated individuals into the organization.

BP-PROG-02.01 [70], the Worker Staffing Program recruits, orients, and deploys staff that possess the competencies required for maintaining staffing levels consistent with the requisite organization structure, and includes the subsequent release of staff. It applies to employees including regular, temporary, and contract employees and requires that personnel must be recruited against current organizational competencies (technical and behavioural), which are specified in approved job documents and related selection criteria.

This program is implemented through a series of procedures for Student Hiring (BP-PROC-00319), Contractors Hiring Process (BP-PROC-00355) [71], Regular Positions Hiring Process (BP-PROC-00465), and Hiring Process for Temporary PWU [Power Workers Union] Assignments (BP-PROC-00601).

Bruce Power's Succession Management Procedure BP-PROC-00221 [58] ensures there are capable managers to deliver on future business plans by identifying and developing successors to management positions. This procedure is supported by BP-PROC-00468 [72], Workforce Planning Process which ensures that Bruce Power has the right people with the right skills at the right time in the right jobs. The Workforce Planning Process is accountable for delivering a 5-year workforce plan, through the annual business planning process and integrating with the recruiting function to develop hiring plans for all divisions across site.

4.1.4. Performance Improvement – Human Performance Program, Operating Experience Program, Corrective Action

BP-PROG-00.07 [43], Human Performance Program, ensures personnel particularly line management are trained to be knowledgeable in Human Performance (HU) processes and the proper use of HU tools so they are role models and reinforce the use of HU tools to their peers and teams, so they search for and eliminate, wherever it is possible to do so, conditions that lead to human error. Where the conditions for human error may not be eliminated and may impact the performance of critical steps, line management ensures staff is trained to take defensive action to detect and to correct against human error, and to ensure known measures are implemented to mitigate event consequences if they occur.

Staff and contractors adhere to leadership and worker behaviours that contribute to excellence in human performance by their adherence to the use of HU tools and identification and reporting to line management of conditions that might lead to human error.

The Performance Improvement Department monitors the status of HU indicators and generates site-wide HU reports, manages HU initiatives and makes HU recommendations based on industry best practices, benchmarking, self-assessments, and operating experience.

BP-PROG-01.06 [59], Operating Experience Program defines processes to meet the requirements of CSA N286.0-05 (e.g., Sections 5.4, 5.11 and 5.14), by making improvements via Processing Internal and External Operating Experience information, conducting Focus Area Self-Assessments, Benchmarking others, and by attending industry Conferences and Workshops.

Bruce Power's processes governing Operating Experience are described in its implementing procedure "Processing External and Internal Operating Experience". The Operating Experience program and Corrective Action Program are closely inter-connected.

BP-PROG-01.07 [64], Corrective Action identifies and eliminates or mitigates adverse conditions that could negatively impact nuclear safety (including reactor safety, radiation safety, industrial safety and environmental safety), business loss or corporate reputation. Adverse conditions and non-conformances are to be promptly identified, documented and reported. For most events, significant events and significant conditions adverse to quality, the causes are determined and corrective action is taken to correct, and where appropriate, prevent their recurrence. Corrective actions taken to address identified causes are tracked to completion. Effectiveness is verified for actions taken to prevent recurrence. Adverse conditions are trended and periodically analyzed for adverse trends. Corrective actions are implemented to address adverse trends where warranted. Periodic assessment of the effectiveness of the program is done based on the results and recommendations obtained from verifications and audits.

4.1.5. Training – Worker Learning & Qualification

BP-PROG-02.02 [73], Worker Learning and Qualification program enables personnel to competently and safely operate, maintain and improve the performance of the Station.

Learning includes: the training elements that support Worker Qualifications that grant working rights; and training elements that support Professional Development. The Worker Learning and Qualification program sets the standard on how to ensure that personnel are competent at the work that they do.

4.1.6. Records Mgmt. – Document Management

BP-PROG-03.01 [82], Document Management defines a Controlled Document as a document that has a defined revision control process for its entire life cycle and is officially assigned a unique controlled document number by the Document Custodian. Controlled Documents are subject to formal procedural control of their preparation, review, validation, approval, issue and change control. Controlled Documents are reviewed for accuracy and approved by authorized personnel prior to release. Controlled Documents are indexed and distributed using the Controlled Document Module in PassPort. A Record is defined as information in any format that has been authenticated (i.e., initialed, stamped or signed, dated, clearly identified) and is retained to meet business or regulatory requirements, by authorized personnel.

The preparation, issue and change of documents that specify quality requirements or prescribe activities affecting quality are controlled to assure that correct documents are being employed. Such documents, including changes thereto are reviewed for adequacy and approved for release by authorized personnel. Documentation which may cause loss, disadvantage or harm to Bruce Power or any of its partners, customers, employees, suppliers or other third parties are not disclosed to external parties without the written consent of Bruce Power. Documentation entrusted to Bruce Power is treated with the same rigor as that created and owned by Bruce Power. The implementing procedures consider the impacts of Nuclear Safety as they apply to

decision making and risk management of Industrial Safety, Environmental Safety, and Radiological Safety in support of overall Reactor Safety.

4.1.7. Supply Chain – Supply Chain

BP-PROG-05.01 [85], the Supply Chain Program defines the requirements and responsibilities associated with the Supply Chain processes and complies with CSA N286-05 [23]. Elements of the program include: Procurement of Items and Services; Contract Management; Warehouse Operations; and Quality Oversight.

BP-PROC-00041 [86], Contractor Management provides clear and consistent direction for Bruce Power staff who are required to work within the acquisition of services process. Activities associated with implementing the requirements of this procedure ensure processes are identified and requirements are understood recognizing that reactor safety, industrial safety, radiation safety and environment safety are essential to the achievement of the company long term goals. Clauses include the need to arrange for inspection and technical surveillance (including identifying and performing/verifying Inspection and Test Plan (ITP) hold and witness points) of on-site Supplier work, when required by the Technical Specification and/or Contract. If the scope of an on-site Contract involves safety-related or Pressure Boundary work, a Supplier ITP, or equivalent document, shall be prepared and submitted to Bruce Power in accordance with the Supplier's Quality Assurance (QA) program.

BP-PROC-00854, Quality Oversight [87], defines the functional requirements and key responsibilities associated with Quality Services processes. The objective of Quality Service is to provide sufficient oversight of suppliers through receipt inspection of material; performance of source surveillance; validation of supplier QA requirements; review of supplier quality performance and correction of quality assurance related issues according to approved procedures that assure best practice and regulatory requirements are applied, and that only correct and accepted items and services are available for use as per established programs.

4.1.8. Licensing & Reg. Affairs – CNSC Interface Management

BP-PROG-06.03 [89] CNSC Interface Management defines the overall business need, functional requirements, constituent elements and key responsibilities associated with managing the interface between Bruce Power and the CNSC. This is achieved by establishing and implementing standards and processes that meet the expectations of both parties and facilitate conformance to the NSCA, applicable regulations and other CNSC requirements and expectations.

The program supports the achievement of excellence in nuclear safety as the overriding priority and a healthy nuclear safety culture by assuring that processes and practices are defined and managed to ensure that the requirements arising in the PROL are understood, implemented and reported on in a controlled manner throughout the management system. The program was recently updated to confirm the need for compliance against CNSC REGDOC-3.1.1 ([89] program clause 4.5 item 3).

The CNSC regulatory framework consists of a mix of requirements and guidance. Requirements are set out in legislation, regulations, licences and CNSC regulatory documents invoked in licences. Guidance on how applicants and licensees can meet regulatory requirements is provided in CNSC guidance documents. CNSC INFO-documents provide more general information on the regulatory regime and processes for the broader public. CNSC interface management processes are structured to facilitate compliance with CNSC requirement and to conform, where practicable, to CNSC guidance or expectations with the understanding compliance to a CNSC Regulatory Document is mandatory when the document is referred to in a CNSC licence. Deviations from a licence-referenced regulatory document and transitional arrangements, where necessary, are addressed on a case-by-case basis in accordance with the applicable Licence and/or LCH.

4.1.9. Emergency Protective Services – Emergency Measure Program

BP-PROG-08.01 [91], Emergency Management Program ensures that the consequences of unplanned events that have the potential to impact on employee, public and environmental safety and the continuity Bruce Power's business operations are managed. Nuclear safety is the paramount consideration guiding decisions and actions. This programmatic document is discussed in detail in Safety Factor 11.

4.1.10. Stakeholder Engagement – Employee Communications, Stakeholder Interaction

BP-PROG-02.07 [80], Employee Communications defines the key responsibilities, standards, processes and vehicles used in communicating with employees, and when appropriate others working at Bruce Power locations. This supports not only those working in the Employee Communications Department, but also the many functions who are responsible for ensuring a strong site communications environment, including senior executives, line management, human resources, performance improvement, safety, and business improvement functions. This ensures that processes and vehicles are in place so personnel are: continually engaged in the objectives of the business and how it is performing against business goals; and aware of the contribution that they as individuals and their work groups make to the performance of the business.

Additionally, communication efforts promote and contribute to safety culture awareness on the part of employees with the goal of improving nuclear safety performance and underscoring Bruce Power's values in the areas of environmental safety, industrial safety, radiological safety and reactor safety.

BP-PROG-09.02 [92], Stakeholder Interaction defines the fundamental business need, implementing approaches and key responsibilities associated with managing stakeholder interaction and communication. This program establishes Bruce Power's public outreach approach and ensures information on health, safety and security of persons and the environment, and issues associated with the company's licensed operations and activities are effectively communicated.

4.1.11. Configuration Management Engineering – Plant Design Basis Management, Engineering Change Control, Configuration Management

BP-PROG-00.04 [42], the Pressure Boundary Quality Assurance Program describes the program to control the quality of pressure boundary activities at the facilities. It complies with the applicable rules and quality assurance requirements contained in CSA Standard: a) N285.0 and supporting codes for Class 1, 1C, 2, 2C, 3, 3C, 4 and 6 systems and components, and b) B51 and supporting codes for Class 6 and unclassified registered systems and components.

Pressure boundary activities are performed in accordance with the Codes and Standards required by the PROL. Organizations that support pressure boundary work at Bruce A comply with the requirements established in the approved Pressure Boundary Quality Assurance Program.

BP-PROG-10.01 [93], Plant Design Basis Management ensures the plant design meets safety, reliability, and regulatory requirements including pressure boundary quality assurance requirements described in BP-PROG-00.04, Pressure Boundary Quality Assurance Program. This program sets out requirements for engineering analysis and documentation so the adequacy of the design can be demonstrated.

BP-PROG-10.02 [106], Engineering Change Control specifies the manner in which design changes and modifications are defined, planned, implemented, and controlled to ensure design changes and modifications are controlled so the design requirements are met and the station is operated safely consistent with the design basis for the full duration of design life. The program applies a graded approach based on risk. The assessment of risk includes elements of safety (industrial safety, reactor safety, environmental safety, radiation safety) and business needs. This program fosters a strong nuclear safety culture by defining relevant accountabilities and responsibilities, appropriate management and supervisory oversight, support interfaces, and ensuring that decision-making with respect to design changes and modifications is systematic and rigorous.

BP-PROG-10.03 [109], Configuration Management ensures modifications to the plant, operation, maintenance and testing of the physical plant configuration is in accordance with the design requirements as expressed in the facility configuration information and defines the processes to maintain this consistency is maintained throughout the operational life-cycle phase, particularly recognizing changes are being made.

4.1.12. Equipment Reliability – Equipment Reliability

BP-PROG-11.01 [111], Equipment Reliability defines the fundamental engineering operational performance needs, requirements, implementing approaches, and responsibilities of the plant equipment reliability integration process. The objective of plant reliability integration is to develop, implement and revise the approaches required for anticipating, identifying, preventing and resolving performance and condition problems with SSCs on the basis of risk, to support safe, reliable plant operation at optimum cost. This is accomplished by:

- Ensuring the safe operation of risk significant plant SSCs, and
- Maintaining a culture that has intolerance for unanticipated equipment failures and drives continuous improvement based on industry leading practices.

4.1.13. Work Management – On-Line Work Management

BP-PROG-11.02 [116], the On-Line Work Management Program, defines the performance needs, requirements, implementing approaches and responsibilities of On-Line Work. Its objective is to provide timely identification, selection, prioritization, approval, scheduling and coordination to allow execution of work necessary to ensure safety and to maximize the availability and reliability of SSCs. It accounts for the risks associated with conducting work and identifies the impact of work to the station and to work groups; protects the station from unanticipated transients due to the execution of work; and supports nuclear safety and fosters a nuclear safety culture through the incorporation of the following guiding principles and values:

- Provide timely identification, screening, scoping, planning, scheduling, preparation and execution of work necessary to maximize the availability and reliability of station equipment and systems;
- Manage the risk associated with work through the proactive identification of situations or activities that could jeopardize or adversely impact safety margins and enable the development of mitigation strategies;
- Identify the impact of work to the station and work groups, and protect the station from unanticipated transients that result from work; and
- Maximize the efficiency and effectiveness of station staff and material resources while sustaining safe, reliable and competitive plant operation at optimum cost to Bruce Power.

4.1.14. Outage Mgmt. – Outage Work Management

BP-PROG-11.03 [117], Outage Work Management program defines the performance needs, requirements, implementing approaches, and responsibilities of Outage Work Management. It identifies the controls associated with planning, implementation, and control of work performed on a reactor unit when the unit is shut down so maintenance, inspections, and modifications are performed safely and on the basis of value to maintaining safe, reliable and cost effective operation. This includes selecting and controlling the scope of work, planning, scheduling, coordinating work execution, and completing the outage.

4.1.15. Maintenance – Plant Maintenance

BP-PROG-11.04 [118], Plant Maintenance defines the performance needs, requirements, implementing approaches and responsibilities of the management of the plant maintenance process. It covers the hands on maintenance of plant SSCs based on the approved

maintenance strategies, schedules, procedures and practices in a cost effective manner that maximizes the availability and reliability of safety related and production sensitive equipment while maintaining the commitment to Nuclear Safety: Reactor, Radiation, Environmental and Industrial Safety. Predictive and preventive maintenance supports enhanced equipment reliability and improved operational safety performance. Maintenance strategies are continually refined using improved technologies, Operating Experience (OPEX) and plant reliability integration feedback. Work selection, prioritization and response are guided by risk informed decision making.

4.1.16. Operations – Conduct of Operations

BP-PROG-12.01 [121], Conduct of Plant Operations defines the fundamental business need, functional requirements, constituent elements and key responsibilities associated with the conduct of operations at Bruce A. The objective is to safely and reliably operate the station systems within the design basis for which the plants are licensed. Operations conducted in accordance with the standards and expectations defined in this program provide strong support for the four pillars of nuclear safety: reactor safety; industrial safety; radiological safety; and environmental safety.

The four operational areas implemented by the Conduct of Plant Operations program are:

- Operations Documentation - Controls the development, review, and approval of all procedures, flowsheets, and other documents used by Operations personnel.
- Operator Staffing - Controls the activities to ensure qualified Operations staff complements are acceptable for the safe operation of the reactor units and for the performance of routine and outage activities.
- Plant Operation - Controls the execution of Operator activities in the plants to start-up, operate and shut down the reactor units, to refuel the reactors on an on-going basis, to perform routine operations in support of maintenance activities, and to perform routine surveillance of systems and to respond to unanticipated events.
- Work Protection - Controls the development and approval of Work Protection related procedures and oversees the execution of Work Protection related activities to ensure an isolated and de-energized condition exists for the execution of work.

4.1.17. Radiation Protection – Radiation Protection Program

BP-PROG-12.05 [126], Radiation Protection Program document defines the requirements and implementing approaches of the Radiation Protection Management Policy as defined in the Management System Manual (BP-MSM-1, Appendix A).

4.1.18. PMC – Contractor Management

BP-PROG-14.02 [128], Contractor Management provides guidance to personnel acting as Contract Managers/Officers and Supervisors for accomplishing effective oversight of contractors and supplemental personnel performing work for Bruce Power. The program defines the roles and responsibilities of the Contract Manager/Officer, which includes the following:

- Responsible for the site administration, coordination and overall performance of the contractor while working at the site, including but not limited to: quality, timeliness, safety and error-free performance; and
- Ensures the contractor's personnel are qualified and trained to perform the work assigned including any additional risk based training that may be required for specific tasks.

An implementing procedure of BP-PROG-14.02 is BP-PROC-00547 [129], Management of Contractors, which is discussed further in Section 5.

4.1.19. Nuclear Oversight – Nuclear Oversight Management

BP-PROG-15.01 [130], Nuclear Oversight Management identifies the processes required to independently oversee the functioning of Bruce Power's Management System. This program contributes to the development and growth of Nuclear Safety Culture by communicating the Nuclear Safety message, setting the example for nuclear safety, and demonstrating this commitment through words and actions. The Program serves to meet the embedded PROL requirements for oversight of Pressure Boundaries and Environmental Protection. These are accomplished by the Planning, Scheduling, Conducting, Reporting, and Overall Evaluation of Audits and Assessments.

5. Results of the Review Tasks

The results of the review of this Safety Factor are documented below under headings that correspond to the review tasks listed in Section 1.2 of this document. The review tasks assessed in this section have not changed from those listed in Section 1.2.

5.1. Overview Discussion of the Management System and Past Safety Factor 10 Reviews

The Bruce Power Management System is common to both the Bruce A and B systems.

Bruce Power performed its Performance Review of the Stations as part of a supplemental submission in support of the Licence Renewal, in October 2013 [133]. This report [133] discusses numerous Safety Control Areas (SCAs) applicable to this Safety Factor report review tasks, including the complete discussion in Sections:

- 3.1.1 on the SCA 1, on Management Systems, Organization and Change Management;

- 3.1.2 on Safety Culture;
- 3.1.4 on Records Management;
- 3.1.5 on Management of Contractors;
- 3.2.1 on SCA 2, on the Human Performance Program (continuous improvement);
- 3.2.2 on Personnel Training;
- 3.2.3 on Personnel Certification;
- 3.2.4 on Certification and Requalification Tests;
- 3.2.5 on Work Organization and Job Design, including specialized staffing;
- 3.3 on Operating Experience;
- 3.4.5 on Management of Safety Issues;
- 3.5 on SCA 5, on Physical Design which covers Configuration Management;
- 3.6 on SCA 6, on Work Management;
- 3.7 on SCA 7, on Radiation Protection; and
- 3.8 on SCA 8, on Conventional Health and Safety.

Each of these sections provides information on the relevance and management of the Safety Control Area (SCA), past performance, future plans, challenges (if any) and requests (if any). Overall, the report shows Bruce Power has moved forward to renew and modernize its nuclear fleet and is building on the lessons learned and the experience gained over the last decade to ensure greater certainty and predictability in future projects.

Safety performance, as managed via the Management System, is an area of continual focus and improvement across the site, as Bruce Power is constantly striving to achieve world-class performance levels by embracing a philosophy of continuous improvement. In 2013, the Bruce site reached over 14 million hours without a lost time injury. Likewise, diligent application of Bruce Power's Radiation Protection (RP) Program has been effective at identifying and controlling radiological hazards. During the current licensing period Bruce Power has consistently maintained worker radiological exposures below regulatory limits and many enhancements to the RP Program have been implemented and are yielding positive results as discussed in the Performance Reports.

The CNSC performs an annual review of each Station [134] [135]. The review for 2013 showed Bruce A's performance was satisfactory, unchanged from the 2012 review. The Radiation Safety, Management System, Human Performance Management and Integrated Plant Rating SCAs were satisfactory, while the Conventional Health and Safety rating was fully satisfactory ([135] Section 3.1).

CNSC staff concluded that the management system SCA met performance objectives and all applicable regulatory requirements, unchanged from the previous year. Bruce Power is

maintaining compliance with N286-05. CNSC staff verified that the licensee continued to maintain and improve an effective management system at Bruce A ([135] Section 3.1.1).

With respect to change management, Bruce Power's activities to control design changes were managed in accordance with current accepted procedures and with respect to Safety culture. It was acknowledged that Bruce Power conducted a self-assessment of safety culture in 2013. CNSC staff observed the conduct of the safety culture assessment and agreed with its preliminary implementation at Bruce Power ([135] Section 3.1.1).

Under the Human Performance Management SCA, personnel training at Bruce A was confirmed as having a well-documented, defined and robust Systematic Approach to Training system. The implementation of the training programs at Bruce A in 2013 met regulatory requirements. Identified weaknesses in the implementation of the training system (discussed in Section 7.3) were addressed by Bruce Power in time for the relicensing process and do not represent an increased risk to nuclear safety. The initial certification examinations and requalification tests programs for the certified staff at Bruce A met all regulatory requirements. In 2013, CNSC staff conducted an inspection of the authorized nuclear operator (ANO) simulator-based certification examination. CNSC staff concluded that Bruce Power met the requirements of its program, as well as CNSC requirements. ([135] Section 3.1.2)

Under the Radiation Protection SCA, CNSC staff concluded the radiation protection SCA at Bruce A met performance objectives and applicable regulatory requirements. As a result Bruce A received a "satisfactory" rating, unchanged from the previous year. The RP program performance satisfies the requirements of the Radiation Protection Regulations and includes performance indicators to monitor RP program performance. The RP program documents and supporting procedures are maintained current, taking into consideration operating experience and industry best practices. In 2013, there were no regulatory findings in this area. The oversight applied in implementing and continuously improving this program has been effective in protecting workers ([135] Section 3.1.7).

No significant organizational and administration system-related compliance issues were identified during CNSC inspections ([135] Section 3.1). The CNSC inspections are more fully detailed in Section 7.3.

In addition to the aforementioned reviews, the previous Safety Factor 10 reviews confirmed Bruce Power is meeting the objectives of this Safety Factor. This has been confirmed via the detailed, confidential and privileged industry reviews conducted by organizations such as World Association of Nuclear Operators (WANO), Institute of Nuclear Power Operators (INPO), and the IAEA (Operational Safety Performance Review Team) reviews. The results from these reviews are communicated to the CNSC and areas for improvement, including positive ones, are incorporated into the Bruce Station Condition Records to ensure corrective actions are completed if a negative finding is flagged and positive findings are shared throughout the organization.

These various reviews are discussed in more detail in the next sections as part of the more detailed review tasks for this Safety Factor.

5.2. Safety Factor Review Against National and International Standards

As part of review tasks 1 a. thru e., the organization and administrative management system was reviewed against the following national Canadian Standards Association standards and companion documents:

- N286-05 [23], which as discussed in Section 3.2, is soon to be replaced by the similar document, N286-12, Management System Requirements for Nuclear Facilities;
- N286.0.1, Commentary on N286-12, Management system requirements for nuclear facilities;
- N286.7, Quality assurance of analytical, scientific and design computer programs for nuclear power plants; and
- N286.7.1, Guideline for the application of N286.7-99.

Sections 4 and 7 of N286-12 are applicable to high energy reactor facilities identifying general and specific requirements for the management system. In this Safety Factor, the review focused on the generic requirements as each of the other Safety Factor reports cover the details of the specific requirements.

Furthermore, guidance from the following international standards was considered in the development of Bruce Power's Management System [35] and as appropriate this guidance is captured in interfacing programs and implementing procedure documents, and utilized during audits and assessments as discussed further in Section 7:

- WANO GL 2013-01 May 2013, Traits of a Healthy Nuclear Safety Culture, which provides cross-references from WANO principle PL 2013-1 Traits of a Healthy Nuclear Safety Culture, to the previous GL 2006-2 Principles for a Strong Nuclear Safety Culture and the International Atomic Energy Agency safety culture attributes [103][106].
- WANO Good Practice, GP-ATL-11-006, Work Management Process Description which contains the elements considered essential to a well-functioning work management process.
- WANO GL 2001-02, Guidelines for the Conduct of Plant Operations at Nuclear Power Plants, which describes key elements that support operation of an operating nuclear power plant. Their implementation contributes to safe, reliable and efficient plant operation.
- WANO GL 2001-04, Guidelines for Plant Status and Configuration Control at Nuclear Power Plants [121].
- WANO GL 2001-06, Guidelines for the Management of Planned Outages at Nuclear Power Stations, March 2002, which supports the development and implementation of excellent outage programs [85].
- WANO 2013-1 Performance Objectives and Criteria (PO&Cs) (March 2013) [103] [122] [121] [85] [49].

- OHSAS 18001:2007 Occupational Health and Safety Management System - Requirements, which is used by Bruce Power to implement the requirements of CSA Z1000-06 Occupational Health and Safety Management [49].
- IAEA GS-R-3, The Management System for Facilities and Activities, Safety Requirements (2006), which documents leading international approaches to the implementation of a Management System with a strong focus on Nuclear Safety Culture.
- IAEA Safety Guide No. GS-G-3.1 (2006), Application of Management System for Facilities and Activities [49].
- IAEA Safety Guide No. GS-G-3.5 (2009), the Management System for Nuclear Installations [49].
- INPO 11-007, Principles for Strong Governance and Oversight of Nuclear Organizations (Preliminary) (2011), which describes the key attributes of effective governance and oversight needed for a nuclear power organization to exercise control through management models and to pursue high levels of operational nuclear safety and reliability.
- INPO 11-007 REV0 Principles for Strong Governance and Oversight of Nuclear Power Organizations (March 2013) [49].
- INPO 12-012 REV1 Traits of a Healthy Nuclear Safety Culture (April 2013) and its Addendum 1 [103].
- INPO 12-013 Performance Objectives & Criteria REV0 (December 2012) [49].
- NEI 09-07 (Revision 0), Fostering a Strong Nuclear Safety Culture (2010), Nuclear Energy Institute, which describes the industry approach to monitoring, assessing and addressing nuclear safety culture issues, which was later superseded by NEI 09-07 Revision 1 Fostering a Healthy Nuclear Safety Culture (2014) [49].

Finally, the CNSC is in the early stages of developing CNSC REGDOC-2.1.2, Safety Culture for Nuclear Licensees, with a draft expected to be released in the fall of 2015 for industry and public consultation. It is to:

- provide a clear definition of safety culture and clarify commonly associated language so stakeholders and the CNSC have a shared understanding of these concepts, and
- highlight general safety culture requirements that apply to all licensees, and include an additional chapter with requirements and guidance to nuclear power plants. Specifically, the document will describe the expected and suggested criteria for licensees to self-assess, establish corrective action plans, and report on safety culture.

When issued, it should contribute to the consistent understanding of safety culture assessment expectations.

As discussed in Section 5.1, at a high level Bruce Power and the CNSC perform, at a minimum, annual reviews of Bruce Power's Organizational and Administration performance. Each year these reviews show Bruce Power programs and process in this area meet the established

requirements. These reviews utilize CSA N286, as it is a requirement of the PROL. Therefore, it is useful to identify when the review task is consistent with this standard, since audits are often conducted to illustrate that the requirements are routinely met and have been for years. Under each review task where programs and procedures are identified these are illustrative examples to show that Bruce Power is achieving the standard, but it should be recognized that additional programs and procedures could be identified in addition to those listed. For example, a review of Appendix A from BP-PROG-10.01 [93] shows how engineering procedures map to the N286 requirements.

The aforementioned international standards are treated by Bruce Power as guidance documents, so they are not reviewed in detail in the subsections of Section 5.2. However, they are discussed in Section 5 whenever appropriate, as they aid in the verification that Bruce Power is meeting a particular review task.

In these cases the PO&Cs applicable to the Safety Factor 10 review tasks are identified in the relevant subsections of 5.2, 5.3 or 5.4, and then a review of the Station Condition Records (SCRs) and PassPort Action Requests (ARs) is performed to determine which may have been identified as areas for improvement (AFIs) since the last WANO review of Bruce A was performed between February 10-22, 2014 and a Corporate review was completed earlier in 2013. The PassPort ARs are then reviewed to ensure Bruce Power has corrective actions in place to improve or enhance their programs and processes, if they have not already completed them. Previous AFIs may be included if they are pertinent to Bruce A and illustrate areas of improvement from either the Bruce B WANO reviews or earlier Bruce A ones. Further verification insight on the review task is provided by a review of the assessments and audits discussed in Sections 7.1, 7.2, 7.2.2 and 7.3.

Although in Section 3.2 of this report it is stated that CSA N286-05 [23] and N286-12 [24] will not be assessed as part of this Safety Factor review, they are nevertheless the appropriate benchmarks for the review tasks of this Safety Factor and are therefore referenced in the Review Task Assessments in the subsequent sections.

5.2.1. Policy Statements of Bruce Power

This task reviews the policy statements of the operating organization against CSA N286-05 and N286-12.

In the Bruce Power BP-MSM-1 Management System Manual, BP-MSM-1 [35], policy statements are provided in the body of the document and former Policy documents (BP-POL) have been amalgamated into in Appendix A [35] along with high level value statements.

CSA N286-05 and N286-12 do not identify a need for policy statements but rather they identify management principles, which are covered in Section 4.1.2 of N286-12.[7] These are captured verbatim in Section 2.2 of the MSM.

[7] CSA N286-12 and N286-05 are used interchangeably since Bruce Power has agreed to transition to N286-12, and has done so in some programs, although not all.

The MSM document gives the vision, mission, values and behaviours. It states Bruce Power values guide every day conduct. People are the key to Bruce Power's success and values guide their conduct, decision making and relationships. Living the Bruce Power values means people conduct business ethically, respectfully, safely, and with professionalism. The five high level values identified in this document include (quoted verbatim):

- Safety First: We embrace and practice strong nuclear safety principles recognizing that reactor safety, industrial safety, radiation safety, and environmental safety are essential to the successful achievement of our long-term goals and key to our reputation;
- Professionalism and Personal Integrity: We believe in honouring ourselves, our business, and our personal commitments;
- Respect and Recognition: We recognize that our people are essential to our success and respect their exceptional efforts;
- Passion for Excellence: We demonstrate commitment to continuous improvement to create sustainable performance excellence which benefits all of our stakeholders; and
- Social Responsibility: We recognize business excellence and our financial strength as an opportunity for contributing to the greater good.

In addition to the MSM, Section 4.0 of the BPMS Management Program document, BP-PROG-01.02 [49] is structured to align with the generic requirements of N286.

The Bruce Power MSM is consistent with the Canadian standard N286 with respect to the adoption of the management principles. Bruce Power meets the requirements of review task 1a.

5.2.2. Documentation of Management System

This task requires a review of the documentation of the Management System as per Section 2 of N286-05 and Section 4.7.1 of N286-12. For example, N286-12 Section 4.7.1 requires the Management System to define, document, control, and maintain processes that comprise the management system, as well as objective evidence to demonstrate effective implementation of the management system.

Bruce Power's Management System is documented and defined in BP-MSM-1, Management System Manual [35]. BP-PROG-01.02, Bruce Power Management System (BPMS) Management [49] provides the governing processes to control and maintain the Management System as discussed in Section 4, in particular Section 4.3.3 of the procedure.

The BP-MSM-1 and BP-PROG-01.02 and their lower tier procedures have been revised to reflect completion of the Process and Document Enhancement Project in reaction to CNSC reviews and to improve operational accountability through the introduction of the Governance-Oversight-Support-Perform (GOSP) organizational model. B-HBK-08013-00001 GOSP Implementation Handbook [56] provides detailed information on how the management system is to be executed and includes roles and responsibilities for the programs. The GOSP model clarifies the accountability of the central program owner in terms of establishing the program

expectations and standards. It clarifies the accountability of the station performers in terms of executing the agreed upon program to deliver the desired results. Other lower tier documents from this program lay out responsibilities in greater detail and consistency amongst programs. They are enforced via BP-PROC-00774 Program Requirements [54] and changes to the Management System are controlled via BP-PROC-00703 Change Management Guidance [52].

There have been multiple improvements in the Management System documentation since the last Safety Factor 10 review of Organization and Administration was completed in 2008 [10]. The earlier review was conducted in accordance with the Bruce 3&4 Integrated Safety Review (ISR) Basis Document [136], which was based on the guidelines contained in CNSC RD-360. This CNSC Regulatory Document invoked and augmented the guidance contained in IAEA Safety Guide NS-G-2.10 [137] on the Periodic Safety Review of NPPs. The BP-MSM-1 has undergone significant changes to improve and to address the results of audits, and to accommodate incorporation of new or changing national and international standards. Furthermore, changes to the Management System programs are explicitly captured in the LCH so that many of the program documents are reviewed by the CNSC before they are implemented.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Management Systems OR.3 address the need to ensure the effectiveness of the Bruce Power Management System. A review of the Station Condition Record (SCR) database shows no adverse conditions applicable to this review task have been identified against these PO&Cs following the 2014 WANO station and 2013 corporate reviews.

This was confirmed by a review of the assessments and audits, and CNSC inspections in Section 7. Significant improvements and enhancements have been made to the Management System documentation through the completion of corrective actions arising from past assessments and audits. In particular, Sections 7.2.1.5 and 7.3.2 discuss in more detail sample audits relevant to this review task. No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirement of the review task. The Bruce Power MSM is consistent with the Canadian standard N286 with respect to it being defined, documented, controlled, and maintained through processes that comprise the management system. Objective evidence was provided to demonstrate effective implementation of the management system.

5.2.3. Management and Responsibility for Outsourced Activities or Processes Important to Safety

This task requires a review of the adequacy of arrangements for managing and retaining responsibility for activities or processes important to safety that have been outsourced (for example, maintenance and engineering services and safety analysis) as per Section 4.8.1 of N286-12 and Section 4 of N286.7 (similarly, clauses such as N286-05 Sections 5.3, 5.8, 5.10, 5.11, A.10 and B.3).

Section 4.8.1 of N286-12 says work shall be identified and planned with the following: a clear description of the work including requirements and verification; worker requirements, including

verification worker; supply chain requirements, including lead items; resource assignment, including the worker to perform the verification; critical characteristics of the work to be verified, verification methods, extent, and acceptance criteria established; the sequencing and scheduling of the work, including verification (e.g., inspection and testing requirements); and the acceptance criteria for the finished product. Section 1.4 of N286-12 specifies that top management of the nuclear facility remain accountable to ensure the requirements are met.

As discussed in Section 4, Bruce Power's program BP-PROG-14.02, Contractor Management [128], provides guidance to personnel acting as Contract Managers/Officers and Supervisors for accomplishing effective oversight of contractors and supplemental personnel performing work for Bruce Power. The program defines the roles and responsibilities of the Contract Manager/Officer. Its sub-tier procedure, BP-PROC-00547 [129], Management of Contractors is an implementing procedure of BP-PROG-14.02. It ensures that contractors are aware of requirements in a wide range of areas such as Health & Safety, Work Protection, Human Performance, High Risk Evolutions, Chemical Risks, and how to Management of work in various functional areas are completed (Maintenance, Outage, Security).

BP-PROC-00041 [86], Contractor Management provides clear and consistent direction for Bruce Power staff who are required to work within the acquisition of services process. Activities associated with implementing the requirements of this procedure ensure that processes are identified and requirements are understood, recognizing that reactor safety, industrial safety, radiation safety and environment safety are essential to the achievement of the company long term goals. Clauses include the need to arrange for inspection and technical surveillance (including identifying and performing/verifying Inspection and Test Plan (ITP) hold and witness points) of on-site Supplier work, when required by the Technical Specification and/or Contract. If the scope of an on-site Contract involves safety-related or Pressure Boundary work, a Supplier ITP, or equivalent document, shall be prepared and submitted to Bruce Power in accordance with the Supplier's QA program.

BP-PROG-05.01, Supply Chain [85], aims to ensure activities related to the specification, purchase, receipt, storage, issuance and return of items, equipment and services are adequately planned, implemented and controlled. One element of this program is Quality Oversight, which is implemented through BP-PROC-00854, Quality Oversight [87].

BP-PROC-00854, Quality Oversight [87], defines the functional requirements and key responsibilities associated with Quality Services processes. The objective of Quality Service is to provide sufficient oversight of suppliers through receipt inspection of material; performance of source surveillance; validation of supplier QA requirements; review of supplier quality performance and correction of quality assurance related issues according to approved procedures that assure best practice and regulatory requirements are applied, and that only correct and accepted items and services are available for use as per established programs.

DIV-ENG-00009 [104], Design Authority, states the Chief Engineer and Senior Vice President, Engineering, is Bruce Power's overall Design Authority. The document summarizes the processes that have been put in place to execute the role of Design Authority and who in the site organization is accountable for the execution. The execution of this procedure implies that the specific Design Program Authorities and Signing Authorities as delegated by the Chief Engineer and Senior Vice President, Engineering reside within the organization. It goes on to

list the delegation in specific areas within the Station, such as Plant Design Engineering and Nuclear Safety Analysis. These delegated authorities are to ensure the quality of the design and nuclear safety assessments and assurance of the management of the design basis. Section 7 of the procedure states that the Chief Engineer and Senior Vice President is accountable for the safe and reliable design of the nuclear facility.

DPT-PDE-00008 [102], Interface with Design Contractors Performing Design Activities for Bruce Power provides a structured approach to use whenever external design engineering support is needed. When augmented staff is used, the contract staff is integrated in the respective department and Bruce Power assumes full responsibility and accountability for the work performed. The supervisory and management activities are assumed by Bruce Power and the design activities are performed under the Bruce Power Quality Assurance Program.

BP-PROC-00363 [94], Nuclear Safety Assessment, Section 7.1 states that the Manager of the Nuclear Safety Analysis and Support Department (NSASD) is the code owner for software and is accountable for quality, development, verification, validation, documentation, maintenance and configuration management of Nuclear Safety Analysis work, and the data sets used, and codes executed within NSASD. No discussion is explicitly provided on safety assessments produced outside of the department (e.g., Fire Safe Shutdown and Units 1 and 2 pipe whip). Its lower tier documents DIV-ENG-00013 Planning of Internal Work for Nuclear Safety Analysis and DPT-NSAS-00008 Management of External Work for Nuclear Safety Analysis provide no guidance on the responsibility for work outside the department. Therefore, gap SF10-2 has been identified in Table 10 to highlight this issue.

DPT-NSAS-00008 [96], Management of External Work for Nuclear Safety Analysis and Support, states in Section 7.3 of that procedure, the Technical Single Point of Contact is responsible for ensuring that the deliverable is acceptable and filed with the Records system.

Bruce Power follows the guidance on how nuclear professionals perform their work through procedures such as Engineering Fundamentals, BP-PROC-00582 [103] to ensure that Engineering activities achieve industry best performance. This procedure reinforces the importance of Nuclear Safety and reinforces WANO principles, traits and attributes of a healthy nuclear safety culture and the WANO PO&Cs applicable to design including Engineering Fundamentals EN.1, Technical Authority EN.2 and Nuclear Professional NP.1. This highlights ownership of work. As part of this role, among other responsibilities, Engineers:

- quantify and protect design and operating margins to ensure safety and reliable operation;
- proactively identify, evaluate, and address design vulnerabilities through modifications, maintenance, or other compensating measures, to restore or improve design and operating margins;
- identify and address potential failure modes and the effects of proposed changes to plant design for structures, systems, and components important to safety and reliability; and

- perform thorough, critical reviews of work performed by external organizations to verify that all requirements are met, risks are identified, and necessary compensatory or contingency actions are implemented; and
- recognize and accept their responsibility to address plant technical issues and act as the site technical conscience. They uphold the plant design and licensing bases and ensure a margin of safety is maintained.

Engineering managers:

- advise station leadership and advocate engineering positions on operational and technical matters to ensure balanced and informed decision-making; and
- ensure personnel who perform technical evaluations fully understand their responsibility and personal obligation to perform high-quality technical work [103].

The WANO PO&Cs on applying the Engineering Fundamentals EN.1, on Technical Authority EN.2 and on a Nuclear Professional NP.1, address this review task, as station personnel pursue off-site resources and expertise to aid efforts in responding to emergent challenges and Corporate personnel ensure they have the funding to continuously improve and sustain high levels of safe, reliable operation and emergency response. Additionally, Response to Emergent Operational Challenges OF.3 and Corporate Support and Performance CO.5, address this review task, as station personnel pursue off-site resources and expertise to aid efforts in responding to emergent challenges and Corporate personnel ensure they have the funding to continuously improve and sustain high levels of safe, reliable operation and emergency response. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against these PO&Cs following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort action requests (A/Rs) shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure that this review task meets requirements. This was confirmed by a review of the assessments and audits, and CNSC inspections discussed in Section 7. Significant improvements and enhancements have been made to the Management System documentation covering outsourced activities through the completion of corrective actions arising from past assessments and audits. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

With the exception of the gap identified, Bruce Power programs and procedures meet the requirement of the review task as adequate arrangements for managing and retaining responsibility for activities or processes important to safety that have been outsourced exist.

5.2.4. Roles and Responsibilities

This task requires a review of the roles and responsibilities of individuals managing, performing and assessing work, as per Section 4.8 of N286-12 under work management. Work is planned, so planning needs to capture the role and responsibilities of individuals managing, performing

and assessing the work and the work needs to be authorized and performed using approved processes and procedures.

The roles, responsibilities, authority and accountabilities of the Board of Directors and the Executive Team are defined in the Management System Manual [35]. The roles and responsibilities of personnel are clearly defined in the responsibilities section of each Bruce Power procedure, including a clearly identified process owner and their associated responsibilities. Additionally, as was discussed previously, BP-PROG-01.02, Bruce Power Management System (BPMS) Management [49] provides the governing processes to control and maintain the Management System, in particular Section 4.3.1 of this procedure discusses roles and responsibilities and Section 4.3.4 discusses the management of work. Lower tier documents from this program such as B-HBK-08013-00001 GOSP Implementation Handbook [56] lay out responsibilities in greater detail and consistency amongst programs is enforced via BP-PROC-00774 Program Requirements [54] and changes to the Management System are controlled via BP-PROC-00703 Change Management Guidance [52].

Bruce Power satisfies the requirements in the PROL condition 2.1 by providing to the CNSC roles and responsibilities documents for key operating positions. BP-PROG-02.01, Worker Staffing [70] specifies the requirements for hiring of all staff positions, regular and contract, which includes a requirement that Regular employees must be recruited against current organizational competencies that are specified in approved job documents and selection criteria. The program requires that no internal or external job search can be initiated until these documents have been reviewed and approved. In addition, all Bruce Power employees receive Human Performance Fundamentals initial training, which includes a review of individual and organizational roles and responsibilities.

The roles and responsibilities for job tasks form part of the pre-job briefing requirements. As stated in the BP-PROG-00.07, Human Performance Program [43] “A pre-job briefing is a meeting of workers and supervisors conducted before performing a job to discuss the tasks involved, hazards, and related safety precautions. This meeting helps individuals to better understand what to accomplish and what to avoid. Pre-job briefings help participants avoid surprises in the field and reinforce the idea that there are no ‘routine’ activities”.

Bruce Power follows the guidance on how nuclear professionals perform their work through procedures such as Engineering Fundamentals, BP-PROC-00582 [103] or Operator Fundamentals, BP-PROC-00561[122]. Engineering Fundamentals was discussed in Section 5.2.3. That discussion is equally applicable to this section. Operator Fundamentals [122] set expectations to ensure Operations activities achieve industry best performance. These fundamentals constitute a set of standards and behaviours for the Bruce Power Operations Division of the nuclear stations. Nuclear professionals use the Operator Fundamentals to apply the essential knowledge, skills, behaviours and practices that operating crews need to operate the plant effectively. It is important to note that Accountability is integral to each of the fundamentals. Operations staff must accept responsibility for their actions and behaviours in order to uphold and maintain the high standards and expectations described in each of these areas. As leaders, Operators establish and reinforce the content of this procedure, which is based on industry top performance, to continually strive for improvement and intervene to identify any gaps in the process or compliance to the process [122].

This procedure reinforces the importance of Nuclear Safety and reinforces WANO principles, traits and attributes of a healthy nuclear safety culture and the WANO PO&Cs applicable to operators' work including and Nuclear Professional NP.1. As part of this role, among other responsibilities, Operators perform such tasks as:

- Fulfill assigned roles, and do not assume another role without a proper turnover and pre-job brief; and
- Maintain oversight of the plant and crew to ensure crew actions are performed correctly and in accordance with procedures.

Appendix A of the Operator Fundamentals [122] identifies the roles and responsibilities of an Operator from a Monitor, Control, Conservatism, Teamwork, and Knowledge perspective for Field Operators, Control Room Operators, Shift Supervisors and the Shift Manager.

GPS-OPS-00038 [124], Bruce A and B Operations Standard and Expectations establishes the expectations and standards for the Bruce A and B Operations Divisions. These provide tools for ensuring safe, reliable and consistent plant operation. The standards established within the document are used for all operational activities and are applicable for both plant operation and simulator operations. They provide direction to other departments that provide support to the Operations Divisions in operating the plants. The Operations Division is in charge of the plant. During the shift, the Shift Manager is responsible for the safe operation of the plant and has oversight of the conduct of all personnel and all activities in the station.

Operations Management establishes the highest standards for the conduct of work, ensures that all staff are aware of, and comply with the standards at all times. Management uses observations of work activities to monitor compliance and provides appropriate coaching as necessary. Operators know and understand their role in Operator Fundamentals, defined as the essential knowledge, skills, behaviours and practices that operating crews need to apply to operate the plant effectively.

The Operations Division owns the station work schedule and demonstrates leadership for enabling completion of scheduled activities by all departments.

The WANO PO&Cs on applying the Engineering Fundamentals EN.1, on Technical Authority EN.2 and on a Nuclear Professional NP.1 are applicable under this review task. Additionally, those for applying Operator Fundamentals applicable to this task are Operations Fundamentals OP.1 and Conduct of Operations OP.2. A review of the SCR database shows no adverse conditions applicable to this review task have been identified against these PO&Cs following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements.

This was confirmed by a review of the assessments and audits, and CNSC inspections in Section 7. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of the review task as it has its own procedures and processes to perform the work.

5.2.5. Work Processes and Supporting Information

This task requires a review of the processes and supporting information that explain how work is to be specified, prepared, reviewed, performed, recorded, assessed and improved, as per Section 4.8 of N286-12 [24] and Sections 5.5, 5.8, 5.10 and Annex A.1, A.4 of N286-05 [23].

N286-12 [24], Section 4.8 has three subsections on Section 4.8.1 Work Planning, Section 4.8.2 Work Control, and Section 4.8.3 Independent Verification of Work.

Section 4.8.1 of N286-12 [24] was discussed in Section 5.2.3 as the work planning is the same whether the work is performed in-house or out-sourced. It states that work shall be identified and planned with the following: a clear description of the work including requirements and verification; worker requirements, including verification worker; supply chain requirements, including lead items; resource assignment, including the worker to perform the verification; critical characteristics of the work to be verified, verification methods, extent, and acceptance criteria established; the sequencing and scheduling of the work, including verification (e.g., inspection and testing requirements); and the acceptance criteria for the finished product.

Section 4.8.2 on Work Control focuses on ensuring that the work is authorized and performed using approved sources of information (i.e., controlled documents, software, tools, processes and practices).

Section 4.8.3 discusses the need for ensuring the independence of the verification, so those performing the work do not verify it and the extent and timing be based on the potential impact on the work.

The BPMS is described in the MSM [35] Section 2.2, which addresses and incorporates the following principles, which are consistent with CSA N286-05, Management System Requirements for Nuclear Power Plants [23] and are incorporated in the PROL [15]:

- Work is planned;
- The performance of work is controlled;
- Work is verified to confirm that it is correct;
- Problems are identified and resolved;
- Changes are controlled;
- Records are maintained; and
- Assessments are performed.

Bruce Power performs work based on MSM [35] Section 2.4.4, which defines a single point of accountability that is responsible for executing and achieving outcomes in accordance with planned methods and goals. This includes accountability to develop plans, schedules, scope, detailed implementing procedures and ensuring overall results. The process management

procedure (DO), identified in Section 4.0 MSM [35], defines how work is done. The system of documents consisting of the Management System Manual [35] including Policy Statements, Programs (Section 4.1.3 - Programs and Section 4.1.4 - Procedures and Processes) and other supplementary documentation (Section 4.1.6.) collectively define the organizational structure, strategic direction, authorities, responsibilities and detail what work that must be done, how it is done and by whom.

Bruce Power prepares standard programs and procedures (Section 4.1 of MSM [35]) that are key to sustainability of performance, and are approved by senior management and implemented by line management with corporate support and oversight. Section 4.1.4 of the MSM states that Bruce Power Procedures and Processes provide a structured set of activities designed to produce an output, define how the work gets done, and require standardization of procedures and processes across Bruce Power.

Section 5.1 of MSM states that a set of performance indicators is monitored and reported on a regular basis as the means to assess performance and to improve. Section 6.0 of the MSM identifies the requirement to take action to learn and continually improve the performance of business, including improvements in governance and equipment, and to manage changes arising from these improvements. Section 6.1 of the MSM identifies the importance of process improvements and awareness of changes to the business environment in achieving desired performance at Bruce Power.

Additionally, as was discussed previously, BP-PROG-01.02, Bruce Power Management System (BPMS) Management [49] provides the governing processes to control and maintain the Management System, in particular Section 4.3.4 discusses the management of work.

Within specific Programs, further requirements and guidance are provided through implementing procedures. For example, as discussed in Section 4, BP-PROG-11.02, On-Line Work Management Program [116] defines the fundamental business need, constituent elements, functional requirements, implementing approaches and key responsibilities to support nuclear safety and foster a nuclear safety culture through the incorporation of the guiding principles including the provision of timely identification, screening, scoping, planning, scheduling, preparation and execution of work necessary to maximize the availability and reliability of station equipment and systems. Similarly, other Programs discussed in Section 4, BP-PROG-10.01, BP-PROG-11.01, 11.03, 11.04 provide more detailed steps for defining work in their respective areas of Plant Design Basis Management, Equipment Reliability, Outage Work Management and Plant Reliability.

Within in the various Programs, there are implementing procedures that provide direction on Design Verification. For example, in Appendix A of BP-PROG-10.01 numerous procedures cover planning of work, performance of work, work verification as discussed in the body of CSA N286 (similar to N286-12), as well as further procedures which point to the annex of CSA N286-05. BP-PROG-11.01 does the same thing in its Appendix C.

As stated in Sections 5.2.3 and 5.2.4, Bruce Power follows the guidance on how nuclear professionals perform their work. Another example is through procedures such as Maintenance Fundamentals, BP-PROC-00580 [120] to ensure that Maintenance activities achieve industry best performance. This procedure reinforces the importance of Nuclear Safety and reinforces

WANO principles, traits and attributes of a healthy nuclear safety culture and the WANO PO&Cs applicable to maintenance such as Maintenance Fundamentals MA.1. This highlights ownership of work and how work is performed. As part of this role, among other responsibilities, examples for Maintenance personnel include:

- prepare in advance for work by performing required walkdowns, reviewing instructions, verifying qualifications, and participating in pre-job briefings
- perform work only when authorized and only on equipment that is properly aligned for maintenance. Work activities are performed in accordance with controlled procedures.
- planning and performing rigging, lifting, and material handling activities to high standards ensuring equipment and personnel safety.

The WANO PO&C discussed in Sections 5.2.3 and 5.2.4 are relevant in that they cover roles and responsibilities, in particular on Nuclear Professionals NP.1. More specifically, On-Line and Outage Work Management WM.1, Maintenance Fundamentals MA.1, Conduct of Maintenance MA.2, and Operational Risk OF.2 address this review task, as they cover work processes in their respective areas. A review of the SCR database shows that adverse conditions applicable to this review task have been identified against PO&C WM.1. A WANO Area for Improvement (AFI) on work management has been raised to resolve the shortcomings. Issues have been combined and closed into one WM apparent cause evaluation. Due to the repeat findings, Nuclear Oversight has elevated this shortcoming to management.

A review of the assessments and audits, and CNSC inspections discussed in Section 7 was performed to verify compliance with this review task. The FASAs in Section 7.1, Table 5 and Audits in Table 6 identify past Bruce Power reviews (e.g., AU-2014-00020) relevant to this review task. Section 7.2.1.6 discusses AU-2013-0008 improvements needed in the area of work management for outages in prioritizing and sufficiently preparing important activities to allow full execution of the work. Overall work management processes in specifying, preparing, reviewing, recording, assessing work are performed well and outage execution has improved in 2015.

A gap, SF10-1 has been identified regarding work management in Table 10.

Bruce Power programs and procedures meet the requirement of the review task on Work Processes, as the issues have been correctly identified and corrective actions have been identified to improve work management.

5.3. Organization and Management System Verification

Review tasks 2 a. thru k. address verification of numerous aspects of the organization and management system. These are discussed in the subsections of Section 5.3.

5.3.1. Managing Organizational Change

This review task requires verification that there are adequate processes in place for managing organizational change.

N286-05 Sections 4, 5.2., 5.9 and 5.12 discuss the need to: define the organization; ensure it is understood; control changes; and the documentation of those changes. Similarly, N286-12, covers these aspects, for example in Section 4.1.2.

Under BP-PROG-01.02 [49] the BPMS, changes to the Bruce Power organization at the Section Manager level and higher are controlled by the BP-PROC-00001, Organizational Structure Change Management [53]. On an annual basis, a copy of the baseline organization down to the department manager level is provided to the CNSC in response to PROL Licence Condition 1.4.

The process ensures consideration of the impact of a proposed change on the interrelated processes, organization and document structures. The process objective is to ensure that all proposed changes are properly identified, justified, assessed for impact, planned and approved. The level and extent of review depends on the scope, complexity or potential impact of a change on safety, commercial or corporate reputation performance. This procedure does not cover changes to the Safety Related Plant Systems and how work is done, as these are covered through Programs such as Plant Design Basis Management BP-PROG-10.01, Engineering Change Control BP-PROG-10.02 and the Process Change Management Procedure BP-PROC-00788 [116][106][55].

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1, Manager Fundamentals OR.2, Management Systems OR.3, Corporate Governance CO.2 and Corporate Human Resources CO.6 address this review task. For example, OR.1, OR.3, and CO.2 are specifically referenced in BP-PROG-01.02 ([49] Section 5.6). A review of the SCR databases shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure that this review task meets requirements. This was confirmed by a review of the assessments and audits (e.g., AU-2012-00005, AU-2013-00007 and NK21-CORR-00531-10265) discussed in Sections 7.2.1.2, 7.2.1.5 and 7.3.2. No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task, as there are adequate processes in place for managing organizational change.

5.3.2. Human Resource Management Process

This review task requires verification that there is a human resource management process in place that ensures the availability of adequate, qualified human resources, including succession planning.

N286-05 Section 5.3 discusses the need that personnel are competent in the work they perform and Section 5.4 discusses that personnel know what is expected of them. Similarly, N286-12, covers this aspects for example in Section 4.5.2.

Under BP-PROG-01.02 [49] the BPMS Section 4.3.1 Resources are Managed, Bruce Power addresses the requirements of this review task through BP-PROG-01.04 [57], Leadership Talent Management, BP-PROG-02.01 [70], Worker Staffing and BP-PROG-02.02 [73], and Worker Learning and Qualification [73].

These programs were discussed in Section 4, but two of the key processes are BP-PROC-00221 [58], Succession Management, which ensures there are capable managers to deliver on future business plans by identifying and developing successors to management positions and BP-PROC-00468 [72], Workforce Planning Process, which ensures that Bruce Power has the right people with the right skills at the right time in the right jobs.

The Workforce Plan created annually as part of the business planning process is integrated with the recruiting function to develop hiring plans for all divisions across the site. The annual Workforce Plan provides objective evidence that this review task is met. More specifically, for Certified Operator Staff Planning minimum staff complements and control room staffing are maintained. The key staffing positions and the number of qualified staff are documented quarterly in Section 2 of the Quarterly Operations Reports, including whether there are changes to the staffing procedure DIV-OPA-00001 [123][138]. These are submitted to the CNSC to confirm compliance with LCH clauses 2.1 and 2.2.

A recent Bruce Power submission summarizes the recruiting status in three key areas: Authorized Nuclear Operators, Shift Managers / Control Room Shift Supervisors and Unit 0 Control Room Operators. It shows that Bruce Power is continuing to project more than the qualified minimum number of operators for the next several years (data up to 2018) ([139] Section 2.2.2).

Furthermore, Bruce Power as part of its performance review of the Stations, reports on its general staffing levels and recruitment success ([133] Section 3.2.5).

The WANO PO&C on Corporate Leadership CO.1, Corporate Support and Performance CO.5, and Corporate Human Resources CO.6 address this review task. A review of the SCR databases shows two adverse conditions applicable to this review task as identified in SCRs 28403431 and 28403434 against CO.1 and CO.6 following the 2013 WANO Corporate review. Some changes were made to the GOSP Implementation Handbook, B-HBK-08013-00001 [56] to clarify responsibility and authority of corporate and station (line) organizations in regards to process implementation, as well as clarification of expectation around alignment of metrics and excellence plans/gaps to excellence, there were no fundamental changes to the management system, but rather improvements to the commitment to, alignment and understanding of the implementation of the GOSP model were made in the management system resulting in an update to BP-PROG-01.02 [49].

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this that review task meets requirements. A review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3 shows that there are no significant outstanding corrective actions in this area. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task, as there are adequate human resource management processes in place to ensure the availability of adequate, qualified human resources, including consideration for succession planning.

5.3.3. Control of Documents, Products and Records

This review task requires verification that there is adequate control of documents, products and records and that this information is readily retrievable.

This review is consistent with the requirements of Sections 5.9 and 5.13 of N286-05 and Section 4.7 of N286-12. Per N286, controlled documents and records are to be controlled consistent with their intended use and available to those who need them. Means to uniquely identify them are included.

BP-MSM-1 defines the governing document structure and document hierarchy and BP-PROG-01.02 [49] Section 4.3.3 Information is Managed describes the record management function and responsibilities. As discussed in Section 4.1, BP-PROC-00166 [51] specifies the requirements for administrative process and procedure controlled document formatting and presentation, whereas BP-PROG-03.01, Document Management [82], is the process that Bruce Power uses to control Technical documents, products and records ensuring that the information is readily retrievable from a physical perspective. The program maintains and manages documents and records during their life cycles so their integrity, security, accessibility, disclosure and preservation is ensured, while satisfying applicable legal and regulatory requirements. As part of the Program, implementing procedures ensure that Document Owners in specific areas are identified, so they can ensure the specific requirements for controlled documents, products and records are met and the information is readily retrievable. Retrieve-ability, Secure Storage, Maintenance and Destruction of documents and records are covered in the implementing procedures, as identified in the program, including the need for signed affidavits if records are permanently destroyed or lost and as appropriate the notification of Regulatory authorities.

For example, to ensure plant modifications are managed in accordance with the BP-PROG-10.03 [109], Configuration Management and BP-PROG-10.02 [106], Engineering Change Control, it is important to ensure that design changes and modifications are controlled so that the design documentation remains consistent with the as-built and as-operated station and the design basis and design requirements. This may include a non-physical change to the design, which is covered by BP-PROC-00542 [108] Configuration Information Change or a physical change covered by BP-PROC-00539 [107] Design Change Package. Configuration Management is discussed further in Section 5.3.10.

On a daily basis, Bruce Power staff utilize the Document Management system to retrieve documents and records. If documents or records are found to be incorrect, depending on the extent of the adverse condition either a Station Condition Record [140] is raised along with a Corrective Action per BP-PROG-01.07 [64] or a Document Change Request (DCR) is raised via BP-PROC-00068 [84] Controlled Document Life Cycle Management. For example, SCR 28425278 identified an incorrect revision between a control document number in PassPort, the official repository of controlled documents, and the searchable tool Livelink due to a lack of attention to detail. A review of the DCRs showed many have been logged against a particular document, but have not progressed past the initiation phase. This daily verification shows that Bruce Power has an effective document management system.

This was confirmed by a review of the assessments and audits, and CNSC inspections in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task. FASA SA-BS-2012-01 specifically identifies the shortcoming that DCRs can become stagnant in the system, for example depending on how they are initiated. This occurs as a finding in other FASAs and Audits; for example, AU-2013-00015, where 18 outstanding DCRs were initiated prior to the revision date of a document, but they were not factored into the revision. This is identified as gap SF10-3 in Table 10.

The identified gap notwithstanding, Bruce Power programs and procedures meet the requirements of this review task, as there is adequate means to control documents, products and records and this information is readily retrievable. Bruce Power has taken action to improve the resolution of DCRs.

5.3.4. Purchase of Equipment and Services

This review task requires verification that there is adequate control of purchasing of equipment and services where this affects plant safety.

CSA N286-05, including clauses 5, 6.4, Annexes B, C.3, F.1, F.2 and G cover the supplying of equipment and services. Annex B specifically covers Purchasing Requirements in B.1, Inspection of purchased items and services in B.3, Receiving in B.4, and Storage and Handling in B.5. Similarly, this review is consistent with the requirements of N286-12, such as in Sections 4.1.3, 4.8.1, and in particular Section 7.6.2 on Supply Chain.

Many of the processes and procedures discussed in oversight activities or processes of contractors performing work on safety-related SSCs in Section 5.2.3 are equally important for the purchase of equipment and services. Bruce Power's Contractor Management BP-PROG-14.02 [128] and Supply Chain Programs BP-PROG-05.01 [85], and their implementing procedures are applicable to this review task, as well as the interfacing programs and their detailed procedures. The list includes: BP-PROC-00547 [129], BP-PROC-00041 [86], BP-PROC-00854 [87], DIV-ENG-00009 [104], DPT-PDE-00008 [102], BP-PROC-00363 [94], and DPT-NSAS-00008 [96].

The key program addressing this review task is BP-PROG-05.01, Supply Chain Program [85]. As was described in Section 4, depending on the importance to safety consideration of requirements are requested from the functional areas desiring the work and these are to be included in the purchase specification. They include requirements covering: receipt, storage, issuance and return of items, planning, review and verification in the production and supply of the purchased equipment and services. These are implemented, controlled and monitored consistent with the Supplier's Management System, as discussed in the next subsection. Annual assessments of the company's compliance with Supply Chain policies are conducted by Supply Chain Division ([85], Section 4.0).

Additionally, from a safety perspective, design related procurement requirements are specified in accordance with procedures associated with BP-PROG-10.01 [93], to ensure compliance with regulatory and licensing requirements, including BP-PROG-00.04 [42] pressure boundary

requirements so that purchased items can adequately perform their intended end-use design functions. The Engineering Division, Procurement Engineering (PE) Section provides technical evaluation and approval of safety-related, pressure boundary or nuclear class Catalog ID items and changes to the Catalog ID data ([85] Section 4.0). Furthermore, pressure boundary component inventory considerations are managed to ensure availability of spare parts, safety equipment, consumable items and operating supplies required to operate and maintain the plant and other work programs at optimum cost. Inventory levels and deployment points reflect the trade-off between service levels and costs. Service levels are established that meet internal customer needs, costs and risks of a service failure. Inventory levels are defined by safety stock and cycle stock level ([85] Section 4.1.1).

Measures are established for the inspection of the quality of purchased items or the verification of services. Inspection and verification are planned, documented and performed by the responsible organization to ensure that items and/or services meet the requirements of the purchase order/contract. The extent of inspection and verification is directly proportional to the importance to safety and the complexity of the item or service. Inspection or verification may be performed at the supplier's facilities or upon receipt of the item(s) as determined by the verification plan. The supplier's performance is monitored and inspection and verification activities modified according to performance ([85] Section 4.1.2).

In the event that services are required to safeguard public or personal safety or to prevent damage to plant and equipment, the requirements of the Supply Chain program may be set aside temporarily, subject to Executive approval, and purchasing is subject to a specific procedure. The number of such incidents, if any, is to be reported annually ([85] Section 4.2).

The Supply Chain maintains a constant scrutiny on nuclear safety through a mix of self-assessments and independent oversight to strengthen safety and improve performance ([85] Section 7.1.2).

The WANO PO&C on Long Term Equipment Reliability ER.3 and Corporate Support and Performance CO.5 address this review task. A review of the SCR database shows no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements (e.g., BP-PROG-10.01).

This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The Focus Area Self-Assessments (FASAs) in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

Section 7.2.1.3 provides details associated with audit AU-2012-00016 to assess the implementation and technical compliance of BP-PROC-00244, Procurement Engineering. It found weaknesses with respect to compliance with CAT-ID Evaluation and Pre-Screening processes, but concluded that no safety implications arose. As part of the corrective action process, the shortcomings were recorded and appropriate actions taken to improve performance. Section 7.2.2 discusses an external audit that found an overall satisfaction in the Supply process.

No continuing gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task as there are adequate controls of purchasing of equipment and services where this affects plant safety and integration between Engineering and the Supply Chain Programs.

5.3.5. Supplier's Management System

This review task requires verification there are adequate processes in place to check the quality of Suppliers' management systems and that such systems are intended to ensure that equipment and services supplied to the nuclear power plant are fit for purpose and are provided in an effective and efficient manner.

CSA N286-05 clauses 5, 6.4, Annexes B, C.3, F.1, F.2 and G cover the supply of equipment and services. Annex B specifically covers Supplier Evaluation and Qualification in B.2. Similarly, this review is consistent with the requirements of N286-12, such as in Sections 4.1.3, 4.8.1, and in particular Section 7.6.2 (e) on Supply Chain requirements of the management system standard and applicable requirements. Section 1.4 of N286-12 specifies that top management of the nuclear facility remain accountable to ensure that the requirements are met.

BP-PROG-05.01 [85], the Supply Chain Program is implemented through BP-PROC-00854 [87], Quality Oversight, which aims to ensure the quality of purchased parts, materials, and services. In order to check the quality of suppliers' management systems, the Quality Oversight procedure requires that suppliers' quality assurance programs be audited to ensure that they are effectively implemented.

Audits and surveys are used to decide whether a supplier qualifies to be included on the Approved Supplier List and are conducted in accordance with BP-PROC-00753, Supplier Audits [88], which describes the procedure for assessing a supplier's quality assurance program to determine if it is adequately established, implemented, controlled, and effective in achieving the expected results.

Additionally, Bruce Power's procedure BP-PROC-00041 Contract Management [86], specifies the process for the entire lifecycle of a contract for services, including responsibilities of the Contract Manager after the contract has been awarded. The Contract Manager monitors the QA program of on-site Suppliers and on-site or off-site service Suppliers involved in safety-related or Pressure Boundary work as well as quality and technical performance.

The WANO PO&C on Long Term Equipment Reliability ER.3 and Corporate Support and Performance CO.5 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements.

This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this

review task. Section 7.3.2 discusses a recent review of the overall Management System. Section 7.2.2 discusses an external audit which found the Supply process satisfactory.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task as there are adequate processes which check the quality of Suppliers' management systems to ensure that equipment and services supplied to the nuclear power plant are fit for purpose and provided in an effective and efficient manner.

5.3.6. Communication Policies

This review task requires verification that there are adequate communication policies in place.

This is consistent with and touches on the requirements of Sections 2, 5.2, 5.4, 5.7, 6.9, 6.12 and 6.13 of N286-05 and Section 4.6 of N286-12.

Bruce Power addresses this requirement through BP-PROG-02.07, Employee Communications [80]. The program ensures that processes and means are in place so that Bruce Power employees:

- Are continually engaged in the objectives of the business and how it is performing against business goals; and
- Are aware of the contribution that they as individuals and their work groups make to the performance of the business.

The program and its implementing and interfacing procedural documents define the key responsibilities, standards, processes and vehicles used in communicating with Bruce Power employees, and in some cases non-employees, working at Bruce Power locations.

Bruce Power achieves and maintains communication excellence by adhering to the following criteria:

- Employee Communications team members have ongoing direct interaction with senior corporate and plant management and are involved in developing strategic communications for management decisions;
- Both corporate and station communications strategies and plans exist that support the Company’s mission and change initiatives and can be monitored for effectiveness;
- Corporate, station executives, managers and leaders at all levels are key sources of information in deploying the communication strategy and are trained and coached in effective communication skills;
- A process is in place to encourage and address employee feedback on business performance, initiatives and organizational culture; and
- All communications within the company, from wherever they originate, must consistently be delivered in accordance with company branding requirements and best practice standards.

BP-PROC-00868, Employee Communications Processes, Vehicles and Standards [81] provides process details for accessing and using Bruce Power's various communication vehicles (e.g., The Point, Bruce Power TV, Intranet, targeted publications, etc.) together with a description of their purposes and accountabilities. This document defines the requirements for audits and checking of effectiveness.

Additionally, BP-PROG-09.02 [92], Stakeholder Interaction defines the fundamental business need, implementing approaches and key responsibilities associated with managing stakeholder interaction and communication. This program establishes Bruce Power's public outreach approach and ensures information on health, safety and security of persons and the environment, and issues associated with the company's licensed operations and activities are effectively communicated.

On a weekly basis, such communication as the Chief Executive Office weekly safety message and week in review covering the four pillars of safety and performance are issued to all staff, while bi-weekly and monthly, such items as the Employee Communications newsletter the Point is issued and Safety Meetings are held. To improve maintenance communication a Bruce A Maintenance podcast is sent out and Bruce Beat which highlights key management messages.

A general e-mail is sent listing the communications weekly wrap-up reiterating each of these items. Communications are issued to external stakeholders through Town Hall meetings and press releases.

The WANO PO&C on Leadership LF.1, Management Systems OR.3, Corporate Leadership CO.1, Corporate Communications CO.7 and Nuclear Organization and Traits OR.1 address this review task, recognizing that most PO&Cs identify the need to communicate. The key ones are CO.1 and CO.7. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task as there are adequate communication policies in place.

5.3.7. Training Facilities and Programs

This review task requires verification that there are adequate facilities for training and training programs are well structured.

This review task is consistent with aspects of Section 5.3 of N286-05 and similarly Section 4.5.2 (a), (c), (d), (e) and (f) of N286-12.

The requirements established in BP-PROG-02.02, Worker Learning and Qualification Program [73] apply to Bruce Power personnel and training areas, with the exception of Nuclear Security.

BP-PROG-02.02 ensures that personnel are provided with the competencies and qualifications necessary to satisfy the requirements of applicable legislation commensurate with Bruce Power business needs. The program follows the Systematic Approach to Training model defined by the INPO document: ACAD 02-001, The Objectives and Criteria for Accreditation of Training in the Nuclear Power Industry.

The procedures and job aids that support implementation of this program:

- Implement the necessary controls to ensure personnel are competent to do the work assigned to them;
- Implement the intent of the Bruce Power Training Performance Objectives and Criteria (TPO&C). The TPO&C address the intent of both the CNSC and INPO training performance objectives and criteria; and
- Require the training elements that support Worker Qualifications approved for inclusion within the Training and Qualification Descriptions be created, managed and conducted in a manner that fully meets the intent of the Bruce Power TPO&Cs.

Bruce Power has in place training facilities, including state of the art full scope simulators used for initial certification training of Bruce Power station staff, examination of staff, and continuing training of certified staff. Bruce Power's SEC-SIMM-0001, Simulator Validation [74] establishes the validation procedure for the full scope Canada Deuterium Uranium (CANDU) control room simulator. The validation procedure is used to confirm that the simulator is capable of providing the correct observable control room responses during the training and testing exercises.

The Bruce A Simulator Reference unit is Bruce A Unit 2 (all unit processes) and Unit 0 (common and switchyard processes). However, it has been updated to reflect aspects of Units 3 and 4.

Changes to the simulator are performed following change control procedure SEC-SIMM-00002: Simulator Change Control [75]. The procedure provides instructions for the development, review, verification, approval, installation, commissioning, and closeout of any modification made to a Bruce Power Full Scope Training simulator.

Bruce Power has a Fire Training facility at site. The facility is used to train staff on fire-fighting techniques. Bruce Power provides its staff with general guidelines regarding the use of the facility in SEC-CST-00001, General Field Guidelines at Bruce Learning Centre Fire Training Area [76]. The purpose of the guidelines is to provide instructions covering the day-to-day operation of the Fire Training Field Area to ensure minimal impact on the environment and surrounding buildings from the training exercises. Training includes initial classroom instruction followed by periodic classroom instruction, fire-fighting practice and site fire drills. Training program requirements associated with the Fire training facility are governed by the processes and activities associated with the requirements of BP-PROG-02.02, Worker Learning and Qualification Program [73].

The WANO PO&C on Nuclear Professional NP.1, Leadership LF.1 and Training TR.1, recognizing each program area address this review task. A review of the SCR database shows

that no adverse conditions applicable to this review task have been identified against these PO&Cs following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task. Further discussion is provided in Safety Factor 12.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task as specific facilities for training exist and training programs are well structured.

5.3.8. Employing Suitably Qualified Internal and External Staff

This review task requires verification that there are formal arrangements in place for employing suitably qualified internal and external technical, maintenance or other specialized staff.

This review task is consistent with Sections 5.3 and 6.4, and Annexes B.2, C, and F of N286.-05 and similarly Section 4.5.2 (b) and for external staff the specific requirement in Section 7.6.6 (b) of N286-12.

Employing suitably qualified internal staff is done in accordance with BP-PROG-02.01, Worker Staffing [70] as explained in Section 5.2.4 and 5.3.2.

The process of employing external technical, maintenance and other specialist staff is controlled through BP-PROG-02.01, Worker Staffing [70] and BP-PROC-00355, Hiring Process (Contractors) [71]. BP-PROG-02.01 defines requirements for hiring of Regular, Temporary and Contract Employees. This process covers both contracted staff working within a defined scope project under the direct supervision of Bruce Power, as well as those personnel working under the supervision of an external organization that has been contracted to deliver a service. Contractor access to site and Bruce Power assets is controlled.

Contractors who work on site under Bruce Power supervision are required to attend the same orientation and training as a regular hired employee of Bruce Power. The Contract Manager or delegate is responsible for meeting with the successful bidder and identifying Bruce Power requirements for contractors accessing the Bruce Power site. Discussions include requirements for security, health screening, training needs, code of conduct, Nuclear Employee Worker Designation and Dose Information Requirements.

BP-PROC-00041, Contract Management [86] outlines the process utilized during the selection process for contractors. Specific controls are defined for contractors whose scope of work includes activities relating to nuclear safety or pressure boundary work.

The WANO PO&C on Leadership LF.1 and Training TR.1, recognizing each program area addresses this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against these PO&Cs following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task.

5.3.9. Feedback of Operating Experience to the Staff

This review task requires verification that there are adequate processes in place for feedback of operating experience to the staff, including experience relating to organizational and management failures.

This review task is consistent with the requirements of Sections 0.2, 5.6, 6.18, 6.19 and 6.19, Annex A and D of N286-05 and similarly requirements such as Section 4.12 and 7.3.2 of N286-12.

This area is reviewed extensively in Safety Factors 8 and 9.

As described in various IAEA documents, signatories to the international Convention on Nuclear Safety are required to have an OPEX program.[8] Canada is a signatory and the enforcement of this requirement falls to the CNSC. The CNSC ensures that the requirement is passed to nuclear utilities indirectly through including CSA N286-05 [23] in the licences.

In Bruce Power, the OPEX Program taking direction from CSA N286-05 [23] is BP-PROG-01.06, Operating Experience Program [59]. The workhorse implementing procedure is BP-PROC-00062, Processing External and Internal Operating Experience [60]. This procedure identifies the processes used to accomplish the two following Program goals:

- To use external operating experience information to identify, evaluate and apply lessons learned to improve plant safety, reliability and commercial performance through improvements to processes, procedures, training and system/equipment design; and

[8] A portion of INSAG-23 states:

> *"4. By signing the international Convention on Nuclear Safety (CNS), each Contracting Party commits to taking the appropriate steps to ensure that:*
>
> *"... incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body; [and that] programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies".*

All Contracting Parties have indicated in the review meetings of the CNS that they have such programmes in place. These programmes have been valuable. Nonetheless, events do recur and this gives INSAG reason to believe that the mechanisms for operating experience feedback are not as effective as they could be. INSAG concludes that significant safety benefits could be achieved by enhancing national and international OEF programmes.

- Communicate internal experience from the Bruce Site to others in the Nuclear Industry in order to improve nuclear plant safety, reliability and commercial performance around the world.

The PROC then provides detailed instructions on how to extract and process incoming and outgoing OPEX. Submission of SCRs (BP-PROC-00060), Action Tracking (BP-PROC-00019), and Root Cause Investigations (BP-PROC-00518 [68]) and Apparent Cause Investigation (BP-PROC-00519 [69]) are associated processes where the impact of inadequate management activity would occur.

A general observation is that many procedures that have been revised in the past three years have added OPEX as one of the components.

The development of Corrective Action Plans from SCRs requires consideration of OPEX.

BP-PROG-02.02, Worker Learning and Qualification [73], requires training on OPEX based on job function, with suggestions for continuous exposure to OPEX training for all employees.

The WANO PO&C on Operating Experience OE.1 and Nuclear Professional NP.1 address this review task, recognizing that each program area reviews operating experience. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task and lessons learned following the refurbishment of Unit 1 and 2.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task as adequate processes are in place for feedback of operating experience to the staff, including experience relating to organizational and management failures.

5.3.10. Maintaining the Configuration of the Nuclear Power Plant

This review task requires verification that there are suitable arrangements in place for maintaining the configuration of the nuclear power plant and operations are carried out in accordance with the safety analysis of the plant.

This review task is consistent with Section 6.3 of N286-05, which covers the interface between the plant operating documentation and the Safe Operating Envelope (SOE) and is similarly covered in N286-12 for example in specific requirements in Section 7.5.

The design and the safety analysis establish an envelope of plant configurations and operating limits acceptable for safe operation. The operation of the plant needs to remain within this safe operating envelope by (a) defining the acceptable configurations and operating limits; and (b)

incorporating these requirements in plant settings and in operating and maintenance procedures, as appropriate.

BP-PROG-10.03 [109], the Configuration Management (CM) program ensures that modifications to the plant, operation, maintenance and testing of the physical plant configuration are consistent with the design requirements as expressed in the facility configuration information. This consistency is maintained throughout the operational life-cycle phase, including when changes are proposed. BP-PROG-10.02 [106], Engineering Change Control, identifies the steps necessary to ensure reviews are conducted prior to the change so the Plant Design Basis, Operations and Maintenance procedures can remain synchronized with the implementation of the design changes. The CM program is established to ensure that:

- Design requirements for SSCs, tools, software and hardware are defined and documented;
- Changes to design requirements are identified, documented, controlled, evaluated and approved or rejected;
- Approved Design Changes and implementation status are recorded and reported throughout the life of the Plant, which results in the accurate implementation of Design Output information into the physical configuration of the Plant (i.e., the as-built status matches the design documents); and
- Plant configuration documents specifying operations, maintenance, testing, installation, procurement, inspection, and training requirements are updated and maintained consistent with the Plant design.

Under BP-PROG-10.02 [106] Engineering Change Control, design changes and modifications are controlled so the design documentation remains consistent with the as-built and as-operated station and the design basis and design requirements. This includes non-physical changes to the design, which are covered via BP-PROC-00542 [108] Configuration Information Control. Physical changes are covered via BP-PROC-00539 [107] Design Change Package.

The link to Safety Analysis is captured in BP-PROC-00363 [94], Nuclear Safety Assessment, which was discussed in Section 5.2.3. Lower tier procedures under BP-PROC-00363, including DPT-NSAS-00011 Configuration Management of Safety Analysis Software [97], DPT-NSAS-00012 Preparation and Maintenance of Operational Safety Requirements [98], DPT-NSAS-00015 Planning and Execution of Nuclear Safety Assessments [99], and DPT-NSAS-00016 [100], Integrated Aging Management for Safety Assessment cover: the updating of the SOE; execution of new analysis ensuring its review by those knowledgeable in the SOE; and the requirement to ensure that the condition of the plant is monitored and inspected so the results can be used to ensure that current safety margins of the aged plant remain adequate.

As part of the SOE program, if the Safety Analysis limits are adjusted, the operating documentation including items such as the Operating Manuals and Safety System Testing is adjusted to remain in configuration.

Non-conformances in configuration are identified as per the BP-PROC-00060 [67], the Station Condition Record Process. Trends in configuration can be captured. Ongoing implementation is also monitored through reviews of audit findings related to configuration management.

Separately, CM oversight and trending is performed per BP-PROC-00470 [141] Configuration Management Program Oversight and Trending, which establishes a mechanism for monitoring, trending and reporting the health of the Bruce Power CM Program.

The WANO PO&C on Design and Operating Margin Management CM.1, Operational Configuration Control CM.2, Maintenance Fundamentals MA.1, Design Change Processes CM.3, Nuclear Fuel Management CM.4, Operations Fundamentals OP.1, Operational Risk OF.2 and Corporate Support and Performance CO.5 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews. Shortcomings in Maintenance Procedure Adherence captured under MA.1 were noted, but this was not applicable to Configuration Management.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

For example, Section 7.2.1.2 notes the overall Configuration Management Engineering functional area procedures was found to meet the requirements of the Program documents although minor gaps and misalignments were found with respect to Bruce Power Management System requirements.

No gaps against this review task were identified.

Bruce Power programs and procedures meet the requirements of this review task, as there are suitable arrangements in place for maintaining the configuration of the nuclear power plant and operations are performed in accordance with the safety analysis of the plant.

5.3.11. Continuous Improvement Programs

This review task requires verification that there are programs in place for ensuring continuous improvement, including self-assessment and independent assessment.

This requirement is consistent with Section 5.14 of N286-05 [23] and similarly Sections 4.11 and 4.13 of N286-12 [24].

The BP-MSM-1 [35], Management System Manual under Values and Behaviours, Section 1.3.4 Passion for Excellence, states that Bruce Power is to demonstrate commitment to continuous improvement to create sustainable performance excellence which benefits the stakeholders and Section 5.1 of BP-MSM-1 states that Bruce Power has an established set of performance indicators that are monitored and reported on a regular basis.

Substandard performance and conditions are identified and appropriate corrective action initiated using the processes documented in BP-PROG-01.07 [64], Corrective Action and BP-PROC-00060 [67], Station Condition Record Process.

BP-PROG-01.02 [49], the BPMS program Section 4.5.3 discusses the requirement for each Corporate Functional Area Manager (CFAM) to consider and identify how the processes and practices of the Functional Area ensure continuous improvement.

BP-PROC-00137 [61], the Focus Area Self-Assessment (FASA) is used to achieve continuous improvement by identifying areas needing improvement and initiating corrective actions if weaknesses are identified and communicating and sharing strengths. FASAs are by managers and employees in an effort to confirm that their work process, work activities, human performance and performance results meet the requirements of the Management System and independent audits by the Nuclear Oversight department. The results of the evaluation are then compared against the programs and procedures, regulatory and statutory requirements, management's business goals and expectations, and industry standards of excellence.

Each of the Fundamental procedures in the respective disciplines for example, Engineering, Operations, Maintenance, and Supply include expectations to improve.

Given the pervasiveness of continuous improvement in the industry, there are numerous WANO PO&Cs, including Nuclear Professional NP.1, Long-Term Equipment Reliability ER.3, Performance Monitoring PI.1, Nuclear Safety Culture SC.1, Manager Fundamentals OR.2 Nuclear Organisation Structure and Traits OR.1, Independent Oversight OR.5, Corporate Leadership CO.1 and Corporate Governance CO.2, and Corporate Independent Oversight CO.4 which address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task.

For example, Section 7.1.2 indicates the Focus Area Self-Assessment process audit SA-PI-2013-06 confirmed that the oversight enhancements and initiatives to increase awareness of the FASA process and revisions to the procedure have been effective and embedded into the procedures for each program. Improvements introduced as a result of SA-PI-2013-06 have been effective with the Corporate Corrective Action Review Board (CARB) providing the single most effective oversight improvement.

A subsequent CNSC Inspection (Section 7.3.3) was conducted to assess compliance with regulatory requirements. The assessment inspection measured the compliance with specific clauses of CSA N286-05 and the Bruce Power processes for self-assessment as defined by BP-PROG-01.06, Operating Experience Program and independent assessments defined by BP-PROG-15.01, Nuclear Oversight Management, and related implementing and interfacing documents. CNSC staff had positive observations about the process; however, CNSC staff identified shortcomings in the Bruce Power process for raising SCRs. CNSC staff concluded that, despite the efforts to audit all programs in a three-year period, the performance audits covered only a limited number of the implementing procedures and a risk-based audit methodology was not fully developed. The CNSC staff concluded that the consequence of

these weaknesses is that management does not have complete input information for their effectiveness reviews of the management system. Nonetheless, generally Bruce Power personnel followed the procedures for self-assessments and audits as identified in the program documents BP-PROG-01.06 and BP-PROG-15.01. Furthermore, subsequently improvements have been completed.

The FASA, SA-OCP-2013-04, reviewed BP-PROG-12.01, Conduct of Plant Operations compliance with N286-05 Audit (Section 7.1.3). It provides evidence that programs are in place to ensure continuous improvement. The FASA noted that BP-PROG-12.01 was below standard for quality and completeness; however, it lists all credited requirements of the standard with a few exceptions identified. To address these quality deficiencies the three year document review DCRs were updated with instructions to correct references and an SCR was raised to have a matrix added to BP-PROG-12.01 to specify which procedures satisfy which requirements.

Section 7.2.1 Internal Audits provides a sampling of recent relevant audits, which confirm that when process weaknesses were observed these conditions were recorded as Opportunities For Improvement to assist in the continuous improvement activities relating to the Management System.

Bruce Power programs and procedures meet the requirements of this review task that there are programs in place for ensuring continuous improvement, including self-assessment and independent assessment.

5.4. Safety Culture

The review tasks in this subsection involve a review of the safety culture. Safety culture is a requirement of Section 0.3 of N286-05 and Section 4.2 of N286-12.

5.4.1. Review of the Safety Policy

This review task requires review of the safety policy to verify that it states that safety takes precedence over production and to confirm that the policy is effectively implemented. Section 4.2 (a) of N286-12 covers the need for a nuclear safety policy.

Bruce Power addresses the requirements of this review task through a statement of their safety policy in the Bruce Power MSM [35]. Section 1.3.1 of the MSM states the Safety First Policy. Similarly, BP-PROG-01.02 [49], the BPMS program Section 4.1 states: Safety is the Paramount Consideration for Guiding Decisions and Actions. Each CFAM is required to consider and identify how the processes and practices of the Functional Area over which they have programmatic governance and oversight fosters a healthy nuclear safety culture and ensures that nuclear safety requirements and considerations are given the highest priority within their Functional Area. Furthermore, the following message from the President and Chief Executive Officer is included in BP-MSM-1 stating that top performance is achieved by fostering a healthy Safety Culture.

"Bruce Power embraces and practices strong nuclear safety principles, recognizing that reactor safety, industrial safety, radiation safety, and environmental safety are essential to the successful achievement of our long-term goals and key to its reputation."

BP-MSM-1 states that the Management System addresses and incorporates the following principle, consistent with industry developed standard CSA N286-12, Management system requirements for nuclear facilities [24] and IAEA GS-R-3: The management system for facilities and activities [142]: Safety is the paramount consideration guiding decisions and actions.

Key Results Areas have also been established in the Bruce Power MSM [35] and support implementation of the Safety First Policy:

- Nuclear Performance Index (NPI): NPI is based on a WANO score out of 100 made up of 10 indicators. The WANO performance indicators have been adopted to provide a quantitative indication of plant performance in the areas of nuclear plant safety and reliability and personnel safety. WANO performance indicators encourage emulation of the best industry performance and motivate the identification and exchange of good practices in nuclear plant operation.
- Safety Performance is a set of metrics that measure the ongoing safety performance of Bruce Power staff. Corporate level Key Performance Indicators include Collective Radiation Exposure (e.g., Outage Whole Body Dose) and Industrial Safety Accident Rate [143].

BP-PROC-00892 [63], Nuclear Safety Culture Monitoring provides the framework for Bruce Power to monitor nuclear safety culture between formal assessment activities, in particular to have mechanisms to identify and correct potential gaps in nuclear safety culture.

In 2011, Bruce Power introduced a monitoring process to identify subtle changes in Nuclear Safety Culture between formal assessments. Bruce Power considered this approach a leading practice and implemented Nuclear Safety Culture Monitoring Panels (NSCMPs) at Bruce A as of May 2012. The objective of the NSCMP is to review the material from various managed processes against INPO/WANO Traits of a Healthy Nuclear Safety Culture, which are broadly equivalent to IAEA Safety Culture Characteristics. This review identifies themes for further reflection and action, as well as to foster a common understanding across the organization of Safety Culture.

Bruce Power is using NEI 09-07 Rev 1, Fostering a Healthy Nuclear Safety Culture, as a guide for this process Bruce Power also conducted Nuclear Safety Culture Assessments during the licence period, most recently a comprehensive site wide self-assessment in May-June 2013.

The assessment used the INPO/WANO Traits of a Healthy Nuclear Safety Culture Framework and included a survey, interviews and focus groups as part of the methodology. Results from the assessment were considered and action plans developed to address findings. On a regular basis, leaders at Bruce A are provided structured opportunities to review Nuclear Safety Culture operating experience as part of an industry wide WANO requirement. The INPO/WANO Traits of a Healthy Nuclear Safety Culture were rolled out to all staff through special focus segments during Bruce Power's monthly safety video.

Development of methodologies and sharing of good practice to more quickly assess and respond to potential changes in nuclear safety culture will continue to be a focus. There is an opportunity to undertake more narrow but more frequent assessments and to extend the time between full assessments to every three to five years [139].

CNSC staff was aware of the site-wide Nuclear Safety Culture Assessment and Bruce Power submitted information regarding its 2013 safety culture self-assessment, method, findings, corrective action plans and implementation to the CNSC who concluded that Bruce Power followed the established processes for safety culture self-assessment. In its submission, Bruce Power identified areas for continuous improvement. The progression towards using updated industry standards and participating in developing such standards regarding safety culture and continuous improvement was identified by CNSC staff as a strength for Bruce Power ([144] Section 3.1.2).

The WANO PO&Cs on Nuclear Safety Culture SC.1 and Corporate Leadership (CO.1) address this review task, as does the information provided in the following subsections of Section 5.4. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task, as does the listing of CNSC inspections in Section 7.3.1.

Bruce Power programs and procedures meet the requirements of this review task, as the safety policy states that safety takes precedence over production and the policy is effectively implemented.

5.4.2. Control of Nuclear and Radiation Safety

This review task requires a review of procedures to ensure that nuclear and radiation safety are properly controlled and appropriate measures are applied consistently and conscientiously by all staff.

Nuclear Safety is controlled by ensuring defence-in-depth through the use of appropriate barriers to protect workers, the public and environment. These barriers are physical (established through design), procedural (established through the management system) and operational (implemented through the establishment of qualified, trained, personnel who follow conservative decision making). These tend to fall within broad categories of prevention, mitigation and accommodation. At Bruce Power, Organizational responsibilities and change approval authority has been assigned to promote through standard processes and activities a commitment to Nuclear Safety which is subdivided into four pillars (i.e., Reactor, Radiation, Environment, and Industrial Safety as discussed in Section 4.1).

The organization's core values and behaviours reflect a collective commitment by all nuclear professionals to make nuclear safety the overriding priority, as evidenced in the discipline Fundamentals documents [103][120][122].

The Plant Design Basis Management [93] program ensures that the design basis and defence-in-depth barriers remain intact, while the Engineering Change Control [106] program ensures that changes to the design are thoroughly reviewed from a nuclear safety perspective by including each of the four pillars of safety. The potential impact on nuclear safety is assessed, including the impact on operational risk and the probabilistic safety assessment during design changes. Completed design changes are incorporated into the plant probabilistic safety assessments.

Finally, under the Configuration Management [109] program and in particular through the Margin Management procedure, BP-PROC-00786 [110], design and operating margins are assessed to ensure the operator's ability to maintain the plant under safe conditions even following postulated transient, upset and accident conditions.

BP-PROG-12.05 [126], the Radiation Protection program, outlines how this specific pillar of nuclear safety is achieved. Bruce Power has a policy statement on Radiation Protection Management [35], which is achieved by establishing and implementing standards and processes for the conduct of licensed activities. A suite of procedures available through the Radiation Protection Program [126] defines the processes and standards to ensure that the Policy objectives are met.

Workers performing radiological work are responsible for the safe conduct of radiological work in accordance with the instructions they have been provided. They have the authority to stop work or prevent work that could result in a violation of the Radiation Protection Program, radiation protection standards or procedures, unplanned radiation dose or otherwise endanger personnel.

Bruce Power has a process in place for routine recording and evaluation of radiation doses to workers to ensure the Radiation Protection Program effectiveness. These include:

- Dosimetry and Dose Reporting;
- Bruce A and B Quarterly Operations and Central Maintenance and Laundry Facility (CMLF) Quarterly Technical Reports [145]; and
- Quarterly CNSC Performance Indicator Reports [146][147].

Section 5.2 of the Bruce A and B Quarterly Operations and CMLF Quarterly Technical Reports provides Occupational Dose information in compliance with S-99, Sections 6.4.1 (m) and (n) alert the CNSC to events or likely events where workers may receive a significant dose and provides information on whole body collective dose statistics and doses by work groups (operators, Projects and Modifications, Chemistry, various Maintenance groups).

Section 8.2 of the Quarterly CNSC Performance Indicator Reports provides Operational reports on the Total Station Whole Body Radiation Dose and identifies the number of workers, including those with no dose.

Worker dose control continues to comply with the regulatory requirements to measure and record doses received by workers. No worker or member of the public received a radiation dose in excess of the annual regulatory dose limits or action levels established in the Bruce Power RP program. The dose information for Bruce A and B was provided in Section 2.7 and Appendix D of the CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants for 2013 ([135] Section 3.1.7). Additionally, worker doses and to members of the public were reported in the Bruce A Refurbishment Annual Follow-up Monitoring Program Report, 2013 [148].

CNSC staff did not identify any regulatory non-compliances or areas requiring improvement in 2013 in the application of As Low As Reasonably Achievable (ALARA). All areas for improvement identified in 2012 related to the implementation of Bruce Power's ALARA program, and were addressed in 2013. Bruce Power has established a five-year ALARA plan that includes numerous dose reduction initiatives. In October 2013, during the compliance inspection, CNSC staff noted the successful implementation of ALARA initiatives at Bruce A and B to reduce worker exposures ([135] Section 3.1.7). Similar information is provided annually to the CNSC, for example, the 2014 request for dose input for the Nuclear Power Plant Summary Report was requested from Bruce Power.

The WANO PO&C on Leadership LF.1, Maintenance Fundamentals MA.1, On-Line and Outage Work Management WM.1, Project Management PM.1, Equipment Performance ER.1, Long-Term Equipment Reliability ER.3, Design and Operating Margin Management CM.1, Design Change Processes CM.3, Nuclear Safety Culture SC.1, Management Systems OR.3, Corporate Governance CO.2, Independent Oversight OR.5, Corporate Independent Oversight CO.4, Corporate Support and Performance CO.5, Corporate Communications CO.7, and Nuclear Organizational Structure and Traits OR.1 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. The FASAs in Table 5 and Table 6 identify past Bruce Power reviews relevant to this review task, as does the listing of CNSC inspections in Sections 7.3.1 and 7.3.4.

Bruce Power has effective radiation protection measures in place to protect workers, the public and the environment. A comprehensive review of Bruce Power's RP Program has been reviewed in Safety Factor 15. Safety Factor 15 discusses specific improvements to the processes themselves.

Bruce Power programs and procedures meet the requirements of this review task, as procedures are in place and personnel trained to ensure that nuclear and radiation safety are properly controlled and appropriate measures are applied consistently and conscientiously by all staff.

5.4.3. Questioning Attitude and Conservative Decision Making

This review task requires an assessment of the extent to which a questioning attitude exists and conservative decision making is undertaken in the organization.

Section 0.3 of N286-05 covers the need for an Operational safety focus and the need to define and implement practices that contribute to excellence in worker performance. Section 4.1.2 (a) of N286-12 covers the need to ensure that safety is the paramount consideration in guiding decisions and actions, while Section 4.13 (b) requires critically assessing the effectiveness of the management system to achieve planned results and Section 7.9 instructs operators to operate, monitor and maintain operation within the safe operating envelope. N286 requires design verification self-checking, co-worker verification, supervisory verification, confirmatory testing, and independent inspection of work based on the potential impact of the work.

The BP-MSM-1 [35], Section 7.6 requires each direct report to the President and CEO to foster the development and growth of Nuclear Safety Culture by implementing and communicating the Nuclear Safety message, setting the example for nuclear safety and demonstrating this commitment through words and actions. The Executive Vice-President of Human Resources is accountable for providing strategic Human Resource support and for creating a high performance engaged culture within the organization.

Questioning Attitude and Decision Making are two of the traits listed in the program which positively influence the organization's shared assumptions, values, beliefs, and group norms that describe how things are done at Bruce Power; thus contributing to a more healthy nuclear safety culture. The use of these two traits is identified in Bruce Power procedures and training programs. A sample follows:

BP-PROC-00136 [132], the Plant Operational Review Committee conducts reviews to provide assurance potential issues are addressed in a timely and safe manner. These reviews may include:

- Plant transients or equipment problems and decisions associated with these problems.
- External OPEX events to ensure appropriate compensatory actions have been implemented as necessary.
- Proposed pro-active plans for future or anticipated events (such as outage maintenance or adverse system health events).
- Proposed Operations/Maintenance/Engineering activities.

BP-PROC-00136 states that the Plant Operational Review Committee consistently supports the basis of conservative decision making as outlined in the Bruce Power Nuclear Safety Policy, the Bruce Power Policy on Conduct of Operations and the procedure on Conservative Decision Making, GRP-OPS-00038 [124]. The PORC serves as a forum for challenging the safety culture of the organization and fostering open constructive criticism in the spirit of continuous improvement.

BP-PROC-00561 [122], Operator Fundamentals identifies conservatism as one of the operator fundamentals and states: Conservatism is a bias for action in the direction of plant safety and

includes maintaining a sufficient safety margin, as indicated by parameters. This behaviour avoids challenging the plant and shows a clear desire to protect the reactor core. Similar procedures instill the same knowledge worker fundamentals in General Employee Training and Radiation Protection, Engineering, Maintenance and other nuclear staff [46] [149]. Operators receive training in conservative decision making.

DIV-ENG-00004 [105], Engineering Evaluations describes a process followed by staff in the Engineering Division when responding to degraded equipment or plant conditions; to ensure that adequate risk evaluation is given during the analysis prior to making any such decisions/advice. Such responses that impact on plant equipment need to be carefully considered using appropriate Fundamental Human Performance tools (self-checking, questioning attitude, technical task pre job briefing, validating assumptions and signature). Use of this procedure helps reinforce a culture in which Engineering performs thorough, rigorous evaluations (commensurate with risk) as an input to the Operational Decision Making process and decisions in general.

GRP-OPS-00030 [125], Operational Decision Making and GRP-OPS-00038 [124] Bruce A and B Operations Standards and Expectations provide a structured approach for making operational decisions to support safe, reliable plant operation. The focus of these procedures is on the response to degraded/degrading equipment or plant conditions that are inside OP&P limits and are not clearly defined by procedures and the overall standards for all operational activities, respectively. There may be situations involving reductions in safety margins that evolve over days or weeks, so these procedures provide guidance and instruction to make conservative decisions and to maintain a questioning attitude.

Self-checking and verification provides opportunities to question the work during the planning stages and as it is being completed. Individuals avoid complacency and continuously challenge existing conditions, assumptions, anomalies and activities in order to identify discrepancies that might result in error or inappropriate action. These steps are part of the typical verification activities required by staff (e.g., BP-PROG-10.01 Appendix A requirement reference N286-05 clause 5.10).

Furthermore, Human Performance Tools for Workers and Human Performance Tools for Knowledge Workers [45][46] encourages individuals to stop when unsure, and ensure the conservatism in their activities are understood. These are communicated to staff as part of the Core 4 communication strategy and reinforced continuously by management.

Output from the Nuclear Safety Culture Monitoring process [63] is recorded in forms such as Form-14015 R000. The SLT uses the form to document and rate the 10 traits of Nuclear Safety Culture, such as the Questioning Attitude of their team members providing strengths, opportunities for improvement and findings during the most recent period (a minimum of three meetings are held each calendar year). These are then used by the SLT to determine subtle changes in the Safety Culture.

The WANO PO&C on Nuclear Professional NP.1, Operations Fundamentals OP.1, Maintenance Fundamentals MA.1, Nuclear Fuel Management CM.4, Radiological Safety RS.1, and Nuclear Organizational Structure and Traits OR.1 address this review task.

A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against these PO&Cs following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure that this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, 7.2.2 and 7.3. Furthermore, the corporate audit of Safety Culture showed a strong questioning attitude and recognition of being conservative in decision making [150] as core values and taking corrective action when issues are brought to management's attention. If a procedure is incorrect, Management allows individuals to place things in a safe condition and stop work until the procedure is formally reviewed and if found to be incorrect, corrected.

Bruce Power programs and procedures meet the requirements of this review task, as a questioning attitude exists and conservative decision making is undertaken in the organization.

5.4.4. Reporting and Investigating Instructive Events

This review task requires verification that there is a strong drive to ensure that instructive events are reported and investigated to discover root causes and that timely feedback is provided to appropriate staff on findings and remedial actions.

This is consistent with Section 5.11, 5.14, Annex B.1 (i) of N286-05 and Section 4.1.2 (h) and (k) of N286-12.

The BP-MSM-1 [35], Appendix A on Policy statements says Bruce Power shall foster a culture of open reporting where personnel proactively report all adverse conditions (significant, minor or potential) without fear of reprisal, maintain a culture that has intolerance for unanticipated equipment failures, and drives continuous improvement based on industry leading practices.

Bruce Power addresses the requirements of this review through a suite of programs and procedures that focus on performance monitoring and corrective actions.

The objective of the Corrective Action program [64] BP-PROG-01.07 is to identify and eliminate or mitigate adverse conditions that have resulted in or could result in loss. The program requires that:

- Adverse conditions and non-conformances are promptly identified, documented and reported;
- The causes are determined and corrective action taken to correct, and where appropriate, prevent their recurrence, for significant events and significant conditions adverse to quality;
- Corrective actions taken to address identified causes are tracked to completion;
- Effectiveness is verified for actions taken to prevent recurrence;
- Adverse conditions are trended and periodically analyzed for adverse trends;

- Where warranted corrective actions are put in place to address adverse trends; and
- Periodic assessment of the effectiveness of the program is done based on the results and recommendations obtained from verifications and audits.

Events and incidents are reported according to the guidance provided in BP-PROC-00059, Event Response and Reporting [65]. Immediate action to secure the area and prevent (further) loss is taken where and when it is safe and appropriate to do so.

Fact Finding is the process used to discover and document the facts relating to an adverse condition in support of a Responsible Manager. Fact Finding is conducted in accordance with BP-PROC-00059, Event Response and Reporting [65], for incidents that meet any of the following criteria:

- Significance Level 1 or 2 event as defined by BP-PROC-00060, Station Condition Record Process [67];
- Station Human Performance Clock Reset event as defined in BP-PROC-00794, Monitoring Human Performance [44];
- Other event deemed consequential by Shift Manager, Plant Manager or Senior Manager.

Bruce Power's line management and safety oversight conduct routine field observation and coaching of staff performance. Focused Area Self-Assessments are conducted throughout Bruce Power's departments by line management to identify governance and performance issues. Significant issues identified are addressed through the corrective action program.

Bruce Power staff can identify issues they encounter through the Station Condition Record process, which are evaluated for significance. Independent Audits are conducted at planned intervals to independently evaluate the status of Bruce Power's programs. Issues from either are addressed through the corrective action program.

External evaluations are conducted by the CNSC, WANO, and various registrars such as the Technical Standards and Safety Authority, British Standards Institution and QMI-SAI Global to identify governance and performance issues. These are corrected through the corrective action program.

BP-PROC-00518, Root Cause Investigation [68] supports the Corrective Action Program by providing a process for Root Cause Investigation and Equipment Root Cause Investigations.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Nuclear Safety Culture SC.1 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews. Furthermore, the corporate audit of Safety Culture showed that individuals could openly identify safety issues without concern of retribution [150]. These results were re-confirmed in the 2013 study.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this

review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3.

For example, CNSC staff had positive observations about the Self and Independent Assessment Process (FASA) (Section 7.3.3) which helps to verify the effectiveness of the FASA process. Overall, the audit supported the review of the effectiveness of the program and in general, Bruce Power personnel followed the procedures as identified in their programs. However, CNSC staff identified a number of weaknesses in the raising of SCRs.

CNSC staff concluded that the self-assessment process does not always continually assess and improve the effectiveness with which work activities meet the requirements. Specifically, CNSC staff concluded that despite the efforts to audit all programs in a three-year period, the performance audits covered only a limited number of the implementing procedures of the programs, even though a risk-based audit methodology was not fully developed. The CNSC staff concluded that the consequence of these weaknesses is that management would not have complete input information for their effectiveness management system reviews. Four action notices and four recommendations were raised. Personnel follow the procedures for self-assessments and audits, as identified in the program documents BP-PROG-01.06 and BP-PROG-15.01, but it was acknowledged that some improvements were required. Bruce Power has responded to the action notices and recommendations with formal Action Tracking commitments (managed process) to address the inspection findings.

FASA SA-PI-2014-04 in Section 7.1.2 examined the state of the Focus Area Self-Assessment to confirm that the oversight enhancements and initiatives to increase awareness of the FASA process and revisions to the procedure have been effective and embedded into the procedures for each program. An Annual Self Evaluation Plan worksheet tracks FASA completion requirements. It concluded, overall that the improvements introduced as a result of SA-PI-2013-06 have been effective.

Operations training utilizes past incidents to help familiarize Operators with a better understanding on how to resolve problems, and reinforce teamwork and leadership skills [151].

To communicate events to staff to gain the benefit of inputs and learning, Morning Review Meetings review events that happened on the same date in past years to remind individuals and events are reviewed as part of quarterly Continuing Training. Furthermore, significant events are reviewed at monthly safety meetings.

Issues potentially impacting safety are promptly identified, fully evaluated and promptly addressed and corrected, commensurate with significance. A safety-conscious work environment is maintained in which personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment or discrimination. BP-MSM-1 Sheet 00002 under roles, decision making authority and responsibilities, shows that the Nuclear Oversight & Regulatory Affairs organization ensures that adverse conditions, incidents, and acts/practices/behaviours that represent substandard or non-conformance situations with regard to established quality requirements are identified, investigated, analyzed and corrected. These are reviewed as part of the Nuclear Safety Culture Monitoring Panel meetings held at a minimum three times per year [63].

Output from the Nuclear Safety Culture Monitoring process [63] is recorded in forms such as Form-14015 R000. The Senior Leadership Team uses the form to document and rate the 10 traits of Nuclear Safety Culture such as the Environment for Raising Concerns and Personal Accountability of their team members providing strengths, opportunities for improvement and findings during the most recent period (a minimum of three meetings are held each calendar year). These are then used by the SLT to determine subtle changes in the Safety Culture.

The corporate audit of Safety Culture showed a strong drive for reporting of unsafe events and investigating to discover the root cause [150]. These results were re-confirmed in the 2013 study.

Bruce Power programs and procedures meet the requirements of this review task, as there is a strong drive to ensure that instructive events are reported and investigated to discover root causes and that timely feedback is provided to appropriate staff on findings and remedial actions.

5.4.5. Identification and Challenging of Unsafe Acts and Conditions

This review task requires verification that unsafe acts and conditions are identified and challenged in a constructive manner wherever and whenever they are encountered by plant employees and external staff (contractors).

Bruce Power addresses the requirements of this review task through BP-PROG-01.07, Corrective Action [64] and its supporting procedures. The objective of this program is to identify and eliminate or mitigate adverse conditions that have resulted in or could result in loss.

This program is facilitated by BP-PROC-00060, Station Condition Record Process [67], which is used to document adverse conditions, investigation results and corrective actions related to people, plant, environment and process. The procedure also states that:

“A consistent reporting and evaluation process for identified adverse conditions, including but not limited to non-conformances is required to minimize undesirable impacts on nuclear safety, business loss, and corporate reputation.

This is accomplished by ensuring the following:

- Events, incidents, and error-likely situations are adequately documented;
- Cause(s) are determined;
- Appropriate corrective action(s) are implemented; and
- Lessons learned are identified for communication to internal and external organizations.”

In addition to the SCR process, the Corrective Action Program is supported by BP-PROC-00059, Event Response and Reporting [65]. The procedure identifies the following steps for the process of Incident Response and Reporting, which consists of the following major steps:

- Immediate response, which specifies that employees have a duty to stop work immediately if there is a hazard to themselves, other employees or the plant, secure any hazards if qualified to do so, or secure the scene to protect workers;

- Rapid Learning, which requires the management to identify and arrange for rapid learning within an identified period from the incident;
- Internal and external notifications, which describes the process for identifying Bruce Power managers and staff, as well as any external agencies that need to be informed of the incident; and
- Initiation of an investigation to determine the cause of the incident.

Both employees and contractors are trained on these processes as part of the Nuclear General Employee Training they receive when joining Bruce Power. Refresher training is conducted on an annual basis. Employees and contractors are made aware of the Nuclear Safety Management Policy identified in the BP-MSM-1. The policy states that individuals at all levels of the organization consider nuclear plant safety as the overriding priority. Their decisions and actions are based on this priority, and they follow up to verify that nuclear safety concerns receive appropriate attention. The work environment, the attitudes and behaviours of all individuals reflect and foster such a safety culture.

Bruce Power ensures that reactor safety is the overriding priority in its business decisions and activities, and as the operator of a nuclear power plant accepts that its fundamental reactor safety objective is to protect the public, site personnel and the environment from harm, by establishing and maintaining effective defenses against radiological hazards.

Output from the Nuclear Safety Culture Monitoring process [63] is recorded in forms such as Form-14015 R000. The SLT uses the form to document and rate the 10 traits of Nuclear Safety Culture such as the Decision Making and Problem Identification of their team members providing strengths, opportunities for improvement and findings during the most recent period (a minimum of three meetings are held each calendar year). These are then used by the SLT to determine subtle changes in the Safety Culture.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Nuclear Safety Culture SC.1 address this review task. The extent and diversity of the SCR database shows that adverse conditions are being flagged on a daily basis. A review of the database shows that no adverse conditions applicable to this review task, with respect to report-ability and challenging by employees and contractors, have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, 7.2.2 and 7.3. Furthermore, the corporate audit of Safety Culture showed that identification and challenging of unsafe acts and conditions was a standard value [150]. These results were re-confirmed in the 2013 study.

Bruce Power programs and procedures meet the requirements of this review task, as unsafe acts and conditions are identified and challenged in a constructive manner wherever and whenever they are encountered by plant employees and external staff (contractors).

5.4.6. Learning Culture

This review task requires verification that the organization has a learning culture and it strives continuously for improvements and new ideas, and benchmarks against and searches out best practices and new technologies.

This review is consistent with the requirements of Section 4.13 of CSA N286-12.

Section 2.1 of the BP-MSM-1, Management System Manual [35] lists “Continuous Learning” as one of the components that form the basis of the BPMS, while Section 6.0 provides more in-depth detail. Bruce Power takes action to learn and continually improve the performance of the business, including improvements to governance and equipment and to manage changes arising from such improvements. Continuous learning is facilitated through “Process Improvement” and “Change Management”.

Process Improvement and awareness of changes to the business environment are critical to achieving the desired performance within Bruce Power. Process Improvement and the identification of focus areas are driven by senior leaders. Similarly, Change Management involves recognizing that changes to processes, designs, systems, equipment, materials and documents must be continually identified, justified, reviewed by stakeholders, approved, implemented and evaluated for effectiveness.

In Appendix A of the Management System Manual [35], Bruce Power’s Policy on Human Performance recognizes that the behaviours of all personnel directly impact safe and reliable station operation, and thus leaders use a risk-based approach to reinforce behaviors that contribute to excellence in human performance and establish the conditions that support event-free performance. This includes searching for and eliminating the programmatic and organizational causes of human error, establishing defenses that prevent or mitigate consequences of human error, and insisting on uniform adherence to high standards of performance. All individuals are required to take responsibility for their actions, and are to be committed to continuously improving plant safety, reliability and performance.

Similarly, the Policy on Operating Experience directs personnel to identify, evaluate, and apply lessons learned to prevent adverse conditions or to improve performance with respect to plant safety, reliability and cost. This is carried through to each of the various organization units via the roles and decision making authority and responsibilities identified in the BP-MSM-1 Sheet 0002 [37]. Departments within the company are encouraged to promote a work environment characterized by innovation, creativity, teamwork, transparency, integrity, respect and promote a learning environment [35].

BP-PROC-00147 [62], Benchmarking and Conference Activities is an implementing procedure of the OPEX policy and program. It provides support to Bruce Power in identifying and documenting lessons learned from external sources in order to continuously improve performance by making improvements to Processes/Procedures, Training or System/Equipment Design.

Through benchmarking and conference activities, Bruce Power is able to foster the use of diverse information sources to understand performance gaps and implement corrective actions to improve performance. These activities enable Bruce Power to:

- Identify industry strengths and best practices;
- Identify performance and/or programmatic gap(s) between Bruce Power and industry peers;
- Identify adverse conditions and opportunities for improvement; and
- Identify the specific improvement activities and corrective actions that will be utilized to close performance/programmatic gaps.

Bruce Power investigates facilities that have the distinction for operational excellence and uses the results to make improvements to Bruce Power processes.

In 2011, a monitoring process to identify subtle changes in Nuclear Safety Culture between formal assessments was introduced. Bruce Power considered this approach to be a leading practice, and implemented Nuclear Safety Culture Monitoring Panels (NSCMPs) at Bruce A as of May 2012. Output from the Nuclear Safety Culture Monitoring process [63] is recorded in forms such as Form-14015 R000. The SLT uses the form to document and rate the Continuous Learning of their team members providing strengths, opportunities for improvement and findings during the most recent period (a minimum of three meetings are held each calendar year). These are then used by the SLT to determine subtle changes in the Safety Culture.

Success at Continuous and Performance Improvement are gauged by each organization and by the Nuclear Oversight and Regulatory Affairs (NORA) Division. The Performance Improvement Department facilitates a notion of improving safety culture via BP-PROC-00137, Focus Area Self Assessment [61]. This procedure supports each area in identifying and documenting lessons learned from internal sources in order to continuously improve performance by making improvements to Processes/Procedures, Training, or System/Equipment Design. As was discussed in Section 5.3.11, FASAs provide a tool that focuses on specific areas of a Functional Area's activities, processes or performance to assess the adequacy and effective implementation of their programs and procedures. The results of the assessment are then compared with business needs, the management system, industry standards of excellence and regulatory/statutory or other legal requirements. Similarly, NORA independently reviews each area to provide independent advice on potential improvements.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Nuclear Safety Culture SC.1 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. Opportunities to continuously learn are valued, sought out and implemented. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3. Furthermore, the corporate audit of Safety Culture showed the organization has a learning culture [150]. These results were re-confirmed in the 2013 study.

Bruce Power programs and procedures meet the requirements of this review task, as the organization has a learning culture and it strives continuously for improvements and new ideas, and benchmarks against and searches out best practices and new technologies.

5.4.7. Communication of Safety Issues

This review task requires verification that there is an established and effective process for communication of safety issues.

This review is consistent with the requirements of Section 4.6 of CSA N286-12 and somewhat applicable to Section 5.7 of N286-05.

BP-MSM-1 [35] Section 7.6 clarifies that all Direct Reports to the President and CEO are accountable to foster the development and growth of Nuclear Safety Culture by implementing and communicating the Nuclear Safety message, setting the example for nuclear safety and demonstrating this commitment through words and actions. Specifically via BP-MSM-1 Sheet 0002 [37] under the Roles, Decision Making Authority & Responsibilities states the:

- Corporate Affairs Vice-President is accountable for supporting the development and growth of a Nuclear Safety Culture by communicating the Nuclear Safety message, setting the example for nuclear safety and demonstrating this commitment through words and actions and ensuring actions are adherent to traits of a healthy nuclear safety culture.
- Employee Communications Department Manager is responsible for educating and promoting the development and growth of a Nuclear Safety Culture by communicating the Nuclear Safety message to employees across site.
- Investor and Media Relations Department Manager is responsible for promoting the development and growth of a nuclear safety culture by communicating the nuclear safety message to the public and our stakeholders.

Additionally, the objectives of Bruce Power's Operating Experience Program BP-PROG-01.06, [59] are:

- To use external operating experience information to identify, evaluate and apply lessons learned to improve plant safety, reliability and commercial performance through improvements to processes, procedures, training and system/equipment design; and
- Communicate internal experience from the Bruce Site to others in the Nuclear Industry in order to improve nuclear plant safety, reliability and commercial performance around the world.

One of the main objectives of the OPEX Program is to capture OPEX and transfer the lessons learned to staff by making updates and/or improvements to training material. One of the program's implementing procedures, BP-PROC-00062 [60], Processing External and Internal Operating Experience requires that OPEX be incorporated into procedures, training material, and system/component design to ensure that these valuable lessons are effectively communicated to staff and relevant OPEX is reviewed in Pre-Job Briefings. BP-PROC-00062 requires supervisors to ensure personnel discuss the OPEX relevant to the work performed. This allows supervisors and managers to emphasize key lessons learned that are applicable to the activity.

BP-PROC-00062 [60] Section 4.2 states that Learning from OPEX information and supporting a healthy Nuclear Safety Culture is everyone's responsibility and identifies effective safety communications as one of the traits of a healthy safety culture. Personnel are required to communicate internal lessons learned to the site. Lessons learned can originate from Plant Evolutions, Outages, High Risk Evolutions, or Post-Job Critiques. To further assist personnel in accessing relevant OPEX, Operating Experience information is available on the corporate intranet.

As discussed in Section 4.1, BP-PROG-02.07 [80] on Employee Communications stresses the need to work to promote and contribute to safety culture awareness on the part of employees with the goal of improving nuclear safety performance and underscoring corporate values in the areas of environmental safety, industrial safety, radiological safety and reactor safety ([80] Section 1.0).

Each morning manager review meetings discuss safety issues that arose the previous day and those issues not resolved from the previous days. Staff receive regular weekly safety inputs from the Chief Operating Officer and from their Department Managers and monthly safety meetings are held, with attendance recorded as part of the standard staff input to the financial reporting system.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Nuclear Safety Culture SC.1 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure that this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, 7.2.2 and 7.3. Furthermore, the corporate audit of Safety Culture showed that communication and safety were clear strengths [150]; these results were re-confirmed in the 2013 study.

Bruce Power programs and procedures meets the requirements of this review task, as there is an established and effective process for communication of safety issues.

5.4.8. Prioritization of Safety Issues to Ensure Proper Resourcing

This review task requires verification that there is a process in place for prioritization of safety issues, with realistic objectives and timescales that ensures that these issues receive proper resources. This review is consistent with the requirements of Section 4.1.3 of CSA N286-12.

B-HBK-08130-00001 [56] GOSP Implementation Handbook, Section 4.3.1 on Responsibilities of the CFAM identifies that the CFAM is responsible for the adequacy of the suite of all documentation and processes associated with the Functional Area. Adequacy includes adopting a graded approach where appropriate for business needs and ensuring that the Functional Area meets requirements in a manner that reflects safety as the overriding decision-making priority and fosters a healthy nuclear safety culture.

Bruce Power Procedure, BP-PROC-00162, Business Risk Management – Business Risk Register [48] provides guidance and tools to:

- Identify threats and opportunities which could impact the ability to achieve the business plan objectives and results;
- Reinforce with all managers that the management of risk is one of their primary accountabilities;
- Maintain a comprehensive and up to date register (i.e., Risk Register) of threats and opportunities which could impact the ability to achieve the business plan objectives and results;
- Monitor the effectiveness of risk mitigating and optimizing activities, including ensuring that actions are developed and executed in a timely fashion and that risks are managed to an acceptable level; and
- Facilitate the Executive Team's review of risks and quarterly reporting of the top risks to the Board of Directors.

As part of this procedure, risk owners are required to assess the impact of the risk to the business plan by multiplying the probability of occurrence by its impact (Probability x Impact = Net Impact). In addition to ranking the risks based on their Net Impact, risk owners should develop action plans that "mitigate the threat to an acceptable level of exposure".

The Risk Status Rating used in this process includes four levels:

- Green, which indicates that either the risk has been reviewed and accepted and no response plan is required or that the risk response plan is complete;
- White, which indicates that the response plan is defined and approved;
- Yellow, which indicates that the response plan is defined and is being implemented; and
- Red, which indicates that either the threat has materialized or that the response plan is not effective.

Appendix E of this procedure provides guidance for risk identification and includes sources such as asset life cycle management, system and component health assessments and SCRs.

Risk logs are maintained to identify threats and opportunities that could impact Bruce Power's ability to achieve its business plan objectives, results and the Safety Policy.

BP-PROC-00559, Station Plant Health Committee [113] (SPHC) defines how the Bruce A SPHC is conducted as an effective management tool enabling the station leadership team to make informed and timely decisions in support of equipment reliability that results in safe and reliable plant operation. As part of this process, the SPHC ensures that the proper prioritization; ownership; organizational alignment; resources; and accountability are in place to resolve station issues affecting system/component performance. The procedure requires the FORM-12881, SPHC Initiative Prioritization Worksheet [152] to be completed. This form provides a framework for ranking of impact of the identified issue to equipment reliability based on an assessment of its impact on the four pillars of Safety.

Additionally, DPT-NSAS-00003, Guidelines for Evaluating and Prioritizing Safety Report Issues [95] describes the process and the responsibilities of associated personnel, for the step pertaining to the evaluation and prioritization of Safety Report analysis issues. The Nuclear Safety Analysis and Program Integration (NSAPI) Section of the Nuclear Safety Analysis and Support Department receive Safety Report analysis issues, of varying complexity and safety significance, from a number of sources. The issues are assessed to decide if they could impact the Safety Report analysis sections and whether they require analysis. Any analysis is scheduled and performed, the results documented, and submitted to the CNSC as necessary. The issues received and the steps taken to resolve them must be documented so information on their resolution is readily available for traceability and future reference.

Additionally, BP-PROC-00498, Condition Assessment of Generating Units in Support of Life Extension [115] aims to evaluate the physical condition, functionality of, and remaining service life of SSCs. The assessment leads to two determinations:

- First, whether there are there any SSCs which are not practical to replace that would prevent a life extension project from being undertaken. (An example might be vault concrete deterioration.)
- Second, the SSCs recommended for replacement or repair during a contemplated refurbishment outage and those repairs deferred to future outages.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Nuclear Safety Culture SC.1 address this review task. A review of the SCR database shows that no adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, 7.2.2 and 7.3. For example, subsequent to Bruce Power's recent licence renewal application, a CNSC Type II Inspection related to Condition Assessments [153], was conducted to assess improvements to the condition assessment methodology as documented in BP-PROC-00498 [115]. CNSC staff concluded there are no major issues associated with the condition assessment methodology; however, it made recommendations to address procedure issues related to not providing clear guidance on how the identified issues should be ranked. Changes are in progress at the time of writing of this report, while CNSC staff recommendations have been added to PassPort in the interim [153].

Bruce Power programs and procedures meet the requirements of this review task, as there is a process in place for prioritization of safety issues, with realistic objectives and timescales that ensures that these issues receive proper resources

5.4.9. Clarity of the Organizational Structure

This review task requires verification that there is a method in place for achieving and maintaining clarity of the organizational structure and managing changes in accountability for

matters affecting safety. This review is consistent with the requirements of Section 4.4 of CSA N286-12.

BP-MSM-1, Management System Manual [35] identifies one of the responsibilities of the CEO as leading and fostering a nuclear safety culture and establishing an organization where reporting relationships, positional authority, human resources, financial resources and corporate policy support and emphasize the overriding importance of nuclear safety.

This document also provides information on roles and responsibilities of Direct Reports to the President and CEO, which includes that they are accountable to foster the development and growth a of Nuclear Safety Culture by implementing and communicating the Nuclear Safety message, setting the example for nuclear safety and demonstrating this commitment through words and actions.

Section 7.0 of the Management System Manual [35], states that Bruce Power's organizational effectiveness is determined by the design of its organization structure, and the clear specification of responsibilities, authorities, accountabilities, and interfaces associated with each of the defined management and individual contributor roles/positions.

As such, the Management System Manual serves the objective of ensuring clarity of the organization structure and managing any changes in accountability for matters affecting safety.

Additionally, BP-OPP-00002, Operating Policies and Principles – Bruce A [40] identify Senior Operations Authority as being specifically accountable for ensuring the ongoing safe operation of the station within the safe operating envelope and licence requirements.

In 2013, a WANO Corporate Peer Assessment was conducted. An AFI associated with implementation of the BPMS [49] was raised so that personnel could readily understand the responsibility alignment regarding the use of the GOSP to meet Performance Objectives in the GOSP Implementation Handbook, B-HBK-08130-00001 GOSP [56]. Specifically, PO&Cs CO.1 on Corporate Leadership and CO.2 on Corporate Governance were cited in the WANO assessment. This resulted in the recent update to the GOSP Implementation Handbook.

A review of the SCR database shows that no further adverse conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, 7.2.2 and 7.3.

Bruce Power programs and procedures meet the requirements of this review task, as there is a method in place for achieving and maintaining clarity of the organizational structure and managing changes in accountability for matters affecting safety.

5.4.10. Training in Safety Culture

This review task requires verification that there is adequate training in safety culture, particularly for managers. Section 4.2 of CSA N286-12 covers Safety Culture and requires Management to

define and implement practices that contribute to excellence in worker performance; however, training on safety culture is not specifically mentioned.

“Safety First” is one of Bruce Power’s “Values” as stated in BP-MSM-1, Management System Manual [35] and is to guide conduct daily. Working Learning and Qualification Management Policy in the MSM states that the Programs under this policy shall provide competent personnel who can safely operate, maintain, and improve performance of the Bruce Power Stations. The program(s) created to implement this Policy must satisfy the requirements of applicable legislation (e.g., acts and regulations), licences, certifications, and codes and standards commensurate with Bruce Power’s business needs and do so in a manner that meets training Guidelines from WANO and INPO, including training on Safety Culture.

One of the implementing procedures of the BP-PROG-01.06 [59], BP-PROC-00892 [63], Nuclear Safety Culture Monitoring provides a framework to monitor nuclear safety culture between formal-assessment activities, in particular to have mechanisms to identify and correct potential gaps in nuclear safety culture. The approach is collegial and supports the development of a common understanding of safety culture within senior and middle levels of leadership at the nuclear power stations and describing the traits and attributes of the desired safety culture. The purpose of the procedure is not to directly measure culture; rather, it tries to characterize the health of the nuclear safety culture and provide a means for embedding the 10 Traits of a healthy Nuclear Safety Culture (INPO 12-012) within all levels of the organization. It suggests optional process inputs, such as Corrective Action Process trending of training feedback. The key process elements include the process inputs, nuclear safety culture review meetings and the actions arising from the insights derived as a result of the process. It suggests a review of Site Performance Indicators, such as training can surface underlying nuclear safety culture issues.

A review of the Certification Training Handbook B-HBK-09510-00005 [77] confirms that Nuclear Safety and Safety Culture training is provided as part of Operations Training for the Unit 0 Control Room Operators and Authorized Nuclear Operators as part of their second group of training activities.

Furthermore, managers are given specific Safety Culture training as part of module 3 of their Principles of Nuclear Safety training under Program Element (PEL) #13128 via Training Aid TA-13128-00003, “Safety Management and Safety Culture”. Furthermore PEL 61556 and PEL 63293 on the Bruce Power Leadership Academy and INPO Shift Manager Professional Development Seminar include the key topic of Safety Culture [154]. As part of standard agenda for BP-PROC-00892 Nuclear Safety Culture Monitoring [63], Appendix D, E and F, managers review root cause investigation reports, significant SCRs, Regulatory Findings, Industry Evaluations, and Site Performance Indicators, among other items.

As part of lesson planning, numerous instructor lesson plan documents refer to the need to discuss safety culture as a reminder to instructors to frequently reinforce and discuss Bruce Power commitments to institute a strong Safety Culture.

The WANO PO&C on Nuclear Organizational Structure and Traits OR.1 and Nuclear Safety Culture SC.1 address this review task. A review of the SCR database shows that no adverse

conditions applicable to this review task have been identified against this PO&C following the 2014 WANO station and 2013 corporate reviews.

A review of the PassPort A/Rs shows that Bruce Power has a managed system to continuously improve and enhance their programs and procedures to strengthen the means to ensure this review task meets requirements. This was confirmed by a review of the assessments and audits discussed in Sections 7.1, 7.2, and 7.3.

Bruce Power programs and procedures meet the requirements of this review task, as there is adequate training in safety culture including for managers.

6. Interfaces with Other Safety Factors

There is some degree of interrelationship among most of the 15 Safety Factors that comprise the Bruce A ISR. The following identifies specific aspects of this Safety Factor that are addressed in, or where more detail is provided in, another Safety Factor Report.

- "Safety Factor 8: Safety Performance" in Section 5.14, assesses the overall safety performance of the Station looking for potential trends and future safety concerns to identify deteriorating safety performance.
- "Safety Factor 9: External OPEX and R&D" in Section 4.2, addresses the effectiveness of implementation of the Operating Experience program, including elements of event investigations and the Corrective Action Program.
- "Safety Factor 11: Procedures" in Appendix B.1, performs a clause-by-clause assessment of IAEA SSR-2/2. The results of this clause-by-clause assessment are applied in the assessment of the review tasks in this report. In Sections 4 and 5.3 of Safety Factor 11, BP-PROG-08.01, Emergency Management is discussed in detail.
- "Safety Factor 12: The Human Factor" Section 5.1, reviews the adequacy of staffing levels for the operating plant. In Section 5.2 of Safety Factor 12, a review of the adequacy of worker qualification and training has been performed, which examines whether deficiencies in the quality of the procedures potentially represent a significant adverse contribution to risk. Safety Factors 10 and 12 both include S-210, and a discussion on RD-204, G-323, and CNSC REGDOC-2.2.2.

7. Program Assessments and Adequacy of Implementation

Section 7 supplements the assessments of the review tasks in Section 5, by providing information on four broad methods used to identify the effectiveness with which programs are implemented, as follows:

- Self-Assessments;
- Internal and External Audits and Reviews;
- Regulatory Evaluations; and
- Performance Indicators.

For the first three methods, the most pertinent self-assessments, audits and regulatory evaluations are assessed. Bruce Power has a comprehensive process of reviewing compliance with Bruce Power processes, identifying gaps, committing to corrective actions, and following up to confirm completion and effectiveness of these actions. While there have been instances of non-compliance with Bruce Power processes, Bruce Power's commitment to continuous improvement is intended to correct any deficiencies.

For the fourth method, the performance indicators relevant to this Safety Factor are provided. These are intended to demonstrate that there is a metric by which Bruce Power assesses the effectiveness of the programs relevant to this Safety Factor.

Taken as a whole, these methods provide a cross section, intended to demonstrate that the processes associated with this Safety Factor are implemented effectively (individual findings notwithstanding). Thus, program effectiveness can be inferred if Bruce Power processes meet the Safety Factor requirements and if there are ongoing processes to ensure compliance with Bruce Power processes. This is the intent of Section 7.

7.1. Self-Assessments

Generally, self-assessments are used by functional areas to assess the adequacy and effective implementation of their programs. The results of the assessment are compared with business needs, the Bruce Power management system, industry standards of excellence and regulatory/statutory or other legal requirements.

The self-assessments:

- Identify internal strengths and best practices;
- Identify performance and/or programmatic gap(s) as compared to targets, governance standards and "best in class";
- Identify gaps in knowledge/skills of staff;
- Identify the extent of adherence to established processes and whether the desired level quality is being achieved;

- Identify adverse conditions and Opportunities for Improvements (OFI); and
- Identify the specific improvement corrective actions to close the performance/programmatic gap.

Selected recent Self-assessments relating to this Safety Factor are listed in Table 5.

Table 5: Focus Area Self-Assessment Reports

FASA	Topic	Applicable to Review Section
SA-BPMS-2014-01	Compliance with CSA N286-05	All of 5.2, 5.3, 5.4
SA-BPMS-2013-01	INPO Corporate PO&Cs Gap Analysis	All of 5.2, 5.3, 5.4
SA-BPMS-2012-02	Documentation Review against N286-05 Requirements and Understanding	All of 5.2, 5.3, 5.4
SA-BPMS-2012-01	BPMS Effectiveness Review against N286-05 Requirements and Understanding	All of 5.2, 5.3, 5.4
SA-BS-2014-01	Oversight to Pressure Boundary QA Program Requirements, Section 6 - Document Control	5.2.2, 5.3.3
SA-BS-2012-01	Review Effectiveness of DCR Process	5.3.3
SA-COM-2014-01	Installation & Commissioning Performance	5.2.2, 5.2.5, 5.3.3, 5.3.10
SA-COM-2011-03	CM Performance Indicators & Configuration Management Index	5.3.10
SA-COM-2011-10	Fidelity of Configuration Information to Plant	5.3.3, 5.3.10
SA-ERI-2014-08	Effectiveness of deployment of SmartSignal at BA and BB	5.2.4, 5.2.5, 5.4.4, 5.4.5, 5.4.8
SA-ERI-2014-07	Quality of System Health Reporting	5.2.4, 5.2.5, 5.3.3, 5.4.4, 5.4.5
SA-ERI-2014-06	Heat Exchanger Program	5.2.4, 5.2.5, 5.3.3
SA-ERI-2014-05	ER interface with PB Program	5.2.2, 5.2.4, 5.2.5

FASA	Topic	Applicable to Review Section
SA-ERI-2014-01	Review of Data Needs to Assess SSC Aging	5.2.4, 5.2.5, 5.3.3
SA-HP-2011-01	Screening and Evaluating External OPEX	5.3.9
SA-MPA-2010-01	Work Management Execution	5.2.5
SA-NSAS-2010-03	Use of OPEX in Fuel Channels Life Cycle Management & Life Extension of Fuel Channels	5.3.9
SA-OCP-2013-04	BP-PROG-12.01 N-286.5 Audit	5.2.2, 5.4.2
SA-PI-2014-04	Effectiveness of FASA Process Improvements, Performance Improvement	5.3.11, 5.4.6
SA-PI-2014-02	External OPEX Applicability Responses	5.3.9
SA-PI-2013-02	OPEX - Utilization of Significant Internal OPEX	5.3.9
SA-PI-2012-02	OPEX Training Materials	5.3.9
SA-RPR-2014-01	EPD Alarm Follow-up at Bruce A and Bruce B	5.2.2, 5.3.9, 5.4.2
SA-RPR-2013-05	Discrete Radioactive Particle Control Evaluation for Bruce A	5.4.2
SA-RPR-2013-04	Locked High Radiation Area Controls	5.3.11, 5.4.2, 5.4.3, 5.4.6,
SA-RPR-2013-03	Review against WANO RP Guidelines	5.4.2
SA-RPR-2013-02	Bruce Power CANDU Radiological Protection Benchmarking Project Assessment	5.3.9, 5.4.2
SA-SC-2012-06	Procurement/Expediting Of Unplanned/Unscheduled Work	5.2.3, 5.3.4
SA-SC-2014-05	Effectiveness review of Implementation of Supply Chain metrics / dashboard	5.2.3, 5.3.4, 5.3.5
SA-SC-2014-04	Supplier Document Acceptance Request	5.2.3, 5.3.4, 5.3.5

FASA	Topic	Applicable to Review Section
SA-SC-2014-03	Quality Services Governance Review	5.2.3, 5.3.4, 5.3.5
SA-SC-2014-02	Application of Contract Administration Activities	5.2.3, 5.3.4, 5.3.5
SA-SC-2014-01	Implementation Effectiveness of BP-PROC-00353	5.2.3, 5.2.5
SA-SC-2012-01	Vendor Audit	5.2.3, 5.3.4, 5.3.5
SA-TRGD-2014-14	Pressure Boundary Quality Assurance Program	5.3.2, 5.3.7, 5.3.8
SA-TRGD-2014-13	Qualifications not associated with TQDs	5.3.2, 5.3.7, 5.3.8
SA-TRGD-2014-10	Initial Simulator Examinations	5.3.2, 5.3.7, 5.3.8
SA-TRGD-2014-06	Complement Qualifications (TQD-00088), Qualification Structure Clarity	5.3.2, 5.3.7, 5.3.8
SA-TRGD-2014-03	Compliance with the Engineering Continuing Training Requirements	5.3.2, 5.3.7, 5.3.8
SA-TRGD-2014-01	Operations Training Assessment of SOER 2013 Recommendation 1 (Operator Fundamentals)	5.3.2, 5.3.7, 5.3.8
SA-TRGD-2012-04	Review of Training Programs	5.3.7
SA-WMSI-SA-2013-01	Graded Approach to Scheduling	5.2.5
SA-WMSI-2014-01	Bruce A – Scheduling and Building of WO's and WR's	5.2.5
SA-WMSI-2013-03	On-Line Work Management	5.2.5

7.1.1. SA-BS-2014-01 Oversight to Pressure Boundary QA Program Requirements, Section 6 - Document Control

The objective of this FASA was to review BP-PROG-03.01, Document Management and implementing procedures to determine if current processes, work activities, and performance results meet BP-PROG-00.04, Pressure Boundary Quality Assurance Program, Section 6 – Document Control requirements. The FASA confirmed the current approved Bruce Power

Controlled Documents processes are aligned with the requirements of the pressure boundary document control processes.

7.1.2. SA-PI-2014-04 Effectiveness of FASA Process Improvements, Performance Improvement

This assessment is relevant, as it examined the state of the Focus Area Self-Assessment to confirm the oversight enhancements and initiatives to increase awareness of the FASA process and revisions to the procedure, have been effective and embedded into the procedures for each program. An Annual Self Evaluation Plan worksheet tracks FASA completion requirements.

SA-P1-2013-06, FASA Program Effectiveness, was performed in 2013 and identified deficiencies in implementation that were directly related to: lack of station awareness of the FASA process or its purpose; lack of oversight at the appropriate levels and lack of appropriate corrective actions resulting from FASAs. An analysis of FASA data, including schedule adherence, team composition and resulting corrective actions has provided insight into the effectiveness of recent improvements that were made to the FASA process. There is still opportunity to further improve and advance the FASA program, and a CNSC Type II compliance Inspection (BRPD-AB-2014-004) in Q1 2014 noted instances of non-compliance with specific procedures requiring the conduct of annual or bi-annual FASAs. This inspection issue was immediately addressed and an action plan raised to ensure it is rectified for the 2015 Self Evaluation Annual Planning.

Enhanced communication to the CFAMs and Peer Group members regarding their requirements, FASA website tools and the addition of a multiyear "Functional Area Assessment Matrix" aided CFAMs and Peer Groups in identifying these requirements. BP-PROG-01.02 [49] was revised to document the improved understanding. The senior station representatives at the monthly Corporate CARB meetings and greater use of communication vehicles, such as The Point and the Visual Management Board (VMB) [155], will serve to further increase awareness.

Overall, the improvements introduced as a result of SA-PI-2013-06 have been effective with the Corporate CARB providing the single most effective oversight improvement. It is expected that as FASAs remain on the agenda and FASA participants are held to a higher level of accountability, FASAs will be more effectively scheduled, resourced and completed.

7.1.3. SA-OCP-2013-04 BP-PROG-12.01 N-286.05 Assessment

The objective of this FASA was to confirm that BP-PROG-12.01 [121] Conduct of Plant Operations and associated implementing procedures, correctly reference the requirements of CSA N286-05 [23] credited by BP-PROG-01.02 Bruce Power Management System Management.

It was found that BP-PROG-12.01 is largely aligned with BP-PROG-01.02 Appendix B, Bruce Power Program Alignment to N286-05 [23]. However, there were four requirements that Appendix B credits 12.01 with that were not listed in BP-PROG-12.01. Additionally, many implementing procedures did not reference any of the requirements of the standard, some

reference requirements were not credited in BP-PROG-12.01, while some should have been referencing additional requirements. Numerous procedures take authority from GRP-OPS-00038 instead of BP-PROG-12.01. Overall, BP-PROG-12.01 lists all credited requirements of the standard, except as noted above, and therefore was found to be below standard for quality and completeness.

The three year document review DCRs were updated with instructions to correct references and an SCR was raised to have a matrix added to BP-PROG-12.01 to specify which procedures satisfy which requirements. This negates the requirement to specify this in the implementing procedures. BP-PROG-12.01 [121] was revised to remove the shortcomings from this FASA and AU-2013-00014 as documented in its revision summary.

Appendix B of BP-PROG-01.02, BPMS Management System has been removed and the onus is on the respective CFAMs to ensure that their programs comply with the appropriate clauses of CSA Standard N286. As part of the preparation for compliance with N286-12, programs are reviewed to ensure consistency with the CSA Standard.

7.2. Internal and External Audits and Reviews

The objective of the audit process as stated in BP-PROG-15.01 [130] is threefold:

- To assess the Management System and to determine if it is adequately established, implemented, and controlled;
- To confirm the effectiveness of the Management System in achieving the expected results and that risks are identified and managed; and
- To identify substandard conditions and enhancement opportunities.

The objective is achieved by providing a prescribed method for evaluating established requirements against plant documentation, field conditions and work practices. The process describes the activities associated with audit planning, conducting, reporting, and closing-out. The results of the independent assessments are documented and reported to the level of management having sufficient breadth of responsibility for resolving any identified problems (as stated in Section 5.14.2 of [23]).

Audits are planned and scheduled annually and tracked to ensure that they are performed regularly [131]. Requirements and the frequency of audits for specific areas is given in documents, such as CSA N286, the PROL based on CSA N285, N288.4, 288.5, 288.7, 293, and S-296, with the frequency generally ranging from annually to every 3 calendar years.

7.2.1. Internal Audits

Table 6 identifies key audits related to this Safety Factor selected from a list of audits completed after 2008.

Table 6: Corporate Risk Oversight and Audit Division Audits

Audit	Topic	Applicable to Review Section
AU-2014-00020	Task Planning	5.2.5
AU-2013-00018	Fluid Leak Management Program	5.3.9
AU-2013-00015	PassPort Equipment Data Management	5.3.3, 5.3.7, 5.3.10
AU-2013-00013	Training	5.3.2, 5.3.7, 5.3.8
AU-2013-00011	Dosimetry Program - Health Physics Lab	5.2.2, 5.3.2, 5.3.3, 5.3.7, 5.3.8, 5.4.2
AU-2013-00008	Outage Management	5.2.2, 5.2.5
AU-2013-00007	Bruce Power Management System	5.2.2, 5.4.4
AU-2012-00017	Supply Chain	5.2.3, 5.2.4, 5.3.4, 5.3.5, 5.4.4, 5.4.8
AU-2012-00016	Procurement Engineering	5.2.2, 5.3.4
AU-2012-00015	Critical Drawing Management	5.2.2, 5.2.5, 5.3.10
AU-2012-00011	Records Management	5.2.2, 5.3.3
AU-2012-00010	Dosimetry Program - Health Physics Lab	5.2.2, 5.3.2, 5.3.3, 5.3.7, 5.3.8, 5.4.2
AU-2012-00005	Configuration Management Engineering	5.2.2, 5.3.10
AU-2011-00013	Radiation Protection and Alpha Radiation Recovery Plan	5.2.2, 5.3.3, 5.4.2, 5.4.4
AU-2011-00012	Dosimetry Program - Health Physics Lab	5.2.2, 5.3.2, 5.3.3, 5.3.7, 5.3.8, 5.4.2
AU-2011-00010	Performance Improvement	5.2.2, 5.3.9
AU-2010-00031	N286.5 Implementation	All of 5.2, 5.3, 5.4
AU-2010-00030	Radioactive Shipments	5.4.2

Audit	Topic	Applicable to Review Section
AU-2010-00024	Root Cause Investigation Audit	5.3.9, 5.4.4
AU-2010-00023	Records Retention Authorization	5.3.3
AU-2010-00016	Re-Certification Training	5.2.2, 5.3.2, 5.3.3, 5.3.7, 5.3.8
AU-2010-00006	Dosimetry Program	5.2.2, 5.2.3, 5.3.2, 5.3.3, 5.3.4, 5.3.7, 5.3.8, 5.4.2
AU-2009-00026	Service Water OPEX	5.3.9, 5.4.4
AU-2009-00013	Radiation Protection Practices	5.3.7, 5.4.2, 5.4.4

Similar to the findings in the 2008 ISR, the sampling of audits reviewed provide evidence that the audit process is effective and audits, when conducted, go into sufficient detail to evaluate the process to determine whether it is implemented and complies with requirements. All audit reports reviewed contained records of the audit plans, briefings, and clear audit scopes. Reports contain detailed references to samples reviewed and adverse conditions observed during the assessment. Where process weaknesses were observed, these conditions were recorded as opportunities for improvement and appropriately flagged in the SCR system to assist in the continuous improvement activities relating to the Management System.

7.2.1.1. AU-2011-00010, Performance Improvement

The objective of this internal audit [156] was to assess the elements of the following programs in the Performance Improvement Department:

- BP-PROG-00.07 [43], Human Performance Program;
- BP-PROG-01.06 [59], Operating Experience Program; and
- BP-PROG-01.07 [64], Corrective Action.

The audit concluded that overall the programs within Performance Improvement are well documented and thorough. The assessment identified a number of minor shortcomings and misalignments and four Action Requests under the Corrective Action process were raised to address them.

7.2.1.2. AU-2012-00005, Configuration Management Engineering

Independent assessments of Programs are generally conducted every 3 years. This audit was conducted in June 2012. There were two objectives of this audit:

Assess the elements of the following programs in the Configuration Management Engineering functional area for completeness and implementation:

- BP-PROG-10.01 [93], Plant Design Basis Management;
- BP-PROG-10.02 [106], Engineering Change Control; and
- BP-PROG-10.03 [109], Configuration Management.

Additionally, assess if requirements of the previous versions of Design Change Package procedures BP-PROC-00539 [107] and BP-PROC-00433 [157] align.

Overall the implementing procedures for the Configuration Management Engineering functional area were found to meet the requirements of the Program documents. Minor gaps and misalignments were found with respect to Bruce Power Management System requirements.

- Implementing procedures for the Configuration Management Engineering functional area programs contain non-adherences to the previous versions of BP-PROC-00166 [51], Procedure and Process Requirements.
- Configuration Management Engineering functional area program documents contain non-adherences to BP-PROC-00774 [54], Program Requirements.
- There were some gaps between the previous versions of Design Change Package Procedures BP-PROC-00539 and BP-PROC-00433. Definitions of terms are not consistent between the procedures and BP-PROC-00433 did not refer to the processes for Software Modifications, Field Change Notices and Temporary Modifications, such as BP-PROC-00539.

The audit identified three adverse conditions related to Configuration Management Engineering that were subsequently addressed through the revisions of the documents.

7.2.1.3. AU-2012-00016, Procurement Engineering

The objective of this audit was to assess the implementation and technical compliance of BP-PROC-00244, Procurement Engineering. The audit was completed in January 2013. Specifically, the audit assessed the implementing procedures associated with the Catalog Identification Numbers (CAT-ID) Evaluation and Pre-Screening processes, and evaluated the extent to which the associated procedures are maintained.

The audit found the Procurement Engineering processes associated with CAT-ID Evaluation and Pre-Screening processes were not readily complied with, and procedures associated with the Procurement Engineering processes are not managed in accordance with the prescribed requirements.

Regarding the CAT-ID Evaluation and Pre-Screening process compliance:

- The documentation of reviews and changes associated with safety related and augmented quality CAT-IDs were not occurring as prescribed. This resulted in the set of procurement and acceptance requirements (Tech Specs, QA, Equipment Qualification, bill of materials, drawings, manuals) that were not always complete or correct. Although no examples were found during the audit where the intended end-use design function was actually jeopardized, this is a risk when compliance with the associated processes is lacking. There were no distinguishable non-conformances specific to the Unit 1 & 2 Restart sampled CAT-IDs, and as such, the identified adverse conditions were applicable to the efforts of both Restart's and Bruce Power's Procurement Engineering organizations.
- A Self-Assessment was performed by the Procurement Engineering organization in the fall of 2011, which identified a lack of clear, consistent, and unambiguous procedural direction. The requirements were structured so the worker had to navigate within and between different documents to complete a task. The Self-Assessment found general technical compliance with the processes (i.e., no jeopardized end-uses). The corrective actions associated with the Self-Assessment remained open and had been extended six times at the time of the audit.

Procurement Engineering process procedures were not managed in accordance with the prescribed requirements. DCRs and Action Tracking assignments were not completed when documents were revised. Documents were not verified by the identified owners, nor approved by the Corporate Functional Area Manager. Subsequent to this audit and others with similar finding, the Nuclear Oversight group was re-organized to provide greater oversight of the completion of actions and DCR completion has been raised as an opportunity for improvement (Section 5.3.3).

An industry peer assessment identified areas of strength for Bills of Material, and Key Performance Indicators associated with Procurement Engineering deliverables and also confirmed properly specified procurement requirements for rad waste pipe where operating experience had indicated incorrect technical specification application. Improvements were made based on the two adverse conditions, one opportunity for improvement and one area of strength identified as a result of the audit.

7.2.1.4. AU-2012-00011, Records Management

The objective of this Audit was to determine if program document BP-PROG-03.01, Document Management [82], was complete and fully implemented. The results of the audit showed that for the most part, the documents were complete and the vast majority of requirements were implemented. BP-PROG-03.01 contained some non-conformances in the areas of process identification, revision controls, definitions, descriptions, references, and various administrative requirements. Corrective actions were raised in response to the shortcomings to improve the program document and the implementing documents. These were managed through Bruce Power's corrective action process.

7.2.1.5. AU-2013-00007, Bruce Power Management System

The objective of this audit was to evaluate the completeness and implementation of BP-PROG-01.02, BPMS Management. It was conducted in June 2013. The audit reviewed and evaluated the suite of documents associated with BP-PROG-01.02. The evaluation included the program document, all the procedures and documents that were part of the Program document hierarchy and related regulatory documents.

The audit found that BP-PROG-01.02 did not completely implement the BPMS. It found that many procedures were not aligned, and found previously identified improvements were not completely implemented (all sources, including CNSC Inspections).

The audit generated three SCRs to address the shortcomings.

NK21-CORR-00531-11681 [158] shows the audit findings have been addressed. The following revisions were included in the R008 issue of LCH document BP-PROG-01.02:

- AR initiated to Addressed Actions Arising from Bruce Power Audit AU-2013-00007, BPMS Management Audit, June 2013 to align document with requirements of BP-PROC-00774 and BP-PROC-00068 (note requirements of BP-PROC-00166 do not apply to this document).
- Major revision to Include Nuclear Safety aspects.
- Deleted reference to Appendix B Matrix; replaced Appendix B with Document Hierarchy, previously Appendix A. Appendix A is now Process Map. CSA N286-05 compliance matrix is defined as a periodic oversight activity to ensure that the clauses of CSA N286-05 are promulgated through the BPMS.
- DCR revised to better reflect CSA N286-05 Generic Clauses 5.1 to 5.14 and show how, through the Plan-Do-Check-Act cycle, they are met by the various Functional Areas that make up the BPMS.

This audit identified weaknesses in implementing the numerous changes that are underway in modifying the BPMS. These changes are being continuously improved though audits and FASAs and in response to CNSC Inspections. The CNSC inspections identified in Section 7.3.2 provide further evidence of the continued improvements underway in implementing the BPMS and BP-PROG-01.02 [49] was updated factoring in the improvements from this audit as referenced in its revision summary. Overview revisions included: addressing the actions arising from AU-2013-00007, to align the document with requirements of BP-PROC-00774 and BP-PROC-00068; major revision to include Nuclear Safety aspects; deleted reference to Appendix B Matrix; replaced Appendix B with Document Hierarchy, previously Appendix A. Appendix A is now Process Map; CSA N286-05 compliance matrix is defined as a periodic oversight activity to ensure that the clauses of N286-05 are promulgated through the BPMS; Revised to better reflect N286-05 Generic Clauses 5.1 to 5.14 and show how, through the Plan-Do-Check-Act cycle, they are met by the various Functional Areas that make up the BPMS; Incorporated changes based on discussion with CNSC, addressing comments contained in [159].

This resulted in the recent update of the BP-MSM-1 series [35][36][37][38][39], BP-PROG-01.02 [49] and some of its implementing procedures in 2014.

7.2.1.6. AU-2013-00008, Outage Management

The Bruce Power Management System requires independent assessment of each Program at least once every 3 years. The Outage Work Management program was evaluated for conformance and consistency with:

- BP-MSM-1 Management System Manual
- BP-PROC-00068 Controlled Document Life Cycle Management
- BP-PROC-00138 Regulatory Requirements
- BP-PROC-00166 General Procedure and Process Requirements
- BP-PROC-00774 Program Requirements

There were two objectives for this audit. One was to determine if the documents associated with the Outage Work Management functional area were complete and fully documented. This was performed by assessing the Outage Work Management program document (BP-PROG-11.03 R006 (Draft In-progress)) to determine how well all the program requirements were implemented through its document hierarchy. The other objective was to evaluate compliance with and implementation of BP-PROC-00342 SHT001 R005 Planned Outage Preparation Milestones. The audit was completed in November 2013.

The audit found that the Outage Work Management Program generally met the requirements of Bruce Power's Management System, although non-compliances were noted. The following program related issues were identified:

- BP-PROG-11.03, Outage Work Management Program and changes associated with the program were not fully compliant with BP-PROC-00774 R002. The areas not fully compliant were adequacy of documenting and implementing ownership, document hierarchy changes, process mapping, stakeholder reviews, periodic reviews, annual regulatory reviews and records.
- Implementing procedures for the Outage Management Program were not fully compliant with BP-PROC-00166 R023, BP-PROC-00068 R019, and BP-PROC-00138 R002. This resulted in process instructions not meeting all the standardized format requirements, the suite of associated documents and records not always being appropriately identified and aligned, and appropriate reviews not always being conducted to ensure the information remains current.
- Other non-compliances related to BPMS program and procedure requirements for draft documents were captured as opportunities for improvement.

Additionally, the audit found non-compliances with Planned Outage Milestone Requirements in the following areas:

- Bruce Power personnel do not always comply with BP-PROC-00342 SHT001 R005. Procedural non-compliances were found in the areas of Recovery Plans and other Outage Preparation Milestone Requirements. In addition, the Scope Review Panel was not functioning as described in BP-PROC-00342 SHT0002 R007, “Scope Review Panel”. These non-compliances may result in inadequate preparation for planned outages and lower than expected performance in managing outages. Contributing to this was the lack of control when procedural requirements were altered without following BP-PROC-00811, "Procedure Alterations".
- Procedural requirements described in BP-PROC-00342 SHT0001 R005, “Planned Outage - Preparation Milestones” were not adequate or clearly defined in the areas of Milestone Requirements, Milestone Deadline Alignments and Documentation (Milestone Management Meetings). In addition, multiple conflicting instructions existed which describe the Scope Review Panel process.

Corrective actions associated with an adverse condition (SCR/AR 28167363) identified during a previous surveillance audit (AU-2009-00035, Validation of Outage Milestones) were found incomplete and ineffective. Assignments were not completed as per the original intent and were closed to Management type ARs contrary to BP-PROC-00060, “Station Condition Record Process". The surveillance audit found that Outage Preparation Milestones reported as 'satisfied' were not always valid. The audit found similar procedural non-compliances and inadequacies in the areas of implementing milestone colour coding status and milestone deadline alignments respectively.

Two FASAs were also found not conducted in accordance with the requirements of BP-PROC-00137, Focus Area Self- Assessment.

Overall, this audit identified six adverse conditions and two opportunities for improvement. Corrective actions are in place to update the BP-PROG-11.03.

Due to the findings of this audit, which points to recurring issues with respect to implementation of BP-PROG-11.03, gap SF10-1 has been identified in Table 10.

7.2.2. External Audits and Reviews

Bruce Power had an independent nuclear industry evaluation of the nuclear oversight program [160], and the NORA improvement initiative, where NORA continuously reviews the effectiveness of their Oversight against the WANO Performance Objectives and Criteria to learn the lessons from WANO 1 Stations around the world [161] [162].

The 2014 Nuclear Industry Evaluation Program (NIEP) evaluation of Bruce Power found that their Programs were effective in meeting the Nuclear Oversight Audit and Supply Chain Quality Services requirements. This assessment concluded that all of the six areas audited were effective. Within those six areas, 75 factors were Satisfactory, although nine areas that were Satisfactory contained Recommendations, three were Deficient and one was defined as a Strength. The deficiencies were in ensuring that the reports were filed on time, to review the Nuclear Procurement reports on Suppliers, and the frequency of meetings of the Plant Operations Review Committee. No concerns were raised with respect to quality assurance and

the Management System Manual, BP-MSM-1 [35] and Bruce Power Management System (BPMS) Manual Management Program BP-PROG-01.02 [49].

The strength was that the audit organization has a well-developed Auditor Training program which used a Systematic Approach to Training based training design. Job Task Analysis is documented for knowledge and skill elements. The training program is documented and aligned to develop proficient auditors upon completion of qualifications. Auditors are professional and meet expectations of managers for performance as qualified auditors. This is important from an Organization and Administration Safety Factor perspective, as the Auditors are qualified to assist other groups in improving their performance.

As part of continuous improvement, in 2008 and 2013 an independent consulting firm was employed to perform a survey on Safety Culture within Bruce Power. The methodology and results from the assessments were shared with staff and updates were provided to the CNSC [150] [163]. These were used in the review assessments discussed in Section 5.4. The key focus areas from the 2013 survey were to: address Equipment Health issues expediently, so an Equipment Health Strategic Plan was developed and funded; enhance the Corrective Action Program to reinforce aspects of a Learning Organization, so the Audit and Oversight functions were improved including adopting improvements in the Management System; and Expanding Communication through the use of Visual Management Boards to enhance staff understanding to assist in problem solving and team engagement.

7.3. Regulatory Evaluations and Reviews

After a licence is issued, the CNSC stringently evaluates compliance by the licensee on a regular basis. In addition to having a team of onsite inspectors, CNSC staff with specific technical expertise regularly visit plants to verify that operators are meeting the regulatory requirements and licence conditions. Compliance activities include inspections and other oversight functions that verify a licensee's activities are properly conducted, including planned Type I inspections (detailed audits), Type II inspections (routine inspections), assessments of information submitted by the licensee to demonstrate compliance, and other unplanned inspections in response to special circumstances or events.

Type I inspections are systematic, planned and documented processes to determine whether a licensee program, process or practice complies with regulatory requirements. Type II inspections are planned and documented activities to verify the results of licensee processes and not the processes themselves. They are typically routine inspections of specified equipment, facility material systems or of discrete records, products or outputs from licensee processes.

The CNSC carefully reviews any items of non-compliance and follows up to ensure all items are quickly corrected.

The CNSC regularly performs Compliance Inspections of wide aspects of the Bruce Power Programs to ensure continuing compliance with CNSC Regulations, Standards and Guidance documents, as well as the internationally recognized Codes and Standards Bruce Power has adopted in their management system. Also the CNSC conducts quarterly Field Inspections.

Both these review process are done to ensure continued and improved compliance with the Management System and Safety Culture. The Compliance Inspections are discussed first and then the Field Inspections.

7.3.1. Regulatory Compliance Inspections

Over the last five years, Compliance Inspections relevant to Safety Factor 10 have included single and multiple audits of: Organizational Change Management; Human Resources; Control Documents and Records Management, Communications; the Management System Manual including the documentation and policies; Supply, Work Management including roles and responsibilities; Training and Qualifications; feedback on Operating Experience; Configuration Management; Continuous Improvement; Safety Culture; Nuclear and Radiation Safety procedures; Reportability; and Prioritization of safety issues.

A review of these inspections shows compliance with the majority of the requirements, and continuing improvement.

Examples of the Compliance Inspections relevant to Organization and Administration including Safety Culture are shown in Table 7.

Table 7: Regulatory Evaluations and Reviews

NK21-CORR-00531	Bruce A Compliance Inspection Report	Issues	Summary Comments
-07917 -08519 -09309 -10265 -10361 -10573 -10639 -11125 -11236 -11681 -11754	Action Item 1307-3968: Response to Compliance Inspection Report BRPD-AB-2012-016 – Management System Review and BP-PROC-00016, Business Assessment Process	State of Functional Area Assessment process incomplete.	Corrective actions taken to resolve concerns. MSM-1 and BP-PROG-01.02 subsequently revised, as well as BP-PROC-00016. Actions have been closed as actions are complete.
-10925 -11382 -11517 -11706	Action Item 2014-07-5109: BPRD-AB-2014-004 – Assessment (Self and Independent)	Frequency, depth and width of audits; pressure boundary checklists; summary report on audits; tracking actions to completion	Need to Implement a risk-based audit methodology so Graded approach for Audits of the Management System added BP-PROC-00955.

NK21-CORR-00531	Bruce A Compliance Inspection Report	Issues	Summary Comments
-11508 -11596	Action Item 2014-07-5294: BRPD-AB-2014-007 – Problem Identification and Resolution – Corrective Action	Train staff performing trend analysis; improve common cause analysis reports; improve quarterly performance assessment reporting; perform more casual trend analysis	Problems Identified and Corrective actions assigned and tracked to completion
-09245 -09721 -09869 -09870 -11117 -11139 -11436 -11445	Action Item 1107-2924 - BPRD-2011-AB-011 - Radiation Protection Alpha Monitoring and Control; Action Item 1307-4696 - BRPD-AB-2013-018 – Radiation Control - Worker Dose Control;	A process establishing requirements for alpha monitoring is required; hazard posting frequency; personal air samplers; deficiencies with whole body monitor calibration data labels; procedure verification	Worker dose activities in compliance with regulatory requirements but improvements have been suggested.
-08074 -08165 -08380 -08487 -08557 -09721 -09833 -09851 -10219 -10220 -10221 -10222 -10282 -11422 -11459 -11661 -11704	Action Item 100712: BRPD-2010-AB-002 Radiation Protection Compliance Inspection Report; Action Item 110706 – BRPD-2010-AB-007 - Radiation Protection Program; Action Item 1107-2924 - BRPD-2011-AB-011 – Radiation Protection Alpha Monitoring and Control; Action Item 1207-3516 – BRPD-AB-2012-009 – Radiological Hazard Control; Action Item 2949 CNSC review of Bruce Power's effectiveness review, of the implementation of BP-RPP-00022, R009 Contamination Control Action Item 2014-07-5397 – BRPD-AB-2014-010	Update Restart Radiation Safety Plan and Procedures to become consistent with Station procedures; perform FASA on contractor and employee onboarding; improve clearances of waste materials; posting and communication of hazards; air purifying respirators; Radiation Exposure Permits; Housekeeping; monitoring at zonal boundaries; CCA requirement compliance; alpha monitoring; lunch room surveillance; dosimetry; waste removal; radiation instrument management; qualification; Contamination Control	Bruce Power was in the process of revising their documentation to ensure top down compliance of the lower tier documents; corrective action plan defined the change timeline. Occupational ALARA Planning and Control meet regulatory requirements with areas and opportunities for improvement
-11507 -11547 -11684	S-99 Reporting	Improve preliminary report timeliness; improved detailed reports	Meeting S-99 reporting requirements
-11025	BRPD-A-2013-008 – Human Performance	Management should focus on high priority tasks; consider involving HF design	Significant gains in HU made; plans in place to improve

NK21-CORR-00531	Bruce A Compliance Inspection Report	Issues	Summary Comments
		group in the performance monitoring of implemented design changes and including HF experience in the HU program	further
-08638 -08673 -08746	Action Item 110719 – BRPD-2011-R-010 – OPEX	Training qualification record deficiency;	
-11262 -11380 -11534	Action Item 2014-07-4687 - BRPD-AB-2014-002 - Condition Assessment Inspection	Improvement of BP-PROC-00498 to use a consistent list of systems important to safety and implementation of a risk-informed decision making process for opportunities for improvement	Satisfactorily implemented
-10426	Action Item 1207-3075: Inspection Report BRPD-2011-AB-018 CFAM Organization Responsibilities	Gaps wrt Supply Chain and Configuration Management	Corrective actions subsequently completed
-08325 -09003 -09024	Document Control MSD- BSGAB-2009-T16492 and Records Management Inspection Report and Document Control of Program Document - BRPD-2011-AB-013	No formal actions, but a recommendation wrt when BP-PROG documents are issued to CNSC past the original stated date.	Improvements made to process. BP-PROG documents which need to be submitted to the CNSC are identified in the LCH.
-10553 -11025	Human Performance Inspection - BRPD-A-2013-008 Includes discussion of Safety Culture and Improvement & Management Review, Personnel Training	Plans in place should improve human performance. No non-compliances identified and three recommendations for further improvement e.g., focus on higher priority issues and greater participation of Human Factors specialists.	Significant gains in the area of human performance over the past several years

Table 8 assists the reader in determining the relationship between the compliance inspections impact and the review tasks discussed in Section 5.

Table 8: Relationship Between CNSC Compliance Inspections and Review Tasks

CNSC Compliance Inspection	Topic	Applicable to Review Section
BRPD-2010-AB-002 BRPD-2010-AB-007 BRPD-2011-AB-011 BRPD-AB-2012-009 BRPD-AB-2014-010	Action Item 100712: Radiation Protection Compliance Inspection Report; Action Item 110706: Radiation Protection Program; Action Item 1107-2924: Radiation Protection Alpha Monitoring and Control; Action Item 1207-3516: Radiological Hazard Control; Action Item 2949 CNSC review of Bruce Power's effectiveness review, of the implementation of BP-RPP-00022, R009 Contamination Control Action Item 2014-07-5397.	5.4.2
BRPD-AB-2014-007	Action Item 2014-07-5294: Problem Identification and Resolution – Corrective Action	5.4.4, 5.4.5
BPRD-AB-2014-004	Action Item 2014-07-5109: Assessment (Self and Independent)	5.3.11
BRPD-AB-2014-002	Action Item 2014-07-4687: Condition Assessment Inspection	5.4.8
BPRD-2011-AB-011 BRPD-AB-2013-018	Action Item 1107-2924: Radiation Protection Alpha Monitoring and Control; Action Item 1307-4696: Radiation Control - Worker Dose Control;	5.4.2
BRPD-A-2013-008	Human Performance Inspection - Includes discussion of Safety Culture and Improvement & Management Review, Personnel Training	5.3.7, 5.3.11, 5.4
BRPD-AB-2012-016	Management System Related Inspections by CNSC	5.2.2
No audit number	S-99 Reporting	5.4.4
BRPD-2011-R-010	Completion Inspection - OPEX Program; Action Item 110719: Bruce A Units 1 and 2 Return to Service	5.3.9

CNSC Compliance Inspection	Topic	Applicable to Review Section
BRPD-2011-AB-018	Action Item 1207-3075: Inspection Report CFAM Organization Responsibilities	5.2.2, 5.2.4
BRPD-2011-AB-013	Document Control MSD- BSGAB-2009-T16492 and Records Management Inspection Report and Document Control of Program Document	5.2.2, 5.3.3

7.3.2. Management System Related Inspections by CNSC

From Table 7, there are seven correspondence letters related to the Bruce Power Management System Inspection conducted since November of 2012 or related to updates to the Management System. These are: NK21-CORR-00531-10265, -10361, -10573, -10639, -11125, -11236 and -11681.

The details of the inspection are identified in Bruce A & B CNSC Type II Compliance Inspection Report BRPD-AB-2012-016 “Management System Review at Bruce Power”, which identified three action notices under Action Item 1307-3968.

The purpose of the inspection was to verify the compliance of the Bruce Power assessment process against CSA N286-05 clause 4 “Management assessment of effectiveness”. Also it included verifying the assessments are performed with sufficient frequency to confirm its continuing effectiveness to assess adherence to requirements, and to evaluate the need for changes to the management system including its scope and principles.

A Bruce Power evaluation of the overall effectiveness of the Management System per requirements of CSA N286-05 was piloted in 2010 (for year ended 2009) and took into consideration the introduction of the GOSP model and was performed in parallel with other reviews. Bruce Power Management reviews are also required by other standards/specifications that licensees comply with, such as IS0 14001 (Clause 4.6), “Environmental Management Systems - Requirements with guidance and use”, OHSAS 18001 (Clause 4.6), “Occupational Health and Safety Management Systems”, and ASME NQA-1 (Requirement 2, Article 100(c)), “Quality Assurance Requirements for Nuclear Facility Applications”.

CNSC staff concluded that the report structures addressed the full range of activities identified in clause 4 of CSA N286-05, but several weaknesses were also observed with the quality and inputs to some of the reports, and the documentation and resolution of problems.

To address the weaknesses, Bruce Power developed and implemented corrective actions so that the State of the Functional Area (SOFA) reports comply with BP-PROC-00098 requirements and committed to providing copies of any procedures that were revised. Bruce Power noted during the 2012 SOFA review that a number of processes and tool changes were

made to improve the quality of Excellence Binders and to strengthen the tie to business planning and augmenting the verification process. Bruce Power also noted that a Continuous Improvement event is part of the Performance Improvement Self-Evaluation plan.

CNSC staff requested that Bruce Power take the necessary measures to ensure that both the documented and implemented Business Assessment process consistently makes a determination of the effectiveness of each program element and the adherence to Functional Area program requirements, based on data from all relevant sources and comprehensive metrics. Bruce Power advised that it had already revised BP-PROC-00166 to include requirements around verification and oversight activities associated with implementing processes. It is expected that the revised procedure will result in better defined verification activities and results for the processes supporting the Programs in each Functional Area.

The Bruce Power oversight model includes Self-Evaluation, management review meetings, Audits, and Assessments to help the CFAM determine the effectiveness of each program suite, and a selection of key metrics are defined and monitored by the CFAM to monitor effectiveness and efficiency. The SOFA process does not use metrics to solely evaluate the effectiveness of the Functional Area and Bruce Power does not require it to report on individual metrics for each programmatic element. To alleviate concerns that the aggregation of scores on the scorecard may lead to an incorrect assessment, the 2011 scorecard was modified to reflect a balanced approach that separates the CFAM's self-evaluation of effectiveness, metric health, results and trends and independent assessment, so that better insights into the Functional Area are achieved.

Additionally, CNSC staff requested that Bruce Power establish and implement administrative or procedural measures to further ensure compliance with the requirements of BP-PROG-01.07 related to documentation and reporting of identified problems, and establishing of corrective actions resulting from the Business/Management Assessment process. Bruce Power revised BP-PROC-00016 to specify when CFAMs are required to use the corrective action or other processes to formally document identified gaps.

The planned due date for the completion of a continuous improvement event on the SOFA process was November 30, 2013, with the submission of the results of the continuous improvement event on the SOFA process by January 30, 2014. The completion date of the revision to BP-PROC-00016 from the identified improvements was identified as February 28, 2014 and formal submission by April 28, 2014. Bruce Power advised an interim update is planned to be made to the procedure, in advance of the Continuous Improvement event, which will go some way to addressing process deficiencies.

Bruce Power subsequently decided that the existing process of ongoing consideration of improvements was a more effective method to gain insights into improving the perceived usefulness, efficiency and integration of the process, rather than performing a single continuous improvement event. BP-PROC-00016 [50] was completed and a request to close AI 1307-3968 was made in August 2014, in time for initial preparations for the next SOFA Assessment and the periodic full Business Assessment Report which is ongoing in 2015. The action was closed by the CNSC on December 1, 2014.

BP-PROG-01.02 [49] was revised to better communicate the SOFA process and link to the N286 requirements.

7.3.3. Self and Independent Assessment Process Inspections by CNSC

From Table 7, there were two correspondence letters related to the Bruce Power Self and Independent Assessment Process as follows: NK21-CORR-00531-11382 is a CNSC Type II Compliance Inspection Report including Action Item 2014-07-5109; and NK21-CORR-00531-11517 is the Bruce Power request to close the AI.

The inspection was conducted to assess compliance with regulatory requirements. The assessment inspection measured the compliance with specific clauses of CSA N286-05 and the Bruce Power processes for self-assessment as defined by BP-PROG-01.06 “Operating Experience Program” and independent assessments defined by BP-PROG-15.01 “Nuclear Oversight Management”, and related implementing and interfacing documents.

CNSC staff had positive observations about the process and in general, Bruce Power personnel followed the procedures as identified in their programs; however, CNSC staff identified a number of weaknesses with Bruce Power raising SCRs for some issues identified during the inspection to correct these issues.

CNSC staff concluded that the self-assessment process does not always continually assess and improve the effectiveness with which work activities meet the requirements. Specifically, CNSC staff concluded that, despite the efforts to audit all programs in a three-year period, the performance audits covered only a limited number of the implementing procedures of the programs even though a risk-based audit methodology was not fully developed. The CNSC staff concluded that the consequence of these weaknesses is that management would not have complete input information for their management system effectiveness reviews. Four action notices and four recommendations were raised.

In general Bruce Power personnel followed the procedures for self-assessments and audits as identified in the program documents BP-PROG-01.06 and BP-PROG-15.01, and improvements are in progress. Bruce Power has responded to the four action notices and four recommendations with formal Action Tracking commitments (managed process) to address the inspection findings and subsequently formally requested closure of the AI.

Overall, the process was positive, in that there was a collaborative exchange of information and ideas were provided to improve the Self and Independent Assessment Process.

7.3.4. Regulatory Quarterly Field Inspections

In addition to the Type I and II CNSC Inspection, thirteen Quarterly Field Inspection Reports were completed by CNSC staff from the last quarter of 2011 through 2014. These are shown in Table 9, and cover the field surveillance inspections conducted to address each of the CNSC Safety Control Areas. The SCAs closely align with the IAEA SSG-25 Safety Factors. The Safety Control Area most closely mapping to Safety Factor 10 is SCA 1 on Management Systems, although some overlap exists with SCA 2 on Human Performance Management,

SCA 6 on Fitness for Service, SCA 7 on Radiation Protection, SCA 9 on Environmental Protection and SCA 11 on Waste Management.

The CNSC staff Compliance and Verification activities did not find evidence of unsafe operation that would result in undue risk to health and safety of persons, the environment, or that would compromise respecting Canada's international obligations. Major issues result in an Action Item being opened so that the issue resolution can be tracked. Minor issues are usually corrected immediately by Station staff or acceptable responses for the issues were provided. Major issues were reviewed to see if they impacted the Management System – Organization and Administration, but as expected no gaps were identified, as the CNSC would have requested quick remedial action.

Table 9: CNSC Quarterly Field Inspections Reports

NK21-CORR-00531	Bruce A And B Quarterly Field Inspection Report	# of field inspections Bruce A	Minor Issues	Major Issues / comments
-06987	BRPD-20009-AB	27	Information Purposes	None
-09267	BRPD-2011-AB-019	16	Seismic restraining; Radiation protection, Maintenance backlogs	None
-10080	BRPD-AB-2012-014	16	16 positive findings; 7 areas with minor findings; key area: Maintenance backlogs;	None
-10247	BRPD-AB-2012-017	16	13 positive findings; Issues found in 9 areas; fire blanket use for combustible material; scaffolding, work requests for Control Room Panels	2 recommendations / enforcement actions;
-10539	BRPD-AB-2013-005	16	18 positive findings; 5 areas minor issues; Key - Elective Maintenance Work Request high backlogs; 3 action notices and 2 recommendations on elective maintenance	None
-10731	BRPD-AB-2013-010 - ACTION ITEM 1307-4270	11	16 positive findings; 6 areas of minor issues; 3 areas needing improvement; Operator Surveillance, (Elective) Deficient Maintenance Work Requests; Scaffold inspections; 1 action notice and recommendation	2 Enforcement Actions
-11018	BRPD-AB-2013-015	16	18 positive findings; 4 areas of minor issues; 3 areas needing improvement; Operator Surveillance, (Elective) Deficient Maintenance Work Requests; Whole body counters; 1 action notice and recommendation	None

NK21-CORR-00531	Bruce A And B Quarterly Field Inspection Report	# of field inspections Bruce A	Minor Issues	Major Issues / comments
-11194	BRPD-AB-2014-001	16	21 positive findings; 2 areas of minor issues; 2 areas needing improvement; Operator Surveillance, (Elective) Deficient Maintenance Work Requests; Whole body counters; 1 recommendation	Improve tagging recommended
-11354	BRPD-AB-2014-003	13	17 positive/ compliant findings; 6 areas of minor issues; 2 areas needing improvement: Operator Surveillance, (Elective) Deficient Maintenance Work Requests;	None
-11381	BRPD-AB-2014-005		1 small area for improvement; 1 recommendation on Fukushima implementation with respect to Unit 4 Safety Relief Valve instrument air hoses for consistency with the other Bruce A units.	Concurrence on procurement of equipment and modifications to date as consistent with progress updates
-11551 -11607	BRPD-AB-2014-008	11	17 compliant findings; 5 areas of minor issues; 4 areas needing improvement: Deficient Maintenance Work Requests, Housekeeping, combustible material management and scaffolding inspection; 1 action notice	Reviewing the process for inspecting scaffolds.
-11698	BRPD-AB-2014-011	17	18 compliant findings; 5 areas of minor issues; 4 areas needing improvement: Deficient Maintenance Work Requests, and scaffolding inspection;	None

7.4. Performance Indicators

Performance indicators are defined as data that are sensitive to and/or signals changes in the performance of systems, components, or programs.

The Human Performance Event Free Day (or Human Performance Clock) Reset Indicator is used to depict clock resets as a result of an event at the Station, Department or Section level. The clock is reset as a result of an event attributable to human error or organizational weakness that results in the reset criteria being met for reactor safety, radiological safety, industrial safety and environmental safety.

As discussed in Section 5.1, the CNSC performs an annual review of each Station. The report for 2013, “CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants for 2013”, issued in September 2014 [135], summarizes the 2013 ratings for Canada’s NPPs in each of the 14 CNSC Safety and Control Areas (SCA), including management system and human performance management.

CNSC staff rated Bruce A as “satisfactory” in the management system SCA, and concluded that the management system SCA met performance objectives and all applicable regulatory

requirements, and that Bruce Power is maintaining compliance with N286-05. CNSC staff verified that the licensee continued to maintain and improve an effective management system at Bruce A.

The human performance management SCA covers personnel training, personnel certification, and work organization and job design. For 2013, the Bruce A rating for the human performance management SCA was also “satisfactory”.

Overall, the review for 2013 showed that Bruce A’s performance was satisfactory, unchanged from the 2012 review.

8. Summary and Conclusions

The overall objective of the Bruce A ISR is to conduct a review of Bruce A against modern codes and standards and international safety expectations and provide input to a practicable set of improvements to be conducted during the Major Component Replacement in Units 3 and 4, and during asset management activities to support ongoing operation of all four units, that will enhance safety to support long term operation. The specific objective of the review of this Safety Factor is to determine whether the organization and administration are adequate for the safe operation of the nuclear power plant. This specific objective has been met by the completion of the review tasks specific to organization and administration.

Strengths identified during this review are:

- The existence of a comprehensive suite of programs and procedures that ensure the organization and administration will be controlled and well-documented in the future. Additionally, Bruce Power demonstrates a strong commitment to continuous improvement by conducting regular self-assessments of their processes.
- The commitments to improvements that are systematically being undertaken based on the strong direction and guidance from the Nuclear Oversight and Regulatory Affairs organization, both in their audit and assessment reviews and their push to comply with more recent Regulatory Documents, Guidance Documents and Standards. The organization was re-organized to improve their focus on both Audits and Assessments and has committed to the CNSC to introduce a risk-informed process to their audits and assessments process to ensure risk significant areas are reviewed more frequently.
- Bruce Power’s organization shares Safety Performance OPEX, Compliance Reporting and Corrective Action processes, as commonly-maintained programs with Bruce B, so observations and lessons learned at Bruce B can be used at Bruce A. Additionally, there is an opportunity to share knowledge from Bruce B by transferring managers to Bruce A and vice-versa. Thus, strengths at each station and means to see how the other Station prevents and mitigates less desirable situations are shared to increase the corporate knowledge and experience.

Table 10 summarizes the key issues arising from the Integrated Safety Review of Safety Factor 10.

Table 10: Key Issues

Issue Number	Gap Description	Sources
SF10-1	Work Management Program BP-PROG-11.03 [117] should be improved to address recurring outage issues identified through audits and FASAs.	Sections 5.2.5 and 7.2.1.6
SF10-2	BP-PROC-00363 [94], Nuclear Safety Assessment, and its implementing documents should be revised to provide guidance on the responsibility of staff for Safety Assessment work performed outside of the NSAS Department.	Section 5.2.3
SF10-3	DCRs can become stagnant in the system, for example, depending on how they are initiated.	Section 5.3.3
SF10-4	BP-PROC-00136 is not affiliated with a Program.	Section 4.1, Table 4, footnote 6

The overall conclusion is that, with the exceptions noted in Table 10, Bruce Power's programs meet the requirements of the Safety Factor related to Organization and Administration.

9. References

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[2] NK21-CORR-00531-11005/NK29-CORR-00531-11397, Submission of Safety Basis Report, Bruce Power Letter, F. Saunders to R. Lojk, December 30, 2013.

[3] IAEA SSG-25, Periodic Safety Review of Nuclear Power Plants, IAEA, March 2013.

[4] CNSC RD-360, Life Extension of Nuclear Power Plants, CNSC, February 2008.

[5] NK21-CORR-00531-03839, Bruce A Environmental Assessment Study Report, Bruce Power, December 7, 2005.

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[7] NK21-CORR-00531-00514, Bruce A: CNSC Approval to Restart Units 3 and 4 and Application to Amend PROL 15.01/2003, Bruce Power Letter, F. Saunders to J.H.M. Douglas, November 16, 2001.

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[9] NK21-CORR-00531-04339, Bruce A Units 1 and 2 Return to Service – Systematic Review of Safety, Bruce Power Letter, F. Saunders to P. Webster, July 31, 2006.

[10] NK21-CORR-00531-05976, Bruce A Units 3 and 4 Refurbishment for Life Extension and Continued Operation: ISR Safety Factor Reports, Bruce Power Letter, F. Saunders to P. Elder, June 2, 2008.

[11] NK21-CORR-00531-06596, Bruce A Units 3 and 4 Refurbishment for Life Extension and Continued Operation: ISR Safety Factor Reports 1, 2, 3 and 4, Bruce Power Letter, F. Saunders to K. Lafrenière, December 18, 2008.

[12] NK21-CORR-00531-06076, Bruce A Units 3 and 4 Refurbishment for Life Extension and Continued Operation: ISR Safety Factor Reports 5, 6, and 7, Bruce Power Letter, F. Saunders to P. Elder, July 22, 2008.

[13] NK21-CORR-00531-10576/NK29-CORR-00531-10975, Application Requirements for Renewal of Power Reactor Operating Licences for Bruce Nuclear Generating Stations A and B, Bruce Power Letter, F. Saunders to R. Lojk, July 17, 2013.

[14] Nuclear Safety and Control Act, 1997, c. 9, N-28.3, Assented to March 20, 1997.

[15] NK21-CORR-00531-11272, Nuclear Power Reactor Operating Licence, Bruce Nuclear Generating Station A (PROL 15.00/2015), May 1, 2014.

[16] NK21-CORR-00531-11391, Bruce Nuclear Generating Station A Nuclear Power Reactor Operating Licence: Licence Conditions Handbook (LCH-BNGSA-R8), June 4, 2014.

[17] PROL 18.00/2020, e-Doc 4723908, Nuclear Power Reactor Operating Licence, Bruce Nuclear Generating Station A and Bruce Nuclear Generating Station B, June 1, 2015.

[18] LCH-BNGS-R000, e-Doc 4659316, Bruce Nuclear Generating Station A and Bruce Nuclear Generating Station B Power Reactor Operating Licence, June 1, 2015.

[19] CNSC REGDOC-3.1.1, Reporting Requirements: Reporting Requirements for Nuclear Power Plants, CNSC, Regulatory Document, CNSC, May 2014.

[20] CNSC RD-204, Certification of Persons Working at Nuclear Power Plants, CNSC, Regulatory Document, CNSC, February 2008.

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Appendix A – High-Level Assessments Against Relevant Codes and Standards

No codes or standards relevant to Safety Factor 10 were subjected to high-level assessment. This Appendix is retained only for consistency with the Appendix numbering scheme in all other Safety Factor Reports.

Appendix B – Clause-By-Clause Assessments Against Relevant Codes and Standards

No codes or standards relevant to Safety Factor 10 were subjected to a clause-by-clause assessment. This Appendix is retained only for consistency with the Appendix numbering scheme in all other Safety Factor Reports.