Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 22-H2.139B

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Request for Ruling filed by PEACE-NB

Demande de décision déposée par PEACE-NB

In the Matter of the

À l'égard de la

New Brunswick Power Corporation, Point Lepreau Nuclear Generating Station

Société d'Énergie du Nouveau-Brunswick, centrale nucléaire de Point Lepreau

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Application for the renewal of NB Power's licence for the Point Lepreau Nuclear Generating Station

Demande de renouvellement du permis d'Énergie NB pour la centrale nucléaire de Point Lepreau

Commission Public Hearing
Part 2

Audience publique de la Commission
Partie 2

May 10, 11 and 12, 2022

10, 11 et 12 mai 2022

Canada

Request for Ruling

In the Matter of NB Power's request to renew the operating licence for the Point Lepreau nuclear generating station

May 12, 2022

PEACE NB submits two requests for rulings under section 20 subsection(3) of the CNSC Rules of Procedure that states "At any time during the public hearing, a participant may make an oral request to the Commission for a ruling on a particular issue by explaining the issue and the reasons for the ruling that is sought."

> **Ruling #1** We request a ruling that the Commission acknowledge there was a change in the PSA based Seismic Margin large release limit from .4g to .344g in the 2017 licencing hearings.
>
> **Ruling #2** We also request a ruling that the Commission instruct NB Power to perform upgrades until they meet the previous .4g limit for large release as part of their continuous improvement program within the next 5 years.

Rationale

Our explanation of the issue and reasons for the two requests for rulings are as follows.

In the 2011 NB Power license application CMD 11-H12.1 Pg 105. NB Power stated the following

> "For the PSA-Based Seismic Margin Assessment, the limit corresponds to the Review Level Earthquake (RLE), and is a pass or fail threshold against which the resulting plant seismic capacity is compared. In this case, a HCLPF(High Confidence Low Probability of Failure) value higher than then the one listed below is satisfactory."

NB Power also provided the table (Figure 1 below) following this paragraph in their 2011 licence application, showing a limit of .3g for Sever Core Damage and a separate.4g limit for Large Release.

Figure 1

PSA LEVEL	INTERNAL EVENTS, FIRE AND FLOOD			PSA-BASED SEISMIC MARGIN ASSESSMENT	
	METRIC	LIMIT (Events/Year)	GOAL (Events/Year)	METRIC	LIMIT
LEVEL 1	Severe Core Damage	1E-04	1E-05	HCLPF	0.30g
LEVEL 2	Large Releases	1E-05	1E-06	HCLPF	0.40g

The Commission adopted these stated safety limits in paragraph 65 in the 2011 written Reasons for Decision. As PEACE_NB later discusses, this is the at the core of our first request for ruling.

There was nothing on the public record from the 2011 hearings, in the CMD's or reasons for decision that form the licensing basis, that the .4g large release safety limit was not a requirement of the

proposed licensing. It was very clear that there were 2 different limits one for Core Damage and one for large release and they were not the same value.

We did however question in 2011, if the .4g was high enough - but none the less the .4g was adopted by the Commission. Our questions about if the .4g was high enough was based on a grammatical error by the CNSC staff in CMD 11-H12 B Supplementary Submission from CNSC Staff that stated the .4g limit was tied to a 1 in 100,000 year earthquake but they later corrected this in CMD 11-H12.C Supplementary Submission from CNSC Staff as copied below (Figure 2). We would like to point out that this supplemental CMD from CNSC staff acknowledges the .4g large release safety goal.

Figure 2

2 CORRECTION TO CMD 11-H12.B

2.1 Relationship between Safety Goals and Earthquake Magnitude

This section should be read in conjunction with section 3.4.1, page 14 of CMD 11-H12.B.

In the third paragraph of section 3.4.1, on page 14 of CMD 11-H12.B a grammatical error occurred, which associated the Large Release Frequency (LRF) of one in 100,000 years to the return frequency for an earthquake.

The sentence reads:

"*Additionally, there is a high confidence that a large release of fission products from containment will be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g and a return frequency of about one in 100,000 years.*"

The sentence should read:

"*Additionally, there is a high confidence that a large release of fission products from containment will be prevented with a probability of about one in 100,000 years for an earthquake with a horizontal ground acceleration of as high as 0.4g.*"

During the 2011 hearing, Sharon of PEACE-NB and I requested a ruling for an updated seismic Hazard assessment to be performed for Point Lepreau. The commission concurred with our request and ordered one be done in paragraph 65 in the 2011 reasons for decision, as well as to make the assessment public. While I have received a copy of the assessment to date the assessment is not readily available to the public on NB Power's website. Please refer to CRED-CELA CMD22-H2-194 pg10.

The results of this assessment found evidence of 3 large previously unknown earthquakes from the paleo seismic study that was performed. It showed that the hazard from large earthquakes was larger

than what was previously thought credible. We would like to note that this new hazard assessment came directly from our public intervention. A 25 year license would severely limit important safety related work such as this from interveners.

In response to this new hazard information, NB Power updated the PSA based seismic margin analysis and methodology (which is where the limits are set) and CNSC staff approved this methodology. In this update it was found that the Large release HCLPF of the plant decreased from .42g to .35g and as a result NB Power no longer met the stated safety limit of .4g as put forth in the 2011 hearings. In the 2017 hearings a new large release limit of .344g was presented without the change being acknowledged by either CNSC staff or NB Power to the commission members.

I, Chris Rouse, had written a detailed intervention CMD 17-H2.94 complaining about this change in safety limit, and argued that CNSC Staff and NB Power could not change this limit and that it had to be done by the commission members. I also argued that the commission members not accept the new safety limit and at a minimum if they did accept the reduced safety limit that it be done transparently for the public.

In the 2017 written Reasons for Decision the Commission did accept the new large release safety limit which we reluctantly accept but recognize it is within the power of the Commission to do so, but it was not done transparently.

In the 2017 reasons for decision paragraph 132 pg 26 the commission stated

> "The Commission is satisfied that the PLNGS licensing basis in regard to seismic capacity of a 0.2g design basis earthquake was not modified during the current licence period and remains as approved in the Commission's 2011 licence renewal decision on this matter. (We agree with this statement, but this is not what we were arguing.) Further, the Commission wishes to note that, in its 2011 decision, the Commission acknowledged that (the first sentence of paragraph 65 of the 2011 reasons for decision) "Based on the above information, the Commission is satisfied that the PLNGS meets the required safety goals." and that the Commission was referencing an RLE of 0.3g and not 0.4g. The Commission was satisfied with the safety limits (goals) as stated and that represented the probability of a 1 in 10,000 year earthquake."

In paragraph 132 of the 2017 decision the commission stated that paragraph 65 of the 2011 decision was referencing an RLE of .3g and NOT .4g. But if we read the whole paragraph 65 of the 2011 decision it states:

> "Based on the above information, the Commission is satisfied that the PLNGS meets the required safety goals. The Commission is satisfied that the seismic margin assessment has demonstrated with high confidence that core damage would be prevented in the event of an earthquake with horizontal ground acceleration as high as 0.3g, and that a large release of fission products from containment would be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g. The Commission is satisfied that the safety systems

> currently in place would safely shut down the reactor in the event of the worst possible earthquake in the region."

PEACE-NB submits it is not transparent when the Commission references the first sentence of a paragraph from the 2011 Decision, and then proceeds to state they were only referring to .3g in 2011. The full paragraph clearly states "and that a large release of fission products from containment would be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g." This latter part of the paragraph was omitted from the Commission's decision. As well, please note that in the 2011 decision the commission references goals in the plural and not goal in the singular.

As well in the 2017 decision paragraph 134 the Commission states:

> Furthermore, the Commission states that, while NB Power demonstrated during the 2011 hearing that a large release of fission products from the PLNGS would be prevented at 0.4g, this was not, and is not, a licensing requirement. A 0.4g earthquake is representative of a 1 in 100,000 year earthquake and the Commission expresses agreement with the following statement from the Commission's 2011 decision, (last sentence of paragraph 62) "CNSC staff noted that there was no requirement to qualify the facility (the PLNGS) against an earthquake of one in 100,000 years." Notwithstanding, the Commission notes its expectation for NB Power to pursue its continuous improvement efforts in this regard during the proposed licence period.

The "1 in 100,000 year earthquake" noted in the paragraph above from the 2011 decision was in reference to our argument in 2011 that the .4 g was not high enough because a 1 in 100,000 year earthquake was higher than .4 g. This statement from CNSC Staff had nothing to do with our concerns in 2017 as the Commission had already adopted the .4 g limit in 2011 and this limit was not tied to the probability of an earthquake. The 1 in 100,000 year earthquake was resolved in the staff CMD quoted above.

Read in its entirety, paragraph 62 from 2011 decision again provides more context around transparency. ". CNSC staff stated that it is satisfied with NBPN's conclusion that a large release of fission products from containment would be prevented for an earthquake of 0.4g."

Regarding the second request for ruling our issue is as follows.

In the 2017 CNSC Staff CMD 17-H2 Pg 35 36 they stated the following:

> The HCLPF for LRF decreased from 0.42g in 2008 to 0.35g in 2016 as the study took into account a structure weakness related to a fixture in the main control room. CNSC staff is satisfied the HCLPF for LRF meets the RLE of 0.344g, representing a 1 in 10,000 year earthquake. Although NB Power meets the safety requirements associated with an RLE of 0.344g, NB Power is assessing the need for corrective actions to increase the HCLPF for LRF.

In the 2017 Commissions Reasons for Decision pg 27 they state with regards to this.

> "Notwithstanding, the Commission notes its expectation for NB Power to pursue its continuous improvement efforts in this regard during the proposed licence period."

There was discussion at the hearing on May 11 2022 on how items are followed up on – with CNSC Staff making reference to an internal registry where commitments and actions are tracked - and this is a good example of an important item not being followed up on.

In response, we ask: how does the Commission square this gaping round hole around the transparency of the limit changing?

Conclusion

Ruling #1 We request a ruling that the commission acknowledge there was a change in the PSA based Seismic Margin large release limit from .4g to .344g in the 2017 licencing hearings.

Relatedly, how does the Commission assure that their past rulings were adhered to?

Ruling #2 We also request a ruling that the commission instruct NB Power to perform upgrades until they meet the previous .4g limit for large release as part of their continuous improvement program within the next 5 years and come back before the commission with the results.

We offer the following guidance to the Commission members on how to deliberate on the first ruling. The Commission members must use the public record from the 2011 hearings such as the Licence Application which formed part of the licencing basis and the commissions reasons for decision, but also CMDs.

Anything that NB Power or CNSC staff use in response to this ruling must not be new information and they must use the public record, if they do not agree with these rulings. If new information can be presented it would be rewriting the public record which is at the heart of this request for ruling. It is even more important that the public record be used, as none of the current members in this proceeding were present in the 2011 hearings. For this reason, we submit our request for rulings are without prejudice.

This was done by the commission in the 2017 decision by referencing the 2011 decision which we consider appropriate. We do not feel it was appropriate of the commission to take the 2011 decision out of context by omission or assigning a different meaning to the 2011 decision. This was not supported from the 2011 record.

The commission can use the 2017 record to support the reason for changing the limit in 2017 but must admit that the change in limit did occur unless the 2011 record can demonstrate that there was no .4g limit.

We also request from the Commission an opportunity to respond in writing to anything that is brought up on this matter from NB Power or CNSC Staff.

Regards

Sharon Murphy-Chair

Chris Rouse-Member

PEACE NB.

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

UNPROTECTED/NON PROTÉGÉ

SUPPLEMENTAL/COMPLÉMENTAIRE

CMD : 11-H12.B

Date signed/Signé le : 24 October 2011

Reference CMDs/CMDs référence : 11-H11, 11-H12, 11-H12.A

New Brunswick Power Nuclear

Point Lepreau Nuclear Generating Station

Énergie nucléaire Nouveau-Brunswick

Centrale nucléaire de Point Lepreau

Public Hearing Day Two

Deuxième journée de l'audience publique

Scheduled for:

December 1 and 2, 2011

Prévue pour :

Les 1er et 2 décembre 2011

Information Regarding:

Commission Request for Information

Information concernant :

Demande d'information de la Commission

Submitted by:

CNSC Staff

Soumise par :

Le personnel de la CCSN

E-DOCS-#: 3796284 (WORD)
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Canada

Summary

New Brunswick Power Nuclear (NBPN) has applied to renew the Nuclear Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station (PLNGS), which expires June 30, 2012, for a five-year period.

NBPN has also applied to load fuel and restart PLNGS after refurbishment that commenced on March 28, 2008.

Day One of a two-day public hearing on the application by NBPN to renew its operating licence and load fuel was held on October 6, 2011.

This Commission Member Document (CMD) includes supplemental information to CMDs 11-H11 and 11-H12 that was either requested by the Commission on Public Hearing Day One, or committed by CNSC staff in the CMDs.

This additional information does not change CNSC staff recommendations and conclusions, as presented in CMD 11-H11 and 11-H12.

Résumé

Énergie nucléaire Nouveau-Brunswick (ÉNNB) a fait la demande de renouveler le permis d'exploitation du réacteur de puissance de la centrale nucléaire de Point Lepreau pour une période de cinq ans. La date d'expiration du permis est le 30 juin 2012.

ÉNNB a aussi fait la demande de charger le combustible et redémarrer la centrale nucléaire de Point Lepreau après la réfection qui a débutée le 28 mars 2008.

La première journée de l'audience publique de deux jours portant sur la demande d'ÉNNB en vue de renouveler son permis d'exploitation et de charger le combustible a eu lieu le 6 octobre 2011.

Le présent CMD comprend les renseignements supplémentaires aux CMDs 11-H11 et 11-H12 tels que demandés par la Commission lors de la première journée de l'audience publique, ou pour lesquels le personnel de la Commission s'est engagé dans les CMDs.

Ces renseignements supplémentaires n'affectent pas les recommandations et les conclusions du personnel de la Commission présentées dans les CMDs 11-H11 et 11-H12.

Signed/Signé le

24 October 2011

Greg Rzentkowski, PhD

Director General

Directorate of Power Reactor Regulation

Directeur général

Direction de la réglementation des centrales nucléaires

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The purpose of this Commission Member Document (CMD) is to provide supplementary information to the Commission with regards to:

- renewal of the Point Lepreau Nuclear Generating Station (PLNGS) Power Reactor Operating Licence (PROL) which expires on June 30, 2012, and
- fuel load after the refurbishment outage of PLNGS, which started on March 28, 2008,

as discussed in CMD 11-H12 [1] and 11-H11 [2], respectively.

Specifically, Canadian Nuclear Safety Commission (CNSC) staff committed to provide responses to Commission requests raised during the Public Hearing Day One on October 6, 2011 [3], and updates to certain information presented in these CMDs.

CNSC staff revised the proposed PROL to include an amendment to the operating licence. This amendment was approved by the Commission on August 26, 2011. The Licence Conditions Handbook (LCH) will be finalized to reflect the recommendations and input from the Commission, and further review of licensee programs by CNSC staff. The proposed PROL and LCH were provided in CMD 11-H12.

The supplementary information presented in this CMD reaffirms the CNSC staff conclusion that NBPN is qualified to operate PLNGS and will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

Consequently, the supplemental information in this CMD does not change the recommendations of CNSC staff.

1 OVERVIEW

On June 3, 2011, NBPN applied to renew its licence to operate PLNGS for a five-year period [4], from July 1, 2012 to June 30, 2017. On August 24, 2011, NBPN applied to load fuel and restart PLNGS following refurbishment. Day One of a two-day Public Hearing was held on October 6, 2011.

The purpose of this CMD is to provide supplemental information to that presented in the Public Hearing Day One that was either requested by the Commission, or committed by CNSC staff. This supplemental information includes the following:

- specific information;
  - site location
  - implementation and status of new industry standards and regulatory documents
  - refurbishment (fuel load pre-requisites and return to service)
  - Fukushima follow-up, and
- updates pertaining to the licensee programs provided as part of general assessment of safety and control areas.

The specific information is presented in section 2, whereas the updates on the licensee programs are presented in section 3. All requests and commitments are summarized in a tabular form in Addendum A.

2 SPECIFIC INFORMATION

2.1 Site Location

This section should be read in conjunction with section 1.1, page 5 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Maps showing location of PLNGS. (Public Hearing Day One Transcript, pages 80-81)	Requested by the Commission

The Commission requested specific information on maps showing the location of PLNGS.

Four maps can be found in Addendums B through E of this CMD showing the location of PLNGS. The first, in Addendum B, is a map of the East Coast of Canada. The second, in Addendum C, indicates where PLNGS is situated relative to the entire Province of New Brunswick (on the peninsula just south of Dipper Harbour West). The third, in Addendum D shows PLNGS on the Bay of Fundy coastline. The final, in Addendum E, is a larger scale topographic map of the location of PLNGS relative to the Bay of Fundy.

2.2 Implementation of New Industry Standards and Regulatory Documents

This section should be read in conjunction with the LCH. It provides consolidated tables, as requested by the Commission, which show the implementation dates in meeting the new industry standards referenced in the PROL and discussed in the LCH under corresponding licence conditions, and regulatory documents cited in the LCH.

TOPIC	REQUEST/ COMMITMENT
Tabular form of the implementation dates for industry standards and regulatory documents. (Public Hearing Day One Transcript, page 116)	Requested by the Commission

The following table provides implementation dates of new industry standards referenced in the PROL and discussed in the LCH.

Licence Condition	Document	Version	Title	Implementation Date
4.2	N290.15	2010	Requirements for the safe operating envelope for nuclear power plants	Sept. 30/12
6.5	N285.0	2008	General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants	Mar. 31/13
7.3	N285.4	2009	Periodic Inspection of CANDU Nuclear Power Plant Components	Mar. 31/13
7.3	N285.5	2008	Periodic Inspection of CANDU Nuclear Power Plant Containment Components	June 30/12
7.3	N287.7	2008	In-Service Examination and Testing Requirements for Concrete Containment Structures for CANDU Nuclear Power Plant Components	Jan. 31/12
10.2	N288.1	2008	Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities	Jan. 1/13
11.2	N293	2007	Fire Protection for CANDU Nuclear Power Plants	Dec. 31/14

The new industry standards incorporated in the proposed licence represent further enhancements to the CNSC regulatory framework and raise the level of PLNGS safety through improvements to the licensee's programs. NBPN is working diligently to assure compliance with these new standards.

The implementation plans are acceptable to CNSC staff and are discussed in detail in the LCH. The implementation dates are not an impediment to fuel load and relicensing since adequate safety measures are currently in place.

The following table provides implementation dates of CNSC regulatory documents cited in the LCH.

Licence Condition	Document	Version	Title	Implementation Date
4.6	RD-99.1	Draft	Reporting Requirements for Operating Nuclear Power Plants	Oct. 2012 (proposed)
5.1	RD-310	2008	Safety Analysis for Nuclear Power Plants	Dec. 2015 (proposed)
7.3, 7.4	RD-334	2010	Aging Management for Nuclear Power Plants	Mar. 31, 2013
11.1	RD-99.3	Draft	Requirements and Guidance for Public Information and Disclosure	Oct. 2012 (proposed)
11.1	RD-353	2008	Testing and Implementation of Emergency Measures	Mar. 31/13
13.1	RD-321	2010	Criteria for Physical Protection Systems and Devices at High-Security Sites	Apr. 30/12 (proposed)
13.1	RD-361	2010	Criteria for Explosive Substance Detection, X-ray Imaging and Metal Detection at High Security Sites	Apr. 30/12 (proposed)
14.1	RD-336	2010	Accounting and Reporting of Nuclear Material	July 01/12

The new regulatory documents are not referenced in the licence yet, except RD-353 which will enter into force on March 31, 2013. They are introduced in the LCH as regulatory expectations and will be referenced in the licence once implementation plans have been fully developed in accordance with the implementation dates presented in the table above. They are intended to increase prescriptiveness of the CNSC regulatory framework and, as with the new standards, their implementation dates are not an impediment to fuel load and relicensing.

2.3 Status of Refurbishment

This section should be read in conjunction with section 1.2, pages 7-8 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Status of refurbishment. (Public Hearing Day One Transcript, page 72)	Committed by CNSC staff

CNSC staff committed to provide updates on the refurbishment status, including fuel load pre-requisites.

Since Public Hearing Day One, NBPN's refurbishment project team continues to progress on the fuel channel installation sequence and, as of October 20, 2011, has successfully completed 70 percent of the 380 installations. The project team is working to complete this sequence in advance of the December 2011 target date. NBPN issues project updates on a monthly basis, which include progress on project milestones. The major milestones are:

- fuel channel installation completion (December 2011);
- lower feeder installation completion (May 2012); and
- return to service and generating electricity (Fall 2012).

The fuel load pre-requisites in Addendum A of CMD 11-H11 have been updated to clearly show the status of each of the twenty-one items. The updated fuel load pre-requisites are attached in Addendum F of this CMD.

As can be seen, of the twenty-one pre-requisites, thirteen are complete. The completion assurance reports have been submitted by NBPN and the reports were assessed and found acceptable by CNSC staff. For the remaining eight pre-requisites, the completion assurance reports are pending. However, the physical work was completed in accordance with the design approved by CNSC staff. These pre-requisites are managed as part of the phase A (prior to fuel load) regulatory hold point for return to service.

CNSC staff recommended during the Public Hearing Day One that the Commission delegate authority for the necessary approvals associated with fuel load (phase A – remaining pre-requisites) and post-fuel load regulatory hold points (phases B to D) to the Executive Vice President and Chief Regulatory Operations Officer of the Regulatory Operations Branch. The Executive Vice President will approve the release of regulatory hold points based on CNSC staff verification that all the pre-requisites are met. A similar process and delegation of authority was previously approved by the Commission and is currently in use for the fuel load and restart of Bruce A Nuclear Generating Station units 1 and 2.

CNSC staff conclude that the remaining pre-requisites are not impediments to relicensing or to fuel load given the proposed regulatory framework.

2.4 Fukushima Follow-up

This section should be read in conjunction with section 1.2, pages 8-9 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Updates on the Fukushima follow-up. (Public Hearing Day One Transcript, page 72)	Committed by CNSC staff

CNSC staff committed to provide updates on the Fukushima follow-up.

The CNSC Task Force report [5] was issued on September 30, 2011. The following is a high level overview of the report conclusions and recommendations, as applied to the licence renewal and return to service of PLNGS.

Overall conclusions

The CNSC Task Force concludes that Canadian Nuclear Power Plants (NPPs) are safe and that the risk they pose to the health and safety of Canadians or to the environment is very small. The CNSC staff have also verified that all Canadian NPPs are located far from tectonic plate boundaries and that the threat of a major earthquake at a Canadian NPP is negligible. The CNSC Task Force is confident that the improvements recommended in the report will even further enhance the safety of nuclear power in Canada and will reduce the associated risk to as low as reasonably practicable. As a matter of fact, NBPN is the most advanced in addressing lessons learned from Fukushima as many of the enhancements recommended by the Task Force are either fully installed or near completion.

Strengthening reactor defence in depth

Based on the post-Fukushima review, the CNSC Task Force confirms that PLNGS is robust and has a strong design relying on multiple layers of defence. The design ensures that there will be no impact on the public from external events that are regarded as credible. The design also offers protection against more severe external events that are much less likely to occur.

Nevertheless, the CNSC Task Force recommends that, in addition to design modifications implemented as part of refurbishment, certain design enhancements for severe accident management should be considered wherever practicable. Some of these enhancements have already been implemented and others will be implemented in line with the Canadian nuclear industry.

Enhancing emergency response

The CNSC Task Force also confirms that the current status of emergency preparedness and response measures in New Brunswick, specifically the onsite and offsite preparedness and response, is adequate. The CNSC Task Force has verified that there are no significant gaps in emergency planning at PLNGS. NBPN maintains and operates comprehensive and well-documented emergency plans which are regularly tested through self-audited drills and exercises. The

CNSC Task Force has also verified that there are no significant gaps in nuclear emergency planning at the provincial level.

Notwithstanding these measures, their effectiveness can be further improved through upgrading onsite emergency facilities and equipment, in particular through formalizing all arrangements and agreements for external support, and better integration with the existing provincial emergency plans. These enhancements will be implemented as rapidly as practicable.

3 GENERAL ASSESSMENT OF SAFETY AND CONTROL AREAS

3.1 Management System

This section should be read in conjunction with section 3.1.2.1, pages 13-14 and section 3.5.2.6, page 28 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Update on compliance of NBPN nuclear management manual with CSA N286-05. (Public Hearing Day One Transcript, pages 128-129)	Committed by CNSC staff

3.1.1 Safety Management / Quality Management Oversight

CNSC staff committed to provide an update on the compliance of the NBPN nuclear management manual with CSA standard N286-05 – *Management System Requirements for Nuclear Power Plants*. CNSC staff has since completed its review of mapping the requirements of the *Point Lepreau Nuclear Management Manual* (NMM-00660 Rev. 6) and related documentation with N286-05.

CNSC staff review concluded that the *Nuclear Management Manual* (NMM-00660 Rev. 6) and its referenced documentation are compliant with the requirements of N286-05.

CNSC staff conclude that NBPN complies with N286-05 and there is no impediment to fuel load and relicensing.

3.2 Safety Analysis

This section should be read in conjunction with section 3.4, pages 20-25 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Deterministic Safety Analysis (see section 3.2.1) Update on fuel channel annulus spacers (action item 101214). (Public Hearing Day One Transcript, page 181)	Requested by the Commission
Probabilistic Safety Analysis (see section 3.2.2) Update on probabilistic safety analysis reports as required by S-294. (Section 3.4.2.4 Probabilistic Safety Analysis, page 24)	Committed by CNSC staff

3.2.1 Deterministic Safety Analysis

The Commission requested an update on fuel channel annulus spacers presented as an action item 101214 in CMD 11-H12.1 [6].

This action item relates to the safety analysis of the design modification of the fuel channel spacers implemented during refurbishment to enhance reactor safety under accident conditions. This modification will ensure the pressure tube integrity following a hypothetical dual failure event of a large loss of coolant accident plus loss of emergency core coolant injection. CNSC staff requires updates to the safety analysis following any modifications. The deterministic safety analysis was performed by NBPN and was accepted by CNSC staff. The action item has been closed.

CNSC staff conclude that NBPN maintains an up-to-date deterministic safety analysis and there is no impediment to fuel load and relicensing.

3.2.2 Probabilistic Safety Analysis

CNSC staff committed to provide an update on the probabilistic safety analysis (PSA) reports as required by S-294.

Typically, NBPN submits PSA reports in a stepwise manner through a three year period. The future updates are listed in the table below:

March 2012	Level 1 and 2 Fire PSA
April 30, 2012	Level 1 and 2 PSA-based Seismic Assessment
June 29, 2012	Level 1 and 2 Summary Report

The existing PSA is still valid for Point Lepreau. These updates, which are made in accordance with S-294, are a part of continuous enhancements required by the CNSC and will include analysis of the design upgrades implemented during refurbishment.

CNSC staff conclude that NBPN meets the requirements of S-294 and there is no impediment to fuel load and relicensing.

3.3 Physical Design

This section should be read in conjunction with section 3.5, pages 25-28 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Update on engineering change control process document meeting requirements of CSA N286-05. (Public Hearing Day One Transcript, pages 128-129)	Requested by the Commission

3.3.1 Engineering Change Control

The Commission requested an update on whether NBPN's engineering change control process document meets all the requirements for the nuclear management system standard.

In December 2008, CNSC staff carried out a Type II inspection of the design change control process at PLNGS. The inspection evaluated NBPN's implementation of the process *Develop Modifications* (PRR-00660-MS-2) during the refurbishment outage. CNSC staff found that the change control process at PLNGS was implemented as documented, but detected an area of weakness with respect to conformity to requirements of CSA standard N286.2 - *Design Quality Assurance for Nuclear Power Plants*. Specifically, the CNSC staff findings related to the quality of document control.

To correct this deficiency, NBPN updated and issued its process documentation in July 2011, including *Responding to Requests for Design Modifications* (SI-01365-T73 Rev. 12) which sets the grading for external design organizations, and *Basis for Grading Using Risk Informed Methodologies* (IR-00660-05 Rev. 2). CNSC staff reviewed these documents in August 2011 and concluded that NBPN now has the engineering change control process to ensure that permanent and temporary modifications to structures systems and components and to software important to safety are adequately designed, reviewed, controlled and implemented. The outstanding action item from the inspection was closed in August 2011 [7].

CNSC staff conclude that NBPN has improved its process to manage engineering change control and there is no impediment to fuel load and relicensing.

3.4 Fitness for Service

Sections 3.4.1 and 3.4.2.1 should be read in conjunction with section 3.6, pages 18-21 of CMD 11-H11 and the section 3.4.2.2 with section 3.6, pages 28-36 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Inspections and Testing (see section 3.4.1) Update on seismic verification of pipe supports and information on seismic margin assessment. (Public Hearing Day One Transcript, pages 98-100)	Requested by the Commission
Periodic Inspection of Pressure Boundary Components (see section 3.4.2.1) Update on calibration standard variances to CSA N285.6 and the root cause analysis which includes "Extent of Condition" review. (Public Hearing Day One Transcript, pages 116-127, 136, 140)	Requested by the Commission
Periodic Inspection of Pressure Boundary Components (see section 3.4.2.2) Update on NBPN's remaining repair and inspection activities on the concrete ring beam and dome of the reactor building. (Section 3.6.2.3 Periodic Inspection of Pressure Boundary Components, page 32)	Committed by CNSC staff

3.4.1 Inspections and Testing

The Commission requested further information on seismic verification of pipe supports and seismic margin assessment.

NBPN completed a re-evaluation of the pipe supports on seismically qualified piping systems at PLNGS. The evaluation was based on the Electric Power Research Institute guidelines [8], which have been employed by operating nuclear power plants in Canada and the United States of America as an acceptable alternative to the conventional seismic qualification methods used during original plant design. NBPN concluded that the design of the pipe supports meets the original site requirements for a design basis earthquake with ground acceleration of 0.2g. CNSC staff accepted this conclusion.

Based on the results of the probabilistic-based seismic margin assessment, it was determined that in the event of an earthquake with horizontal ground acceleration as high as 0.3g with a return frequency of about one in 10,000 years there is a high confidence that core damage will be prevented. Additionally, there is a high confidence that a large release of fission products from containment will be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g and a return frequency of about one in 100,000 years. In simple terms, this assessment approximately corresponds to an earthquake with a magnitude of about 7 – 7.5 on the Richter scale, which is located above 30 – 35 km from the site and is not credible for the tectonic plate of New Brunswick. This assessment was reviewed and accepted by CNSC staff.

As a result of these assessments, there were a number of changes/improvements NBPN made to PLNGS during the refurbishment outage. These included upgrades to how equipment was supported and secured (dousing piping, oil tanks, electrical cabinets), as well as the addition of two key systems largely to address the station blackout scenario; a make-up line to provide water from an external source to the calandria vault, and the filtered containment venting system. The design and installation of these modifications were reviewed and accepted by CNSC staff.

CNSC staff conclude that the seismic verification of pipe supports and seismic margin assessment do not represent an impediment to fuel load and relicensing.

3.4.2 Periodic Inspection of Pressure Boundary Components

3.4.2.1 Calibration Standard Variances and Root Cause Analysis

The Commission requested further details on calibration standard variances and the subsequent root cause analysis (RCA) reported by CNSC staff in CMD 11-H11.

During fabrication, each calandria tube, pressure tube and end-fitting blank is carefully examined for manufacturing flaws[1] using ultrasonic testing (UT) in accordance with CSA standard N285.6 - *Material Standards for reactor components for CANDU nuclear power plants*. To properly calibrate the ultrasonic inspection tool to the required sensitivity to detect small flaws, the tool is tested using a "calibration standard" (sometimes referred to as a "calibration block").

Representative calibration standards are illustrated in Figure 1 below. Note that the standards shown are for demonstration only, as the notches in the actual standards are too small to be seen clearly (dimensions typically less than one millimetre).

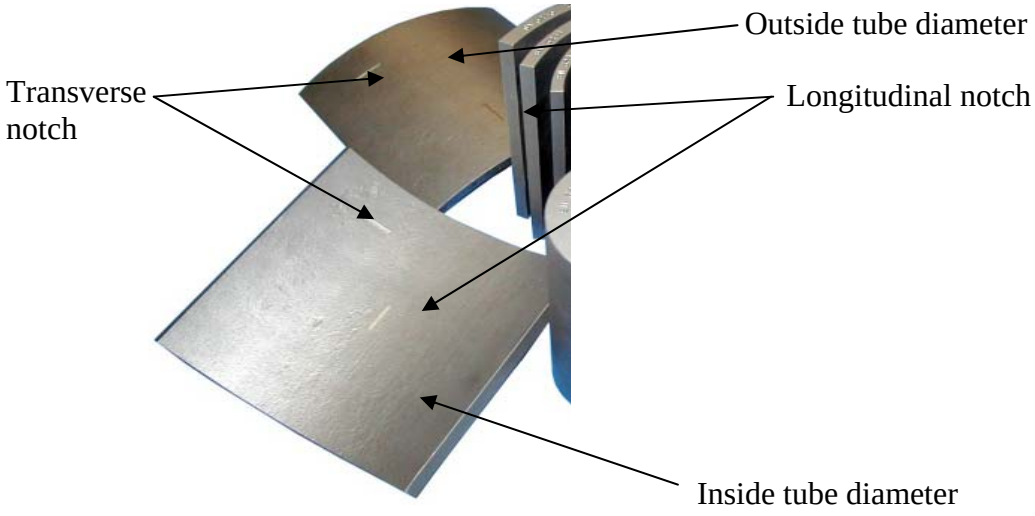


Figure 1: Representative Calibration Standards

[1] A flaw is a relevant signal as revealed by UT that does not meet the acceptance criteria of the standard.

NBPN discovered that some of the calibration standards used for the UT of the Point Lepreau retubing components had notch sizes that were slightly outside the N285.6 specifications. For example, for the calandria tube calibration standards, the length exceeded the maximum allowed length of 0.75 mm by 0.012 mm, the width exceeded the maximum allowed width by 0.027 mm, while for the depth all notches were within specification. For the pressure tube calibration standards, all notch lengths were within specification, the width exceeded the maximum allowed width by 0.003 mm, and the depth was 0.007 mm below the minimum allowable depth of 0.079 mm.

NBPN prepared a detailed technical assessment and evaluation of each variance which was first reviewed and accepted by the Authorized Inspection Agency. The assessments demonstrated that the UT performed on the Point Lepreau retubing items was just as sensitive, and in some cases more sensitive, for detecting manufacturing flaws as the N285.6 material standards require. CNSC staff reviewed the technical assessments and concluded that there is no effect on the integrity of the components and there is no risk to safe and reliable operation.

NBPN performed a Root Cause Analysis (RCA) [9] of the project management, manufacturing and quality assurance systems and processes to determine how calibration standards not fully compliant with N285.6 were used. The following were the corrective actions and recommendations for improvement identified to prevent recurrence:

1. The contractor performed an "extent of condition" review on project materials for the re-tube and refurbishment contracts and found there are no additional issues with compliance.
2. NBPN provided details of the observations in the RCA to the contractor to use in making improvements to their and their supplier’s internal processes.
3. NBPN is to complete a quality assurance audit of the contractor to ensure compliance with the requirements to be an approved vendor. This audit has been delayed due to a change in the ownership of the contractor and is expected to be completed by the end of November 2011.
4. As part of NBPN’s procurement process, NBPN is to complete a self-assessment of its vendor quality surveillance procedures and processes to better address issues identified in the RCA, which is expected to be completed by the end of November 2011. CNSC staff will provide a verbal update during the Day 2 Hearing on the completion of this activity.

CNSC staff reviewed the RCA and found it acceptable.

CNSC staff conclude that the calibration standard variances result in no impediment to fuel load and relicensing. Furthermore, CNSC staff note that the above-mentioned corrective actions undertaken by NBPN and its contractors should prevent recurrence of a similar problem in the future.

3.4.3.2 Ring Beam and Dome

CNSC staff committed to provide an update on NBPN's remaining repair and inspection activities on the concrete ring beam and dome of the reactor building.

NBPN's revised schedule indicated that all concrete repairs and remaining inspections for this phase of the project would be completed by the end of October, 2011 [10] rather than by November 2011. CNSC site staff confirmed, via inspection on October 18, 2011, that the concrete repairs are complete and acceptable.

CNSC staff conclude that the inspection and repair work completed by NBPN is acceptable and there is no impediment to fuel load and relicensing.

3.5 Emergency Management and Fire Protection

This section should be read in conjunction with section 3.10, pages 50-56 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
Emergency Management and Fire Protection An update on this safety and control area including updates on emergency response team drills scheduled for the Fall and fire protection. (Section 3.10 Emergency Management and Fire Protection, pages 51, 54, 56)	Committed by CNSC Staff

3.5.1 Emergency Preparedness

CNSC staff committed to provide an update to the Commission on the performance of the emergency response team drills schedule for the Fall.

CNSC staff have observed several crews perform a live fire drill and a drill inside the protected area, both simulating the response to a transformer fire. Musquash Fire Department also participated in the drill inside the protected area as per the mutual aid agreement between NBPN and the Musquash Fire Department.

Each drill continues to show improvement in fire response. The crews are systematic in their size-up of the scene, deployment of the necessary equipment and their ability to successfully suppress the fire while ensuring the primary tactical objectives of fire ground safety.

The commitment to improvement by NBPN management is taking a positive effect on the fire response program. Increased training, new equipment and the presence of an industry peer, to assist and support NBPN fire response training and development is being demonstrated in improved responses by the Emergency Response Team (ERT) members.

CNSC staff will continue to closely monitor NBPN's progress to ensure that the commitments to continued training and acquisition of equipment essential for fire response are fulfilled. Current progress indicates the development of an acceptable fire response capability will be reached prior to the removal of GSS.

CNSC staff conclude that the progress of emergency response team capability is satisfactory and there is no impediment to fuel load and relicensing.

3.5.2 Fire Protection

CNSC staff committed to provide an update on fire protection.

To meet the intent of CSA standard N293-07 – *Fire Protection for CANDU Nuclear Power Plants*, prior to GSS removal, NBPN is implementing compensatory measures [11]. The measures were accepted by CNSC staff [12] and will ensure an acceptable level of risk is maintained until permanent solutions are implemented. These measures are included in the already established pre-requisites for GSS removal.

NBPN is finalizing the detailed plan to become fully compliant with the requirements of N293-07 by December 31, 2014. This will require additional detailed fire-related analysis, revision to operating procedures and practices, revision to the fire protection program, additional training of staff, installation of emergency response equipment and as well as the physical modification to the station. The major milestones in NBPN's plan are:

Milestone	**Completion Date**
Fire Protection Program Revisions	February 2012
Minimum Shift Complement Analysis for Fire Response	June 2012
Systematic Approach to Fire Training	October 2012
Code Compliance Review to CSA N293-07	December 2012
Fire Hazard Assessment and Fire Safe Shutdown Analysis	December 2012
Inspection Testing and Maintenance of Fire Protection Systems, Structures and Components	June 2013
Operational Compliance with CSA N293-07	December 2014
Design Compliance with CSA N293-07	December 2014

CNSC staff note that modifications implemented to date, meet or exceed code requirements. CNSC staff will review NBPN's plans and conduct compliance verification inspections and desktop reviews to ensure compliance. To date, CNSC staff is satisfied with NBPN's commitment and direction to address outstanding issues in fire protection.

CNSC staff conclude that the compensatory measures that will be implemented by NBPN prior to GSS removal to comply with the intent of N293-07 are adequate. CNSC staff accept also the NBPN's plan to become fully compliant with N293-07 by December 31, 2014. Thus, there is no impediment to fuel load and relicensing, as hold points are established for GSS removal and continued operations to ensure that these commitments will be met.

3.6 Security

This section should be read in conjunction with section 3.12, page 59 of CMD 11-H12.

TOPIC	REQUEST/ COMMITMENT
The expected implementation timeline of RD-321 and RD-361. (Public Hearing Day One Transcript, pages 158-159)	Requested by the Commission

The Commission requested information on the expected implementation dates for CNSC regulatory documents RD-321 – *Criteria for Physical Protection Systems and Devices at High-Security Sites* and RD-361 – *Criteria for Explosive Substance Detection, X-ray Imaging and Metal Detection at High Security Sites*.

RD-321 and RD-361 went through a detailed consultation process and were approved by the Commission in December 2010. CNSC staff conducted piloted performance tests to verify the new regulatory documents requirements.

RD-321 and RD-361 are planned to be implemented in the PROLs by April 30, 2012 by way of licence amendment, as well as the addition of compliance criteria in the LCH.

CNSC staff conclude that adequate safety measures are in place for the security program and that the introduction of RD-321 and RD-361 represent further enhancements and improvements to the regulatory framework for security. Therefore, there is no impediment to fuel load and relicensing.

4 OTHER MATTERS FOR CONSIDERATION

There are no updates, information or changes needed from the Day One CMDs for the various other matters of regulatory interest.

5 LICENSING DOCUMENTS

5.1 Licence Changes

CNSC staff removed the prescribed device *J.L. Shepherd Model 492 Beta Calibrator* from the table of nuclear substances and prescribed equipment in Appendix B.2 of the proposed PROL for PLNGS. This licensed activity was approved by the Commission in Amendment No. 1 of the PROL issued August 26, 2011.

CNSC staff recommendation for a licence period ending June 30, 2017 and the delegation of authority, as presented in CMD 11-H12, have not changed.

5.2 Licence Conditions Handbook Changes

The LCH will be finalized to reflect the recommendations and input from the Commission, and further review of licensee programs by CNSC staff.

6 CONCLUSIONS AND RECOMMENDATIONS

The additional information presented in this CMD by CNSC staff does not change the original conclusions and/or recommendations in CMD 11-H11 and CMD 11-H12.

Other than the updates discussed in this CMD, no further information or changes are needed from the Day One CMDs.

REFERENCES

1. CMD 11-H12, "CNSC Staff Submission on Point Lepreau with Documentation Combined", October 6, 2011. E-DOCS-# 3792135
2. CMD 11-H11, "NBPN Approval to Reload Fuel and Restart Point Lepreau Nuclear Generating Station", October 6, 2011. E-DOCS-# 3689144
3. Transcript, "Public Hearing Transcript of Day One Public Hearing on Applications by New Brunswick Power Nuclear", October 13, 2011. E-DOCS-# 3817265
4. Letter, W. J. Parker to Marc Leblanc, "Application by New Brunswick Power Nuclear Corporation for the Renewal of PROL 17.00/2012", June 03, 2011. E-DOCS-# 3734947, and attached Application, "Application to Renew the Power Reactor Operating Licence", June 3, 2011. E-DOCS-# 3735073
5. Report, "CNSC Fukushima Task Force Report", October 21, 2011. E-DOCS-# 3724191
6. CMD 11-H12.1, "Written Submission from New Brunswick Power Nuclear; Application to Renew the Power Reactor Operating Licence for the Point Lepreau Generating Station", October 6, 2011. E-DOCS-# 3794617
7. Letter, L. Love-Tedjoutomo to W.J. Parker, "Closure of Action Notice MSD-PTLE-2008-T13282-A2 (Associated with Action Item 091213 – Change Control Process)", August 11, 2011. E-DOCS-# 3772328
8. EPRI Technical Report 1019199 - *Experience-Based Seismic Verification Guidelines for Piping and Tubing*
9. NBPN Internal Event Report, "Calandria Tubes Ultrasonic Testing", July 12, 2011. E-DOCS-# 3817045 [PROTECTED]
10. Letter, W.J. Parker to L. Love-Tedjoutomo, "Action Item 091203 – Inspection and Test Plan for Reactor Building Ring Beam and Dome Concrete Repairs", September 13, 2011. E-DOCS-# 3808755
11. Letter, W.J. Parker to L. Love-Tedjoutomo, "Fire Protection Compensatory Actions (Action Item 111207)", October 4, 2011. E-DOCS-# 3817083
12. Letter, L. Love-Tedjoutomo to W.J. Parker, "Confirmation of Fire Protection Compensatory Actions – Action Item 111207 (RIB 2132)", October 5, 2011. E-DOCS-# 3814007

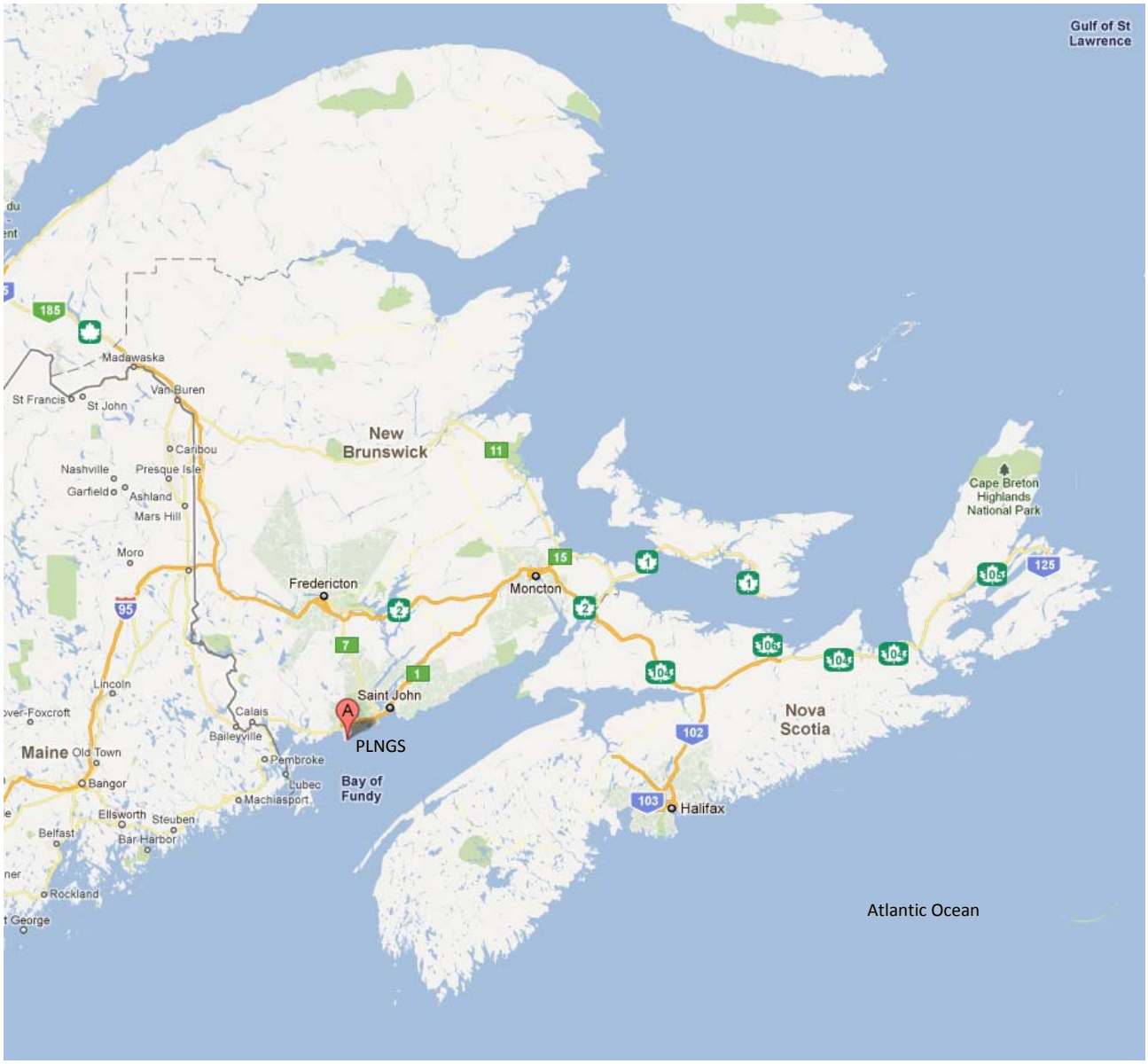
NOMENCLATURE

[Acronym]	[Phrase or Name]
CANDU	Canada Deuterium Uranium
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CVC	Compliance Verification Criteria
ERT	Emergency Response Team
GSS	Guaranteed Shutdown State
LCH	Licence Conditions Handbook
NBPN	New Brunswick Power Nuclear
NPP	Nuclear Power Plant
PLNGS	Point Lepreau Nuclear Generating Station
PSA	Probabilistic Safety Analysis
PROL	Power Reactor Operating Licence
RCA	Root Cause Analysis
UT	Ultrasonic Testing

ADDENDUM A. REQUESTS AND COMMITMENTS

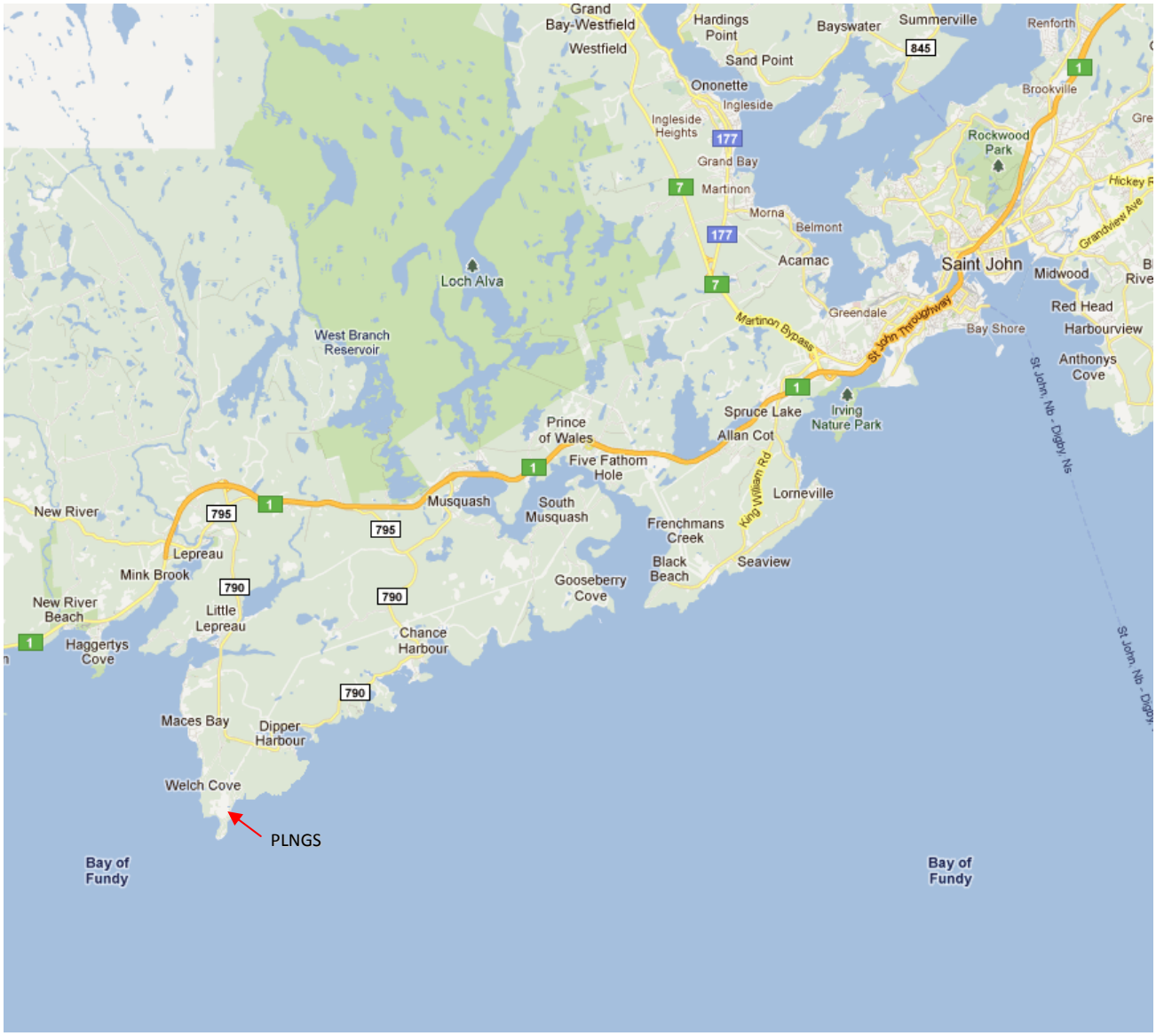
TOPIC	REQUEST/ COMMITMENT
Maps showing location of PLNGS. (Public Hearing Day One Transcript, pages 80-81)	Requested by the Commission
Tabular form of the implementation dates for industry standards and regulatory documents. (Public Hearing Day One Transcript, page 116)	Requested by the Commission
Status of refurbishment. (Public Hearing Day One Transcript, page 72)	Committed by CNSC staff
Updates on the Fukushima follow-up. (Public Hearing Day One Transcript, page 72)	Committed by CNSC staff
Update on compliance of NBPN nuclear management manual with CSA N286-05. (Public Hearing Day One Transcript, pages 128-129)	Committed by CNSC staff
Deterministic Safety Analysis Update on fuel channel annulus spacers (action item 101214). (Public Hearing Day One Transcript, page 181)	Requested by the Commission
Probabilistic Safety Analysis Update on probabilistic safety analysis reports as required by S-294. (Section 3.4.2.4 Probabilistic Safety Analysis, page 24)	Committed by CNSC staff
Update on engineering change control process document meeting requirements of CSA N286-05. (Public Hearing Day One Transcript, pages 128-129)	Requested by the Commission
Inspections and Testing Update on seismic verification of pipe supports and information on seismic margin assessment. (Public Hearing Day One Transcript, pages 98-100)	Requested by the Commission
Periodic Inspection of Pressure Boundary Components Update on calibration standard variances to CSA N285.6 and the root cause analysis which includes “Extent of Condition” review. (Public Hearing Day One Transcript, pages 116-127, 136, 140)	Requested by the Commission
Periodic Inspection of Pressure Boundary Components Update on NBPN’s remaining repair and inspection activities on the concrete ring beam and dome of the reactor building. (Section 3.6.2.3 Periodic Inspection of Pressure Boundary Components, page 32)	Committed by CNSC staff
Emergency Management and Fire Protection An update on this safety and control area including updates on emergency response team drills scheduled for the Fall and fire protection. (Section 3.10 Emergency Management and Fire Protection, pages 51, 54, 56)	Committed by CNSC Staff
The expected implementation timeline of RD-321 and RD-361. (Public Hearing Day One Transcript, pages 158-159)	Requested by the Commission

ADDENDUM B. MAP OF EAST COAST OF CANADA



ADDENDUM C. MAP OF NEW BRUNSWICK

ADDENDUM D. MAP OF BAY OF FUNDY COAST



ADDENDUM E. MAP OF LEPREAU PENINSULA

ADDENDUM F. STATUS OF PRE-REQUISITES FOR FUEL LOAD

ITEM #	ITEM DESCRIPTION	TARGET COMPLETION DATE	STATUS
1	Replacement of all 380 fuel channel assemblies, calandria tubes, and connecting inlet and outlet feeder piping from the end fittings back to the headers (retube)	05-2012	Completion Report Pending
2	Replacement or rewinding of the main generator stator and rotor	07-2011	Complete
3	Replacement of the main generator hydrogen system dryer	07-2011	Complete
4	Replacement of the main generator excitation auxiliary system automatic voltage regulator and stabilizers	01-2012	Completion Report Pending
5	Replacement of the main generator excitation system rectifier units	01-2012	Completion Report Pending
6	Replacement of the turbine electro-hydraulic governor system, turbine supervisory system and turbine mechanical over-speed system	01-2012	Completion Report Pending
7	Installation of new programmable digital comparator units on shutdown system #1 and shutdown system #2	12-2011	Completion Report Pending
8	Moderator heat exchanger improvements	11-2009	Complete
9	Installation of a rupture disk on the top of the existing inspection port of the calandria vault	11-2009	Complete
10	Implementation of a software design change to trip the main heat transport system pumps on high thrust bearing temperature	06-2009	Complete
11	Addition of a filtering system to the main control room ventilation system	12-2011	Completion Report Pending
12	Implementation of a design change to allow independent movement of the three in-core start-up counters	03-2012	Completion Report Pending
13	Replacement of safety related resistance temperature detector cables	05-2012	Completion Report Pending
14	Replacement of the underground diesel fuel storage tank for the emergency power system	06-2009	Complete
15	Replacement of the main moderator system gate valves	08-2011	Complete
16	Replacement of the uninterruptible power supply system inverters and rectifiers	10-2009	Complete
17	Refurbishment of raw service water system components	09-2009	Complete
18	Refurbishment of re-circulated cooling water system components	09-2009	Complete
19	Refurbishment of shutdown cooling system components	09-2009	Complete
20	Removal of the heat transport storage tank liner	08-2009	Complete
21	Repair of the dousing tank liner	07-2011	Complete

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

UNPROTECTED/NON PROTÉGÉ

SUPPLEMENTAL/COMPLÉMENTAIRE

CMD : 11-H12.C

Date signed/Signé le : 22 November 2011

Reference CMDs/CMDs référence : 11-H11, 11-H12, 11-H12.A, 11-H12.B

New Brunswick Power Nuclear

Point Lepreau Nuclear Generating Station

Énergie nucléaire Nouveau-Brunswick

Centrale nucléaire de Point Lepreau

Public Hearing Day Two

Deuxième journée de l'audience publique

Scheduled for:

December 1 and 2, 2011

Prévue pour :

Les 1er et 2 décembre 2011

Information Regarding:

A Licence Renewal

Information concernant:

Un renouvellement de permis

Submitted by:

CNSC Staff

Soumise par :

Le personnel de la CCSN

E-DOCS-#: 3839084 (WORD)
E-DOCS-#: 3843440 (PDF)

Canada

Summary

New Brunswick Power Nuclear (NBPN) has applied to renew the Nuclear Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station (PLNGS), which expires June 30, 2012, for a five-year period.

NBPN has also applied to load fuel and restart PLNGS after refurbishment that commenced on March 28, 2008.

Day One of a two-day public hearing on the application by NBPN to renew its operating licence and load fuel was held on October 6, 2011.

This Commission Member Document (CMD) includes supplemental information to CMDs 11-H11, 11-H12, and 11-H12.B. It provides a clarification of the relationship between safety goals and earthquake magnitude that was discussed in 11-H12.B and it recommends the addition of new licence conditions to the proposed operating licence.

This additional information does not change CNSC staff recommendations and conclusions as presented in CMD 11-H11 and 11-H12.

Résumé

Énergie nucléaire Nouveau-Brunswick (ÉNNB) a fait la demande de renouveler le permis d'exploitation du réacteur de puissance de la centrale nucléaire de Point Lepreau pour une période de cinq ans. La date d'expiration du permis est le 30 juin 2012.

ÉNNB a aussi fait la demande de charger le combustible et redémarrer la centrale nucléaire de Point Lepreau après la réfection qui a débutée le 28 mars 2008.

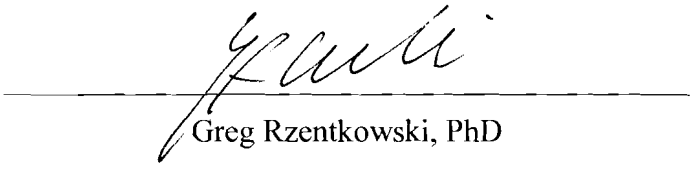
La première journée de l'audience publique de deux jours portant sur la demande d'ÉNNB en vue de renouveler son permis d'exploitation et de charger le combustible a eu lieu le 6 octobre 2011.

Le présent CMD comprend les renseignements supplémentaires aux CMDs 11-H11, 11-H12, et 11-H12.B. Il donne une clarification du lien entre les buts de sureté et l'intensité des tremblements de terre tel que discuté dans le CMD 11-H12.B, et recommande l'addition de nouvelles conditions de permis dans le permis d'exploitation proposé.

Ces renseignements supplémentaires n'affectent pas les recommandations et les conclusions du personnel de la Commission présentées dans les CMDs 11-H11 et 11-H12.

Signed/Signé le

22 November 2011



Greg Rzentkowski, PhD

Director General

Directorate of Power Reactor Regulation

Directeur général

Direction de la réglementation des centrales nucléaires

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The purpose of this Commission Member Document (CMD) is two fold:

- provide a clarification of the relationship between safety goals and earthquake magnitude that was discussed in 11-H12.B; and
- recommend the Commission approve the proposed licence, revised since Day One, which incorporates the addition of new licence conditions.

The new licence conditions add clarity to the licensing basis requirements with regard to other jurisdictional requirements, and make reference to new regulatory documents. The revised licence is included as Addendum A to this CMD.

The Licence Conditions Handbook (LCH) will be finalized once the Commission renders a decision in order to reflect the recommendations and input from the Commission, and further review of licensee programs by CNSC staff. A proposed draft LCH was provided in CMD 11-H12 [1].

The supplementary information presented in this CMD does not change the CNSC staff conclusion that New Brunswick Power Nuclear (NBPN) is qualified to operate Point Lepreau Nuclear Generating Station (PLNGS) and will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Consequently, the supplemental information in this CMD does not change the recommendations of CNSC staff, namely:

- issue the proposed operating licence, in this CMD, until June 30, 2017;
- revoke the current licence;
- delegate of authority for approvals of lower significance issues to CNSC Designated Officers;
- grant permission to proceed with fuel load and restart; and
- delegate authority for release of regulatory hold points to CNSC Executive Vice-President and Chief Regulatory Operations Officer, Regulator Operations Branch.

1 OVERVIEW

The revised licence, Addendum A of this CMD, incorporates the new licence conditions as described below.

- Licence Condition 1.1 which requires the licensee to conduct its activities in accordance with the licensing basis and in accordance with all applicable federal and provincial laws, statutes, agreements and regulations.
- Licence Condition 13.4 which requires the licensee to comply with CNSC regulatory document RD-321 – *Criteria for Physical Protection Systems and Devices at High-Security Sites*, and
- Licence Condition 13.5 which requires the licensee to comply with CNSC regulatory document RD-361 – *Criteria for Explosive Substance Detection, X-ray Imaging and Metal Detection at High Security Sites*.

The new licence also includes an amendment that was approved by the Commission on August 26, 2011, as discussed in CMD 11-H12.B [2].

The Licence Conditions Handbook (LCH), which was provided in CMD 11-H12, will be finalized, once the Commission renders a decision, to include the new licence conditions and their corresponding compliance verification criteria to reflect the recommendations and input from the Commission. The compliance verification criteria, to support each of these licence conditions, are provided in Addendum B of this CMD.

2 CORRECTION TO CMD 11-H12.B

2.1 Relationship between Safety Goals and Earthquake Magnitude

This section should be read in conjunction with section 3.4.1, page 14 of CMD 11-H12.B.

In the third paragraph of section 3.4.1, on page 14 of CMD 11-H12.B a grammatical error occurred, which associated the Large Release Frequency (LRF) of one in 100,000 years to the return frequency for an earthquake.

The sentence reads:

"*Additionally, there is a high confidence that a large release of fission products from containment will be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g and a return frequency of about one in 100,000 years.*"

The sentence should read:

"*Additionally, there is a high confidence that a large release of fission products from containment will be prevented with a probability of about one in 100,000 years for an earthquake with a horizontal ground acceleration of as high as 0.4g.*"

3 OPERATING LICENCE

3.1 Licence Condition 1.1

This licence condition further strengthens the licensing basis of the Point Lepreau station by ensuring that there is no ambiguity with respect to the requirement to comply with other applicable federal and provincial laws, regulations and requirements.

The current licence condition that was included in CMD 11-H12 is as follows:

> Current Licence Condition 1.1
>
> The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis as defined in CNSC document INFO-0795: LICENSING BASIS OBJECTIVE AND DEFINITION, unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission").

The proposed revised licence condition is included in the revised operating licence in Addendum A of this CMD and is as follows:

> Revised Licence Condition 1.1
>
> The licensee shall conduct the activities described in Part IV of this licence in accordance with:
>
> i. the licensing basis as defined in CNSC document INFO-0795: LICENSING BASIS OBJECTIVE AND DEFINITION; and
>
> ii. all applicable laws, regulations and requirements set out in federal statutes and agreements and federal, provincial and municipal regulations;
>
> unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission").

The additional compliance verification criteria to support this licence condition is provided in Addendum B of this CMD.

3.1.1 Conclusion and Recommendation

CNSC staff conclude that the addition of this new licence condition further strengthens the licensing basis of the Point Lepreau station. As NBPN already complies with other federal and provincial laws, regulations and requirements the addition of this new regulatory requirement is not a burden.

3.2 Licence Conditions 13.4 and 13.5

This section should be read in conjunction with section 3.6, page 19 of CMD 11-H12.B.

3.2.1 RD-321

This regulatory document provides an approach for meeting the requirements in sections 9, 10, 11, 14 and 15 of the *Nuclear Security Regulations* aimed at preventing and detecting unauthorized entry into a protected area or inner area at high-security sites.

This regulatory document has been developed to further define the criteria for the:

- unobstructed area surrounding a protected area;
- protected area intrusion detection;
- inner area intrusion detection systems and devices;
- security monitoring room design, systems and devices; and
- vehicle barrier design including protection of protected area barrier access points.

The technical and performance criteria for these systems and devices were developed through benchmarking based on specifications and instructions from manufacturers, applicable standards (Underwriter's Laboratories of Canada), and best practices adopted from other organizations (International Atomic Energy Agency, U.S Department of Energy and U.S. Nuclear Regulatory Commission) that provide similar high-level physical security protection systems and devices. This regulatory document also takes into account operating experience with physical protection systems and devices that have been in place at high-security Canadian nuclear sites the past several years.

While it is understood that the licensees of high-security sites have a responsibility to identify and comply with all applicable regulatory requirements and licence conditions, this document provides additional criteria in order to meet the relevant regulatory requirements of the *Nuclear Security Regulations*.

The proposed new licence condition is included in the revised operating licence in Addendum A of this CMD and is as follows:

> Licence Condition 13.4
>
> The licensee shall implement measures to prevent and detect unauthorized entry into a protected area or inner area at a high-security site is in accordance with CNSC regulatory document RD-321: Criteria for Physical Protection Systems and Devices at High-Security Sites.

The compliance verification criteria to support this licence condition are provided in Addendum B of this CMD.

3.2.2 RD-361

This regulatory document provides an approach for meeting the requirements in sections 25, 27 (2) (a) and 27 (5) of the *Nuclear Security Regulations* aimed at preventing unauthorized entry of weapons and explosive substances into a protected area or inner area at high-security sites.

This regulatory document has been developed to further define the criteria for detection equipment for the purpose of detecting concealed weapons or explosives at high-security sites. This detection equipment consists of explosive substance detection, X-ray imaging, and metal detection devices.

The technical and performance criteria for these detection devices were developed through benchmarking based on specifications and instructions from manufacturers, applicable standards, and best practices adopted from other organizations that use the same detection equipment (e.g., Transport Canada). This regulatory document also takes into account operating experience with detection devices that have been in place at high-security Canadian nuclear sites the past several years.

While it is understood that the licensees of high-security sites have a responsibility to identify and comply with all applicable regulatory requirements and licence conditions, the information contained in this document should help them in meeting the requirements in sections 25, 27 (2) (a) and 27 (5) of the *Nuclear Security Regulations*.

The proposed new licence condition is included in the revised operating licence in Addendum A of this CMD and is as follows:

> Licence Condition 13.5
>
> The licensee shall ensure that detection equipment is in accordance with CNSC regulatory document RD-361: Criteria for Explosive Substance Detection, X-ray Imaging and Metal Detection Devices at High-Security Sites.

The compliance verification criteria to support this licence condition are provided in Addendum B of this CMD.

3.2.3 Conclusion and Recommendation

CNSC staff conclude that adequate measures are already in place for safety and security programs. The introduction of CNSC regulatory documents RD-321 and RD-361 represents further enhancements and improvements to the regulatory framework for security.

In CMD 11-H12.B, CNSC staff indicated that RD-321 and RD-361 were planned to be implemented in the operating licences by April 30, 2012. Given that NBPN is already in compliance with these two new regulatory documents, CNSC staff recommend that these documents be included earlier as part of the licence renewal process.

4 CONCLUSIONS AND RECOMMENDATIONS

The additional information presented in this CMD by CNSC staff does not change the original conclusions in CMD 11-H11 [3] and CMD 11-H12 that NBPN is qualified to operate PLNGS and will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

Furthermore, the additional information presented in this CMD by CNSC staff does not change the original recommendations in CMD 11-H11 [3] and CMD 11-H12, namely:

- issue the proposed operating licence, in this CMD, until June 30, 2017;
- revoke the current licence;
- delegate of authority for approvals of lower significance issues to CNSC Designated Officers;
- grant permission to proceed with fuel load and restart; and
- delegate authority for release of regulatory hold points to CNSC Executive Vice-President and Chief Regulatory Operations Officer, Regulator Operations Branch.

REFERENCES

1. CMD 11-H12, "NBPN Point Lepreau Nuclear Generating Station – Public Hearing Day One – Request for a Licensing Decision", October 6, 2011. E-DOCS-# 3792135
2. CMD 11-H12.B, "NBPN Point Lepreau Nuclear Generating Station – Public Hearing Day Two", October 24, 2011. E-DOCS-# 3796284
3. CMD 11-H11, "NBPN Approval to Reload Fuel and Restart Point Lepreau Nuclear Generating Station", October 6, 2011. E-DOCS-# 3689144

ADDENDUM A. PROPOSED OPERATING LICENCE

The proposed licence is provided on the following pages of the document.

E-DOCS # 3843424 (WORD)

E-DOCS # 3843435 (PDF)

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

PDF Ref.: E-DOCS #3843435
Word Ref.: E-DOCS #3843424
File / Dossier: 2.01

NUCLEAR POWER REACTOR OPERATING LICENCE

POINT LEPREAU NUCLEAR GENERATING STATION

I) LICENCE NUMBER: **PROL 17.00/2017**

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

New Brunswick Power Nuclear Corporation
122 County Line Road
Maces Bay, New Brunswick
Canada E5J 1W1

III) LICENCE PERIOD: This licence is valid from XXXXX, 2012 to XXXXX, 2017, unless suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

(i) operate the Point Lepreau Nuclear Generating Station (hereinafter "the nuclear facility") and the Point Lepreau Solid Radioactive Waste Management Facility (hereinafter "the waste storage facility") at a site located in Charlotte County and Saint John County, Province of New Brunswick;

(ii) possess, transfer, use, package, manage and store the nuclear substances, that are required for, associated with, or arise from the activities described in (i);

(iii) possess, transfer, import, use, package, manage and store the sealed and unsealed sources and the prescribed equipment listed in Appendix B to this licence;

(iv) transport Category II nuclear material by road vehicle from the nuclear facility spent fuel bay to the onsite waste storage facility;

(v) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i), (iii) and (iv).

V) EXPLANATORY NOTES:

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

(ii) The content of any appendix attached to this licence forms part of the licence.

(iii) The "[POINT LEPREAU NGS LICENCE CONDITIONS HANDBOOK (LCH)" provides compliance verification criteria in order to meet the conditions listed in the licence. The LCH also provides information regarding delegation of authority and applicable versions of documents.

VI) CONDITIONS:

1. General

1.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with:

(i) the licensing basis as defined in CNSC document INFO-0795: LICENSING BASIS OBJECTIVE AND DEFINITION; and

(ii) all applicable laws, regulations and requirements set out in federal statutes and agreements and federal, provincial and municipal regulations;

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

1.2 The licensee shall give written notification to the Commission of changes made to the documents needed to support the licence application.

1.3 The licensee shall control the use and occupation of any land within the exclusion zone so that no permanent dwelling is permitted.

1.4 The licensee shall provide, at the nuclear facility and at no expense to the Commission, office space for employees of the Commission who customarily carry out their functions on the premises of that nuclear facility (onsite Commission staff). The licensee shall keep the office space of onsite Commission staff separate from the remainder of the building in which it is located by walls, partitions or other suitable structures.

1.5 The licensee shall, in the event of any conflict or inconsistency between licence conditions, codes or standards or regulatory documents referenced in this licence, direct the conflict or inconsistency to the Commission, or a person authorized by the Commission, for resolution.

2. Management System

2.1 The licensee shall implement and maintain a management system in accordance with the Canadian Standards Association (CSA) standard N286: MANAGEMENT SYSTEM REQUIREMENTS FOR NUCLEAR POWER PLANTS.

2.2 The licensee shall not modify the authorities or responsibilities of the positions listed in condition 3.7 without the prior written approval of the Commission, or consent of a person authorized by the Commission.

3. Human Performance Management

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

3.2 The licensee shall implement and maintain the minimum shift complement for the nuclear facility, as specified in Appendix A.1.

3.3 The licensee shall have, at all times:

(i) in the nuclear facility at least one control room operator and one shift supervisor;

(ii) in the main control room one control room operator or one shift supervisor in direct attendance at the control panels of the reactor unit;

The minimum personnel requirements for the main control room that this condition imposes do not apply where this minimum cannot be met due to emergency conditions that could cause an unwarranted hazard to personnel in the main control room, in which case the licensee shall place the reactor in a safe shutdown state and the nuclear facility in a safe condition.

3.4 The licensee shall implement and maintain a training program.

3.5 The licensee shall implement and maintain a certification training and examination program to support the initial certification, renewal of certification and training of persons in accordance with CNSC regulatory document RD-204: Certification of Persons Working at Nuclear Power Plants.

3.6 The licensee shall prepare, conduct and grade examinations and tests in accordance with the requirements of CNSC documents:

(i) EG1: Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants;

(ii) EG2: Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants; and

(iii) Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants.

3.7 The licensee shall ensure persons appointed to any of the following positions at the nuclear facility hold a certification for the applicable position pursuant to the *Nuclear Safety and Control Act*:

(i) senior health physicist,

(ii) control room operator, and

(iii) shift supervisor.

4. Operating Performance

4.1 The licensee shall implement and maintain an operations program.

4.2 The licensee shall implement and maintain operating policies and principles and a safe operating envelope.

(i) The operating policies and principles shall provide direction for safe operation and shall, as a minimum, reflect the safety analyses that have been previously submitted to the Commission.

(ii) The safe operating envelope shall be in accordance with CSA standard N290.15: Requirements for the Safe Operating Envelope of Nuclear Power Plants.

Operation in states not considered in, or not bounded by, the safety analyses are not permitted.

4.3 The licensee shall not make any changes to the operations or procedures that would invalidate the limits documented in the operating policies and principles or safe operating envelope referred to in condition 4.2 without the prior written approval of the Commission, or consent of a person authorized by the Commission.

4.4 The licensee shall comply with the reactor power limits specified in Appendix A.2.

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

4.6 The licensee shall notify and report in accordance with CNSC regulatory document S-99: REPORTING REQUIREMENTS FOR OPERATING NUCLEAR POWER PLANTS.

5. Safety Analysis

5.1 The licensee shall implement and maintain a deterministic safety analysis program.

5.2 The licensee shall implement and maintain a probabilistic safety assessment program in accordance with CNSC regulatory document S-294: PROBABILISTIC SAFETY ASSESSMENT (PSA) FOR NUCLEAR POWER PLANTS.

6. Physical Design

6.1 The licensee shall implement and maintain a design program.

6.2 The licensee shall not make any change to the design or equipment that would invalidate the limits documented in the operating policies and principles or safe operating envelope referred to in condition 4.2, or introduce hazards different in nature or greater in probability than those considered by the safety analyses and probabilistic safety assessment, without the prior written approval of the Commission, or consent of a person authorized by the Commission.

6.3 The licensee shall not load any fuel bundle or fuel assembly into a reactor unless the use of the design of the fuel bundle or fuel assembly has received prior written approval of the Commission, or consent of a person authorized by the Commission.

6.4 The licensee shall ensure that design and analysis computer codes and software used to support the safe operation of the nuclear facility are in accordance with CSA standard N286.7: QUALITY ASSURANCE OF ANALYTICAL, SCIENTIFIC AND DESIGN COMPUTER PROGRAMS FOR NUCLEAR POWER PLANTS.

6.5 The licensee shall implement and maintain a pressure boundary program in accordance with CSA standard N285.0: GENERAL REQUIREMENTS FOR PRESSURE-RETAINING SYSTEMS AND COMPONENTS IN CANDU NUCLEAR POWER PLANTS.

6.6 The licensee shall have in place a formal agreement with an Authorized Inspection Agency for the purpose of administering the requirements of condition 6.5. A copy of the agreement shall be provided to the Commission.

6.7 The licensee shall implement and maintain an environmental qualification program in accordance with CSA standard N290.13: ENVIRONMENTAL QUALIFICATION OF EQUIPMENT FOR CANDU NUCLEAR POWER PLANTS.

7. Fitness for Service

7.1 The licensee shall implement and maintain a maintenance program in accordance with CNSC regulatory document S-210: MAINTENANCE PROGRAMS FOR NUCLEAR POWER PLANTS.

7.2 The licensee shall implement and maintain a program for the management of outages.

7.3 The licensee shall implement and maintain a periodic inspection and testing program in accordance with the following CSA standards:

(i) N285.4: PERIODIC INSPECTION OF CANDU NUCLEAR POWER PLANT COMPONENTS;

(ii) N285.5: PERIODIC INSPECTION OF CANDU NUCLEAR POWER PLANT CONTAINMENT COMPONENTS; and

(iii) N287.7: IN-SERVICE EXAMINATION AND TESTING REQUIREMENTS FOR CONCRETE CONTAINMENT STRUCTURES FOR CANDU NUCLEAR POWER PLANTS.

7.4 The licensee shall implement and maintain in-service inspection programs for the safety significant balance of plant pressure retaining systems and components, and safety-related structures.

7.5 The licensee shall implement and maintain a reliability program in accordance with CNSC regulatory document S-98: RELIABILITY PROGRAMS FOR NUCLEAR POWER PLANTS.

8. Radiation Protection

8.1 The licensee shall implement and maintain a radiation protection program.

8.2 The licensee shall notify the Commission within 7 days of becoming aware that an action level has been reached.

9. Conventional Health and Safety

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

10. Environmental Protection

10.1 The licensee shall implement and maintain an environmental protection program in accordance with CNSC regulatory document S-296: ENVIRONMENTAL PROTECTION, POLICIES, PROGRAMS AND PROCEDURES AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS.

10.2 The licensee shall control, monitor and record releases of nuclear substances to the environment from the nuclear facility such that the releases do not exceed the derived release limits specified in Appendix A.3 established in accordance with CSA standard N288.1: GUIDELINES FOR CALCULATING DERIVED RELEASE LIMITS FOR RADIOACTIVE MATERIAL IN AIRBORNE AND LIQUID EFFLUENTS FOR NORMAL OPERATION OF NUCLEAR FACILITIES.

10.3 The licensee shall control and monitor the releases of hazardous substances.

10.4 The licensee shall notify the Commission within 7 days of becoming aware that an action level has been reached.

11. Emergency Management and Fire Protection

11.1 The licensee shall implement and maintain an emergency preparedness program to address onsite and offsite events which can affect the nuclear facility. Emergency exercises shall be conducted in accordance with CNSC regulatory document RD-353: TESTING AND IMPLEMENTATION OF EMERGENCY MEASURES.

11.2 The licensee shall implement and maintain a fire protection program for the nuclear facility in

accordance with CSA standard N293: FIRE PROTECTION FOR CANDU NUCLEAR POWER PLANTS.

12. Waste Management

12.1 The licensee shall implement and maintain an in-plant waste management program.

12.2 The licensee shall implement and maintain a program for the planning and preparation for decommissioning in accordance with CSA standard N294: DECOMMISSIONING OF FACILITIES CONTAINING NUCLEAR SUBSTANCES.

13. Security

13.1 The licensee shall implement and maintain a security program.

13.2 The licensee shall implement and maintain a nuclear response force in accordance with CNSC regulatory document S-298: NUCLEAR RESPONSE FORCE STANDARD, and shall carry out the nuclear response force firearms qualification in accordance with the revised criteria.

13.3 The licensee shall ensure fitness of nuclear security officers in accordance with CNSC regulatory document RD-363: NUCLEAR SECURITY OFFICER MEDICAL, PHYSICAL, AND PSYCHOLOGICAL FITNESS.

13.4 The licensee shall implement measures to prevent and detect unauthorized entry into a protected area or inner area at a high-security site is in accordance with CNSC regulatory document RD-321: CRITERIA FOR PHYSICAL PROTECTION SYSTEMS AND DEVICES AT HIGH-SECURITY SITES.

13.5 The licensee shall ensure that detection is in accordance with CNSC regulatory document RD-361: CRITERIA FOR EXPLOSIVE SUBSTANCE DETECTION, X-RAY IMAGING AND METAL DETECTION DEVICES AT HIGH-SECURITY SITES.

14. Safeguards

14.1 The licensee shall implement and maintain a safeguards program and undertake all measures required to ensure safeguards implementation.

14.2 The licensee shall not make changes to operation, equipment or procedures that would affect the implementation of safeguards measures, except with the prior written approval of the Commission, or consent of a person authorized by the Commission.

15. Packaging and Transport

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

16. Nuclear Facility-Specific

16.1 The licensee shall maintain financial guarantees for decommissioning acceptable to the Commission or to a person authorized by the Commission, and shall satisfy the Commission, or a person authorized by the Commission, that the financial guarantee remains valid and in effect and sufficient to meet the decommissioning needs.

16.2 The licensee shall carry out a test to measure the rate of leakage from the reactor building when subjected to full design pressure at the end of the refurbishment outage and prior to removal of the guaranteed shutdown state, unless otherwise approved in writing by the Commission, or a person authorized by the Commission.

16.3 The licensee shall implement a return to service plan in accordance with CNSC regulatory

document RD-360: LIFE EXTENSION OF NUCLEAR POWER PLANTS.

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

17. Waste Storage Facility-Specific

17.1 The licensee shall obtain written approval of the Commission, or consent of a person authorized by the Commission prior to the start of operations at the Phase II Extension of the waste storage facility. With the request for approval, the licensee shall provide assurance, in writing, that all of the operating requirements have been met.

17.2 The licensee shall design, build, modify and otherwise carry out work related to the waste storage facility with potential to impact protection from fire in accordance with the National Building Code of Canada and the National Fire Code of Canada.

17.3 The licensee shall operate, maintain, test, and inspect the waste storage facility in accordance with the National Fire Code of Canada.

17.4 The licensee shall submit quarterly reports to the Commission on the activities at the waste storage facility.

18. Nuclear Substances and Prescribed Equipment-Specific

18.1 The licensee shall not use nuclear substances in or on human beings.

18.2 The licensee shall maintain a list of all areas, rooms and enclosures in which more than one exemption quantity of a nuclear substance is used or stored.

18.3 The licensee is not authorized to import or export the controlled nuclear substances listed in Appendix B.1.

18.4 The licensee shall submit an annual compliance report to the Commission on the activities covering the nuclear substances or prescribed equipment listed in Appendix B.2.

SIGNED at OTTAWA _____

Original signed by _____ **(PDF XXXXXXXX)**
Michael Binder
President
CANADIAN NUCLEAR SAFETY COMMISSION

APPENDIX A – OPERATIONAL LIMITS

A.1 MINIMUM SHIFT COMPLEMENT

Work Group/Position	Number Required
Shift Supervisor	1
Control Room Operator	1
Field Operations Supervisor	1
Senior Power Plant Operators	3
Power Plant Operators	5
Chemical Maintainer*	1
Mechanical Maintainer*	1
Electrical Instrumentation & Control Maintainer*	1
Total	**14**

***** The shift staff shall contain three maintainers. The specific maintenance disciplines may be substituted during atypical situations. At all times sufficient staff will be available to fill all work group and emergency roles.

A.2 REACTOR POWER LIMITS

(i) the total power generated in any one fuel bundle shall not exceed 935 kilowatts;
(ii) the total power generated in any fuel channel shall not exceed 7300 kilowatts under steady-state operating conditions; and
(iii) the total thermal power from the reactor fuel shall not exceed 2156 megawatts under steady-state operating conditions.

A.3 DERIVED RELEASE LIMITS

The releases of nuclear substances to the environment from the Point Lepreau nuclear facility shall not exceed the Derived Emission Limits (DELs) listed below and the sum of all fractional DEL releases must remain less than unity. Any exceedence indicates that the licensee is in non-compliance with the public dose limit of 1mSv/a as per the *Radiation Protection Regulations*.

NUCLIDE	AIR PATHWAY	SEAWATER PATHWAY	NUCLIDE	AIR PATHWAY	SEAWATER PATHWAY
H-3	4.3E17	1.6E19	Sb-124	2.5E14	4.8E13
C-14	3.3E15	3.0E14	Sb-125	-----	1.9E14
Na-24	5.6E15	-----	Te-132	1.4E15	2.9E13
Ar-41	6.4E16	-----	I-123	-----	4.2E16
Sc-46	1.7E14	-----	I-125	-----	2.3E14
Cr-51	2.4E16	2.2E15	I-129	-----	1.9E13
Mn-54	1.1E14	6.4E13	I-131	(2.2E13)	-3.0E14
Fe-55	-----	5.1E14	I-132	1.5E16	2.4E16
Fe-59	4.0E14	3.1E13	I-133	-8.9E14	-3.5E15
Co-58	3.0E14	7.5E13	I-134	1.9E16	3.6E17
Co-60	6.5E12	1.8E13	I-135	7.7E15	9.2E15
Zn-65	7.1E13	1.5E13	Xe-131m	9.9E18	-----
As-76	-----	3.2E14	Xe-133	2.4E18	-----
Kr-65	(1.9E19)	-----	Xe-133m	2.8E18	-----
Kr-85m	5.2E17	-----	Xe-135	3.4E17	-----
Kr-87	9.4E16	-----	Xe-135m	2.0E17	-----
Kr-88	2.8E16	-----	Xe-138	2.2E16	-----
Sr-89	3.7E14	4.4E16	Cs-134	1.9E13	2.5E14
Sr-90	1.2E13	2.2E15	Cs-135	-----	3.4E15
Y-90	8.2E15	4.0E15	Cs-136	-----	6.3E14
Y-91	-----	3.1E15	Cs-137	5.4E12	4.0E14
Zr-95	1.7E14	3.7E13	Ba-140	7.4E14	9.4E15
Nb-95	1.3E14	1.1E14	La-140	1.1E16	4.7E14
Mo-99	5.4E15	1.3E16	Ce-141	2.1E15	7.4E14
Ru-103	1.2E15	1.8E14	Ce-144	1.1E14	2.8E14
Ru-106	7.7E13	2.7E14	Np-239	1.0E16	-----
Ag-110m	3.8E13	1.8E13	Noble Gases	7.3E16	-----
Sb-122	-----	1.8E14			

APPENDIX B – NUCLEAR SUBSTANCES and PRESCRIBED EQUIPMENT

B.1 IMPORT AND EXPORT RESTRICTIONS

This licence does not authorize the licensee to import or export, for the valid period of this licence, any quantity in any form of:

(i) Deuterium, in which the ratio of deuterium to hydrogen atoms exceeds 1:5000;
(ii) Plutonium;
(iii) Thorium, greater than 0.05 weight %;
(iv) Tritium, in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1000;
(v) Uranium other than Depleted Uranium configured as shielding; and
(vi) any other controlled nuclear substance listed in Schedule B to the *Nuclear Non-Proliferation Import and Export Control Regulations*.

B.2 CURRENT INVENTORY

The total quantity of an unsealed nuclear substance in possession shall not exceed the corresponding listed unsealed source maximum quantity. The total quantity of nuclear substance per sealed source shall not exceed its corresponding listed sealed source maximum quantity. Sealed sources shall only be used in the corresponding listed equipment.

ITEM	NUCLEAR SUBSTANCE	UNSEALED SOURCE MAXIMUM QUANTITY	SEALED SOURCE MAXIMUM QUANTITY	EQUIPMENT MAKE AND MODEL	CERTIFICATION NUMBER
1	Activation Products	800 MBq	N/A	N/A	N/A
2	Fission Products	200 MBq	N/A	N/A	N/A
3	Depleted Uranium	6000 grams	N/A	N/A	N/A
4	Am-241	1 MBq	N/A	N/A	N/A
5	Am-241 / Be	N/A	50 GBq	N/A	N/A
6	Activation Products	N/A	5 GBq	N/A	N/A
7	Fission Products	N/A	5 GBq	N/A	N/A
8	Depleted Uranium	N/A	6000 grams	N/A	N/A
9	U-235	N/A	100 KBq	N/A	N/A
10	Cesium 137	N/A	370 MBq	BOT Engineering TR-1A Universal Gamma Checker	414-0011
11	Cesium 137	N/A	50 GBq	J.L. Shepherd 142-10 calibrator	179-0018
12	Cesium 137	N/A	5.5 TBq	J.L. Shepherd 89 calibrator	170-0210
13	Strontium 90/Yttrium 90	N/A	1480 MBq	R-Metrics Beta Meter Checker	276-0001
14	Enriched Uranium 235	N/A	370 kBq	BOT Engineering Model RM-VIFM CDM	414-0012
15	Strontium 90/Yttrium 90	N/A	50 kBq	Eberline Model CS20 for AAGMs	N/A
16	Cesium 137	N/A	1.1 MBq	Eberline Model CSM-1 for GEM	N/A
17	Cesium 137	N/A	366 kBq	Amersham-Buchler Nds for LEPM	N/A
18	Cesium 137	N/A	4.44 MBq	MGPI Model 124086 for GEM	R-069-002-0-2023
19	Cesium 137	N/A	4.44 MBq	MGPI Model 124087 for GEM	R-069-002-0-2023
20	Colbalt 57	N/A	555 MBq	RMD Instruments, LLC LPA-1	0295-0010

AAGM = Alarming Area Gamma Monitor
GEM = Gaseous Effluent Monitor
LEPM = Liquid Effluent Pipe Monitor

ADDENDUM B. COMPLIANCE VERIFICATION CRITERIA

Licence Condition 1.1

Compliance Verification Criteria:

The licensee shall implement measures for the purpose of abiding by all applicable laws, regulations and requirements set out in federal statutes and agreements and federal, provincial and municipal regulations. Examples of applicable laws and regulations are as follows:

- *Cost Recovery Regulations*
- *Canadian Nuclear Safety Commission rules of Procedure*
- *Canadian Nuclear Safety Commission By-laws*
- *National Building Code 2010*
- *National Fire Code 2010*
- National Fire Protection Association, NFPA 801: 2008 edition: *Standard for Fire Protection for Facilities Handling Radioactive Materials*
- New Brunswick Ministry of Environment regulations and laws including those for protection of the environment
- Environment Canada's regulations for protection of the environment; and other relevant Federal, Provincial and Municipal Bylaws
- Environment Canada's regulations for protection of the environment; and other relevant Federal, Provincial and Municipal Bylaws
- *New Brunswick Occupational Health and Safety Act*

Licence Condition 13.4

Compliance Verification Criteria:

The licensee shall implement measures for the purpose of preventing and detecting unauthorized entry into a protected area or inner area at a high-security that apply to:

- Vehicle barriers and vehicle access control points;
- Perimeter intrusion detection systems and devices;
- Interior intrusion detection systems and devices;
- Closed-circuit video equipment systems for applications in a protected area or inner area;
- The design and functioning of security monitoring rooms; and
- The security monitoring room systems and devices.

Licence Condition 13.5

Compliance Verification Criteria:

The licensee shall implement the equipment for detecting concealed weapons and explosives at high-security sites, consisting of:

- explosive substance detection,
- X-ray imaging, and
- metal detection devices.

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 11-H12.1

File / dossier : 6.01.07
Date: 2011-09-06
Edocs: 3794617

Written submission from New Brunswick Power Nuclear

Mémoire d' Énergie nucléaire du Nouveau-Brunswick

In the Matter of

New Brunswick Power Nuclear

Application to renew the Power Reactor Operating licence for the Point Lepreau Generating Station

Public Hearing Day One

October 6, 2011

À l'égard de

Énergie nucléaire du Nouveau-Brunswick

Demande concernant le renouvellement du permis d'exploitation délivré pour sa centrale nucléaire de Point Lepreau

Premier jour de l'audience publique

Le 6 octobre 2011

Canada

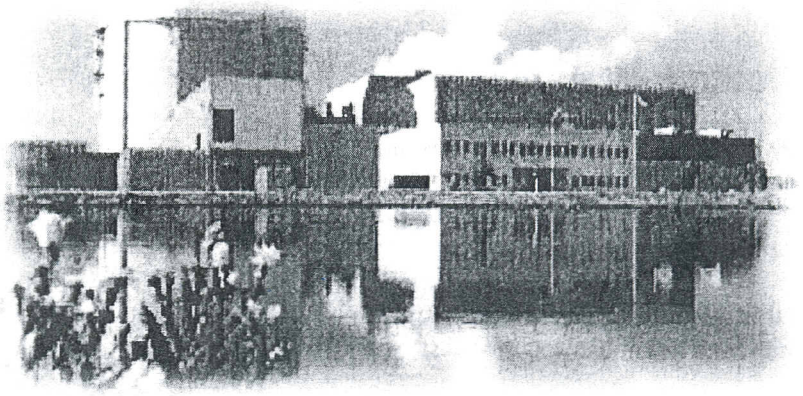
Énergie NB Power

SU-8

POINT LEPREAU GENERATING STATION

Licence and Permits Applications

APPLICATION TO RENEW THE POWER REACTOR OPERATING LICENCE
LPA-00583-2012
Rev. 1



0087-00583-2012-001-LPA-A-01

Document Approval

The following signatures are required prior to issue of this document.

Role	Name	Signature	Date
Author	Rick Gauthier		2011 08 30
Reviewer	Paul Thompson		2011-08-30
SU-8 Process Owner	Rick Gauthier		2011 0830
Licence Owner (Document Owner)	Wade J. Parker	for W.P.	2011-08-30
V.P. Nuclear	Blair Kennedy	Blair Kennedy	2011. 08. 30

Revision Record

The following is the latest revision record for this document.

Rev. #	Date	Changes Since Last Revision	Author(s)	Reviewer(s)
1	2011-08-30	Revised application for Power Reactor Licence Renewal for 2012, added documents, corrected font, typos, removed documents.	R. Gauthier	P. Thompson

Table of Contents

Table of Contents, Continued

Introduction

This document is submitted as the revised application for the renewal of the *Point Lepreau Generating Station, Unit 1 Power Reactor Operating Licence, PROL 17.01/2012*.

This document describes established programs and associated issued station documentation which are the basis supporting New Brunswick Power Nuclear Corporation's (NB Power Nuclear) request for renewal of the Point Lepreau Generating Station, Unit 1, Power Reactor Operating Licence.

This document supersedes the previous document *Application to Renew the Power Reactor Operating Licence 0087-00583-2012-001-LPA-A-00*.

This revised application is a request for renewal of the station Operating Licence to cover a five year period. This would include the commissioning and return to power, and post refurbishment operating period to the end of June 2017.

The request for a five year operating Licence is consistent with the criteria for recommending licence periods as outlined in CNSC CMD 02-M12. i.e.:

- The duration of licence is commensurate with the licensed activity.
- Hazards associated with the licensed activity are well characterized and their impacts well predicted and are within the scope considered in the environmental safety case.
- A Quality Management System is in place to provide assurance that the safety-related activities are effective and maintained.
- NB Power Nuclear has a consistent and good history of operating experience and compliance in carrying out the licensed activity.

The information and documentation referenced in this document is considered current to July 2011.

1.0 Operating Performance

1.1 Applicant Name and Business Address

New Brunswick Power Nuclear Corporation
122 County Line Rd
Maces Bay, New Brunswick
E5J 1W1

1.2 Land Ownership and Control Documentation

Land Ownership

The documentation assuring title to the land acquired by NB Power Nuclear in Charlotte County is registered in the County Registry Office under numbers: 73429, 73943, and 78743.

The documentation assuring title to the land acquired by NB Power Nuclear in Saint John County is registered in the County Registry Office under numbers: 251463, 251624, 251625, 251917, 251918, 251919, 251921, 252226, 252448, 253767, 259656, and 268880.

1.3 Facility to be Licensed

Facility Description

Point Lepreau Generating Station is a CANDU-6 Pressurized Heavy Water Reactor type nuclear power plant supplying steam to a turbine generator set delivering an electrical output of 680 MW(e). Some electrical power is consumed to operate equipment within the station. A net output of 635 MW(e) is available to the New Brunswick Grid. As part of the refurbishment activities, the low pressure turbines were replaced with ones of a more efficient design. This is expected to result in an increased electrical output of about 25 MW(e). The station is designed for commercial base load operation and was declared in service in early 1983.

1.3 Facility to be Licensed, Continued

Facility Description (continued)

The Station is located in New Brunswick on the Lepreau Peninsula, 40 km southwest of Saint John on Route 790, off Highway 1. The property is located in the counties of Saint John and Charlotte, in the Province of New Brunswick, comprising parts of original Crown Grant Number 1 to Henry Corr, Crown Grant Number 2 to Thomas Loveday, Crown Grant Number 3 to John Greenwood, Crown Grant Number 4 to Manse & A. Gould, Crown Grant Number 5 to Catherine Gould, Crown Grant Number 6 to Edward Mooney, and parts of lands formerly reserved for Lighthouse and other public purposes shown in:

- Point Lepreau Generating Station Site Plan drawing number 0086-10200-3001-001-SP-E Rev. 4, August 7, 2007, and
- Point Lepreau Generating Station Site Plan drawing number 0086-10200-3001-002-SP-E Rev. 2, August 7, 2007.

Also located on the site, and covered under the *Point Lepreau Generating Station, Unit 1 Power Reactor Operating Licence*, PROL 17.01/2012, is the Solid Radioactive Waste Management Facility. This facility is operated and maintained by Point Lepreau Generating Station staff and provides safe "short term" storage of low level solid radioactive waste, spent reactor fuel, and waste from the Retube activities coming from the station.

The original waste storage facility (Phase I) began operations in 1983. Spent fuel dry storage capability (Phase II) was added to the facility in 1990/1991, and the Retube waste storage (Phase III) was added prior to the 2008 refurbishment outage.

The Solid Radioactive Waste Management Facility occupies an area of approximately 83,000 square meters, about 1,200 meters north of the reactor building, as shown on Drawing 87-10200-3002-01-GA-E (Rev. 12). Within this licensed areas there are areas designated for possible future expansion, there are currently two fenced working areas. They consist of:

- Phase I, comprised of concrete vaults, filter storage pipes, and quadricells, shown in Drawing No. 87-79100-2001-001-GA-D Rev. 12.
- Phase II, comprised of concrete canisters for spent fuel dry storage, shown in Drawing No. 87-79100-2001-002-GA-E, Rev. 11.
- Phase III, comprised of 5 concrete Retube Canisters and 2 concrete storage vault structures as shown in Drawing No. 87-79100-2001-003-GA-D-00 Rev. 0.
- Associated buildings and structures.

1.3 Facility to be Licensed, Continued

Facility Description (continued)

Further details on the description of the station is provided in Part 1 of the Point Lepreau Generating Station 2009 Safety Report (*0087-01322-3007-001-SR-A-00*), while further details on the Solid Radioactive Waste Management Facility can be found in the Solid Radioactive Waste Management Facility 2007 Safety Report 87-SR-79100-01, Revision 0.

Site Evaluation Report

The overall site has been the subject of a series of evaluations and assessments:

- a full federal / provincial environmental assessment for Point Lepreau 1 (1977),
- a full federal / provincial environmental assessment for a proposed Point Lepreau 2 (1985),
- an assessment to allow the storage of Dry Spent Fuel Storage in above ground canisters at the Solid Radioactive Waste Management Facility (1990), and
- a screening level assessment of modifications at the Solid Radioactive Waste Management Facility to manage refurbishment related wastes, including:
    - the specific refurbishment activities which would generate waste requiring management in the Solid Radioactive Waste Management Facility,
    - the handling and transport of those wastes, and
    - the incremental environmental effects of continued operation of the Point Lepreau Generating Station following completion of the refurbishment activities.

Between them, these assessments and related approvals anticipated the construction, operation, and maintenance of generation and related facilities at this site for 25-30 years post refurbishment operation, followed by decommissioning activities. A summary of these assessments is available in *Review of Environmental Assessments at Point Lepreau Generating Station*, *87RF-07005-3000-001-ENA-A-01*.

CNSC staff have determined that these assessments are sufficient to cover refurbishment and continued operation of Point Lepreau Generating Station[1].

1.3 Facility to be Licensed, Continued

Reference

1. Letter: Grant, I.M. to Pilkington, W.S., "CNSC Determination – Environmental assessment of Proposed Refurbishment of Point Lepreau Nuclear Generating Station", 2005 June 07.

1.4 Activities to be Licensed

Licensed Activities

(i) operate the Point Lepreau Generating Station (hereinafter "the nuclear facility") as described in the documents listed in Part II of Appendix A to this licence, at a site located in Charlotte County and Saint John County, Province of New Brunswick, as further described in Part I, of *Appendix A* to this licence.

(ii) operate the Point Lepreau Solid Radioactive Waste Management Facility (hereinafter "the waste storage facility") As described in the documents listed in Part II of Appendix A to this licence, at a site located in Charlotte County and Saint John County, Province of New Brunswick, as further described in Part I, *Appendix A* to this licence.

(iii) possess, transfer, use, package, manage and store the nuclear substances, other than sealed and unsealed sources and approved devices containing nuclear substances, that are required for, associated with, or arise from the activities described in (i) and (ii);

(iv) possess, transfer, import, use, package, manage, and store the sealed and unsealed sources and the prescribed equipment listed in *Appendix H* of this licence;

(v) transport Category II nuclear material by road vehicle from the nuclear facility spent fuel bay to the waste storage facility; and

(vi) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i), (ii), (iv), and (v).

1.5 Authority to Act for the Corporation

Authority to Act

Those with authority to act for New Brunswick Power Nuclear Corporation in dealing with the Canadian Nuclear Safety Commission are:

- President and CEO — Gaëtan Thomas
- Corporate Counsel — Mike Gorman
- Vice-President — Blair Kennedy
- Station Director — Wade J. Parker

From time to time support staff may accompany any of the above.

Cost Recovery Billing Information

All Invoices and Statements dealing with Cost Recovery should be forwarded to:

Accounts Payable
New Brunswick Power Nuclear Corporation
PO Box 2050, Fredericton NB
E3B 5G4

Single Point of Contact

With the implementation of the *DM-2, Manage External Relationships* process, Point Lepreau Generating Station has designated:

The Station Director as the single point of contact for all written regulatory correspondence related to the operation of the Station. Correspondence should be addressed as follows:

Wade J. Parker, Station Director
Point Lepreau Generating Station
P.O. Box 600 Lepreau, New Brunswick
E5J 2S6

1.5 Authority to Act for the Corporation, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-DM1	2	Direct and Manage the Business	2011 Jan. 14
PRR-00660-DM2	2	Manage External Relationships	2010 Aug. 27
SI-01365-A102	1	Establishing and Maintaining External Relationships	2010 May 17
SI-01365-A66	6	Managing Regulatory Commitments and Action Items	2011 Feb. 15

1.6 Management of Licensed Activities

Management

Those persons responsible for the management of licensed activities are:

- President and CEO — G. Thomas
- Vice-President — B. Kennedy
- Station Director — W. J. Parker
- Deputy Chief Nuclear Officer — E. R. Eagles
- Human Resources Director — F. Ouellette
- Directors of Business Excellence/ Projects — V. Grant /A. Hayward
- Senior Strategic Advisor — K. Miller

1.7 Organization

Organizational Structure

The organizational structure for the Point Lepreau Generating Station, together with a description of specified staff functional responsibilities is provided in *NMM-00660, Nuclear Management Manual*; Reference Document *RD-01364-L3, Operating Policies and Principles* and Station Instruction *SI-01365-A106, Controlling Hours of Work for Regular Shift Workers*.

NBPN has developed a Plan of Establishment that includes the total complement of regular and term positions needed to support the safe operation of the station. The plan identifies vacant positions and key positions that are double-banked. The double-banking strategy permits existing and replacement employees to occupy the same job for a specified period of time, allowing for job specific knowledge transfer. There were 43 double-banked positions at NBPN in the fiscal year 2007-2008.

Sound staffing principles are fundamental to formulating complementary and supportive work units. A new team based recruiting approach was introduced in October 2007 to address this issue. The traditional approach to staffing based on an interview driven, individual focused process leads to cloning of existing employees and management. The new methodology is system driven, focuses on the Team and looks to expand diversity. It makes the selection of new Team members more inclusive and requires employees to take an active part in identifying their preferences, knowledge, skills and experience in a system-based employee profile. A key consideration when adding a new team member becomes the complementary fit to the Team in addition to the professional or technical knowledge, skills and abilities brought by the new member. The new Team member and the Team are supported through a formal integration process and services conducted by the appropriate Human Resources Practitioner.

1.7 Organization, Continued

Organizational Structure Changes

Since August, 2005 the following changes have been made to NB Power Nuclear's organizational structure:

- Mr. Doug Parker was appointed Station Manager on September 28, 2006 and Mr. J.J. McCarthy retired from NB Power Nuclear. [1,3]
- Mr. Keith Stratton assumed role of Director of Engineering on July 24, 2006.[2]
- Mr. Glenn Greenlaw assumed the role of Technical Manager on July 24, 2006. [2]
- Mr. Laurie Comeau assumed the role of Manager of Projects as the roles of Nuclear Safety Manager and the Personnel Safety and Environment Manager were combined and assumed by Mr. Paul Thompson on October 20, 2006. [2,4]
- Changed the Station Manager title to Station Director with no changes to roles and responsibilities. Separated Security, Health Safety & Environment, and Nuclear Safety accountabilities of the Manager, Safety & Environment. Security reports to a new position- Regulatory Affairs Manager which reports directly to the Deputy Chief Nuclear Officer. Health Safety & Environment report directly to the Station Director through the renamed position of Health Safety & Environment Manager. Nuclear Safety joined with Design to form a new unit, Nuclear Safety and Design reporting directly to the Station Director. [8, 10, 11]
- Mr. Charles Hickman was assigned the position of Health Safety and Environment Manager and Tony Munn has been assigned Organizational Manager, Health Safety and Environment. Mr. Glenn Greenlaw has been assigned the position of Nuclear Safety and Design Manager and Mr. John Slade has been assigned Organization Manager, Nuclear Safety and Design. [12]
- The President and CEO of NB Power Corporation, Mr. David Hay retired on January 31, 2010. Mr. Gaëtan Thomas, the vice-president of NB Power Nuclear has been appointed as acting President and CEO. Mr. Keith Stratton, Deputy Chief Nuclear officer retired on February 01, 2010 and Mr. Rod Eagles has assumed his role. [13]
- Mr. Gaëtan Thomas named as NB Power Corporation's President and CEO, Mr. Blair Kennedy has been appointed to the position of Vice-President Nuclear and Conventional. The responsibilities of the Directors of Human Resources Excellence will be assumed by Mr. Fernand Ouellette under a new position title of Chief Human Resource Officer. The positions of Organizational Director and Director Human Resources Excellence have been discontinued. [14]
- Mr. Wade Parker appointed Station Director and Mr. Doug Parker retired on June 30, 2010. [15, 16,17,18]

1.7 Organization, Continued

Organizational Structure Changes (continued)

- Mr. Andy Hayward assumed the partnered position of Director, Business Excellence previously held by Jill Doucett along with the responsibilities for Director, Project Services. [19 & 20]
- Michael Hare will assume the role of Production Manager and Commissioning and Restart Manager partnered with Jim McIntosh. Mark Power has been assigned to the new position of Performance Improvement Manager with responsibilities for oversight and direction for the corrective action process. [21]
- The practice for partnering with sharing of responsibilities has been discontinued for the following:

  Mr. Micheal Hare continues his role as Production Manager with sole responsibility for Operations, Fuel Handling, Chemistry and Work Management.
  Jim McIntosh has been assigned the position of Manager of Nuclear Safety & Design and will be the Station Design Authority.
  Wayne Woodworth assumes the position of Health Safety & Environment Manager.
  John Slade has been assigned the position of Reliable Equipment Manager with oversight of system engineering and equipment maintenance processes. The new position of Maintenance Manager has been assigned to Jamie Calhoun.
  The new positions of Transition Managers have been created to improve organizational focus on business plan initiatives, change management and special projects. [22]

1.7 Organization, Continued

Organizational Structure Change References

The changes are displayed in the organization chart provided in Figure 1.7.1.

1. Letter: Mr. J.J. McCarthy to Mr. K. Lafrenière; "Station Manager Position", 2006-07-28.
2. Letter: J.J. McCarthy to Mr. K. Lafrenière; "Notification of New Brunswick Power Nuclear Corporation Management Changes", 2006-08-04.
3. Letter: Mr. G. Thomas to Mr. K. Lafrenière; "Change in Station Manager Position at Point Lepreau Generating Station", 2006-10-03.
4. Letter: Mr. D. Parker to Mr. K. Lafrenière; "Notification of New Brunswick Power Nuclear Corporation Management Changes", 2006-11-03.
5. Letter: Mr. D. Parker to Mr. K. Lafrenière; "Notification of Persons Responsible for the Management and Control of the Licensed Activity at the Point Lepreau Nuclear Generating Station", 2006-11-03.
6. Letter: Mr. D. Parker to Mr. K. Lafrenière; "Notification of Persons Responsible for the Management and Control of the Licensed Activity at the Point Lepreau Nuclear Generating Station", 2007-06-01.
7. Letter: Mr. D. Parker to Mr. K. Lafrenière; "Update on Type I Inspection of NB Power's Recent Organizational Changes, November 30 to December 3, 2004; Report No. 04-HP-06 (Action Item 051203) and Request for Closure of Action Item 051203", 2008-02-18.
8. Letter: Mr. D. Parker to Mr. F. Rinfret; "Request for Approval of Changes to NB Power Nuclear Organization", 2009-01-20.
9. Letter: Mr. D. Parker to Mr. M. Leblanc; "Approval of Changes to NB Power Nuclear Organization", 2009-01-30.
10. Letter: Mr. D. Parker to Mr. F. Rinfret; "Request for Approval of Changes to NB Power Nuclear Organization", 2009-05-26.
11. Letter: Mr. D. Parker to Mr. F. Rinfret; "Request for Approval of Changes to NB Power Nuclear Organization", 2009-07-20.
12. Letter: Mr. D. Parker to Mr. F. Rinfret; "Notification of Persons Responsible for the Management and Control of the Licensed Activity at the Point Lepreau Generation Station", 2009-10-07.
13. Letter: Mr. D. Parker to Mr. F. Rinfret; "Notification of Persons Responsible for the Management and Control of the Licensed Activity at the Point Lepreau Generation Station", 2010-02-15.
14. Letter: Mr. D. Parker to Mr. F. Rinfret; "Notification of Persons Responsible for the Management and Control of the Licensed Activity at the Point Lepreau Generation Station (PLGS)", 2010-04-23.

1.7 Organization, Continued

Organizational Structure Change References (continued)

15. Letter: Mr. D. Parker to Mr. F. Rinfret; "Notification -Station Director Position", 2010-05-19.
16. Letter: Mr. B. Kennedy to Mr. F. Rinfret; "Change in Station Director Position at Point Lepreau Generating Station", 2010-06-23.
17. Letter: Mr. D. Parker to Mr. F. Rinfret; "Notification of Changes to Persons Responsible For the Management and Control of Licensed Activiites at the Point Lepreau Generating Station (PLGS)," 2010-05-27.
18. Letter: Mr. B. Kennedy to Mr. F. Rinfret; "Station Director Position at Point Lepreau Generating Station", 2010-07-05.
19. Letter: Mr. W. Parker to Mr. F. Rinfret; "Notification of Changes to the Point Lepreau Generating Station (PLGS) Organization", 2010-09-27.
20. Letter: Mr. W. Parker to Mr. F. Rinfret; "Notification of Changes to the Point Lepreau Generating Station (PLGS) Organization", 2010-11-26.
21. Letter: Mr. W. Parker to Mr. F. Rinfret; "Notification of Changes to the Point Lepreau Generating Station (PLGS) Organization", 2010-12-06.
22. Letter: Mr. W. Parker to Ms. L. Love-Tedjoutomo; "Notification of Changes to persons Responsible for the Management and Control of Licensed Activities at the PLGS Organization", 2011-06-07.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
NMM-00660	6	Nuclear Management Manual	2011 Aug. 30
SI-01365-A76	0	Leading and Managing Change	2004 Jul. 06
SI-01365-A101	0	Maintain the Plan of Establishment	2004 Jun. 30

1.7 Organization, Continued

Organization Chart

Since August 1, 2005, the organizational structure of the New Brunswick Power Nuclear Corporation has been refined as shown below.

***A** – Position requiring CNSC approval prior to a change in responsibilities.

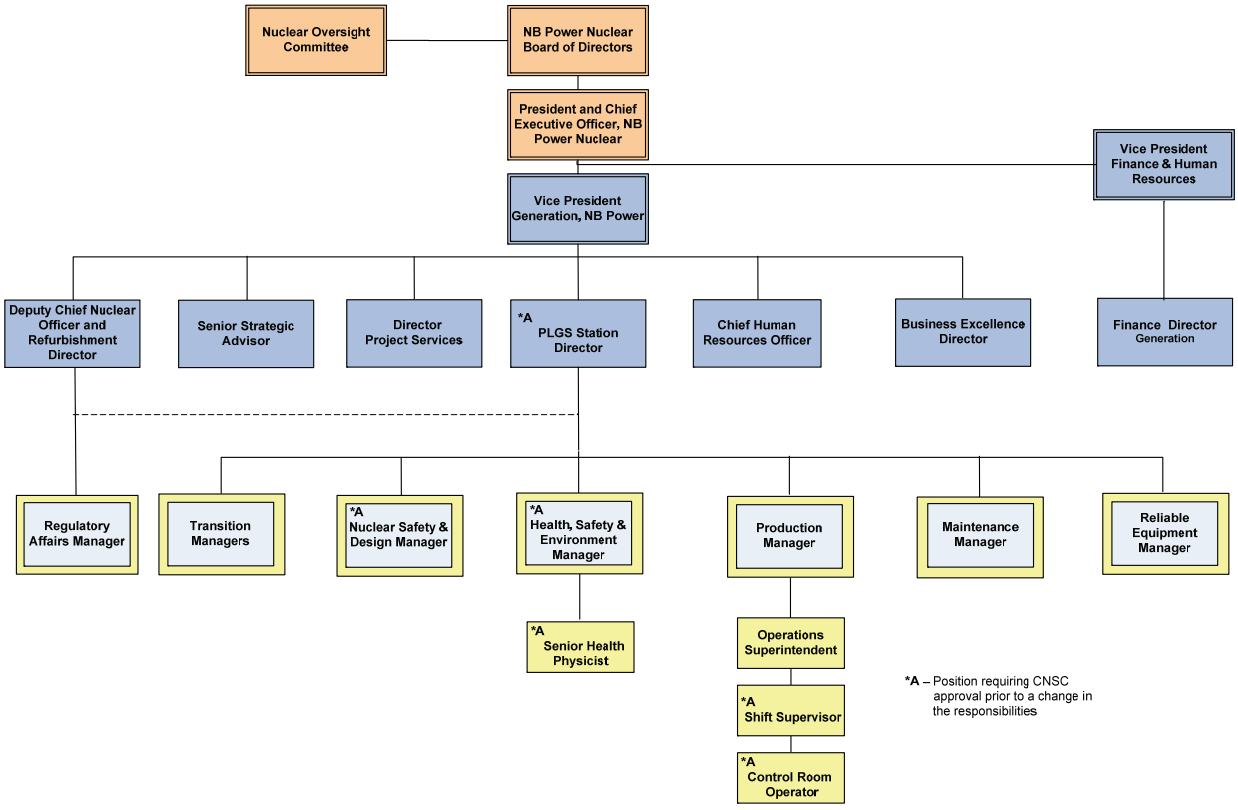


Figure 1.7.1

1.8 Approach to Safety

Safety is the number one priority at NB Power Nuclear and this theme is reflected throughout the Nuclear Management Manual, which is the top tier document governing the management of the station. The importance of safety is reflected throughout the manual and reinforced by the principles that ensure work is performed in a safe and quality manner. The following are some excerpts from the manual.

Management Commitment *(NMM Section 1.2)*

NB Power Nuclear is committed to:

- operating PLGS in a safe, reliable and efficient manner
- implementing a process-based organization
- implementing and maintaining the management system
- complying with the Nuclear Safety and Control Act and applicable regulations
- meeting the requirements of the Power Reactor Operating Licence
- implementing NB Power Nuclear business plans
- complying the applicable portions of the *CSA N286, Quality Assurance standards*
- complying the applicable portions of *CSA N285.0, General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants, CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code* and *RA-2360, National Board Inspection Code* relating to pressure boundary work
- meeting industry expectations as identified in the World Association of Nuclear Operators
- Complying with the applicable portions of the *ISO 14001, Environmental Management Systems*
- Complying with other applicable acts, regulations, licences, standards and codes.

All staff who work for NB Power Nuclear are accountable for following the requirements of the Management System as identified in the Nuclear Management Manual.

NB Power Mission (*NMM Section 1.3*)

Proudly serve our customers.
We proudly serve our customers by demonstrating the values of safety, quality and innovation in everything we do.

1.8 Approach to Safety, Continued

Core Values (*NMM Section 1.4*)

Safety First: We recognize and take seriously the unique safety requirements of the nuclear core. We are committed to employee and public safety.
Pursuit of Excellence: We strive to achieve world class standards through continuous improvement.
Openness …..
Respect for the individual ……
Teamwork …..
Commitment ….
Integrity …..

Management Responsibilities (*NMM Section 4.8*)

NB Power Nuclear management, by leadership, commitment, and example establish and demonstrate high standards of performance and align the organization to achieve safe and reliable station operation. Management responsibilities include:

- Living and promoting the core values of the station.
- Providing appropriate planning and direction.
- Providing appropriate resources including personnel, tools, and equipment.
- Providing training and documentation to enable staff to carry out the tasks they are asked to perform.
- Supporting the accomplishment of work and removing unnecessary obstacles.
- Communicating and reinforcing expectations for high standards of performance.
- Promoting and ensuring safety expectations of the plant.
- Monitoring and assessing performance.

Employee Responsibilities (*NMM Section 4.9*)

All employees, including management, have a personal responsibility to carry out duties safely and in accordance with instructions and training provided. Personal responsibilities include:

- Living and promoting the core values of the station.
- Acting with due regard for personal and co-worker safety.
- Safeguarding the public, the environment, company property, materials and equipment.
- Following procedures and instructions and producing the necessary records.

1.8 Approach to Safety, Continued

Employee Responsibilities (*NMM Section 4.9*) (continued)

- Respecting confidentiality requirements.
- Ensuring commercial integrity when dealing with vendors.
- Identifying problems and deficiencies.
- Identifying ways we can improve.
- Demonstrating a questioning attitude and bringing concerns to the attention of management.

Personnel Safety (*NMM Section 4.10*)

We provide a work environment in which the risk of an individual suffering injury or work place illness is minimized. An important element in providing a safe work environment is maintaining a clean and orderly plant. We promote an environment that encourages the identification and resolution of safety concerns. We provide appropriate direction, training, technical support, procedures, and equipment to enable us to work safely.

By effectively using and improving our radiological safety programs, we ensure that radiation dose to station personnel and the public is kept within regulatory limits and As Low As Reasonably Achievable (ALARA).

Human Performance (*NMM Section 4.5*)

Human performance is a series of behaviors intended to accomplish specific results. The collective behaviors of individuals at all levels in the organization determine the level of safety and performance that is achieved. Individual, leader, and organizational behaviors that contribute to excellence in human performance and teamwork must be continuously reinforced to achieve event-free operations.

Safe Operation (*NMM Section 5.2*)

The plant design and associated safety analysis establishes an envelope of plant configurations and operating limits that are acceptable for safe operation. The plant is operated within the specified safe operating envelope as described in the Power Reactor Operating Licence, Operating Policies and Principles and other related procedures. The *MS-3, Maintain Design and Safety Basis* process identifies the safety-related systems and covers the activities that define and maintain the design and safety basis, including maintenance of the Safety Report.

We comply with licences and permits issued by regulatory agencies and ensure that the requirements identified in these documents are communicated to Process Owners.

1.8 Approach to Safety, Continued

Control of Station Equipment (*NMM Section 5.3*)

We ensure that the station is in a known, safe operating condition for all modes of operation. Changes to the status of plant equipment must be approved, documented, and performed by personnel who have been authorized to make such changes.

Monitor and Managing System and Equipment Performance *(NMM Section 5.4)*

In order to maximize the availability and reliability of plant systems and equipment, we monitor their performance and resolve identified performance problems and degradation.

Work Planning (*NMM Section 5.5*)

Work is identified, planned, scheduled, and supported with adequate resources for safe, timely, and effective completion.

Plant Maintenance *(NMM Section 5.6)*

Plant systems and equipment are maintained in good working order so they can perform their intended design function.

Plant Modifications (*NMM section 5.7*)

Modifications to plant systems or equipment are controlled. Changes to the station design are reviewed and approved by persons with full knowledge of the original intent and requirements prior to implementation. Changes are documented, communicated to affected personnel, and appropriate training provided.

Materials and Services Provided by Vendors (*NMM Section 5.8*)

When requesting materials or services from outside vendors, we clearly specify our technical and quality requirements and select vendors capable of satisfying these requirements.

Security (*NMM Section 5.9*)

Physical plant security is provided at PLGS to minimize the risk to the public, employees, the environment, and the plant from unlawful acts.

1.8 Approach to Safety, Continued

Chemistry (*NMM Section 5.10*)

Plant fluid systems are maintained within the documented chemistry specifications to ensure that the critical plant equipment performs safely and reliably.

Environmental Management (*NMM Section 5.11*)

We control and minimize the effect that the plant operation has on the environment. We are committed to complying with the applicable Federal and Provincial environmental laws and regulations. In addition, NB Power Nuclear is registered to the ISO 14001 environmental standard.

Fire Protection (*NMM Section 5.12*)

The station Fire Protection Program has been established to help minimize the risk of fire at the station. This program uses defense-in-depth measures for fire prevention, fire detection and suppression, and limiting or mitigating the effects of fire.

Should a fire occur, the fire Protection Program will:

- Ensure that fires do not significantly increase the risk of radiological release to the public.
- Protect plant operating personnel from the hazards of fire.
- Minimize the interruption of power generation due to fire.
- Minimize economic loss resulting from fire damage to structures, systems, equipment, and material.

Nuclear Fuel Management (*NMM Section 5.13*)

Programs and procedures have been established to ensure adequate control of nuclear fuel from the procurement of new fuel to the storage of irradiated fuel in accordance with standards, regulations, and internal safeguards obligations.

Emergency Preparedness (*NMM Section 5.14*)

Appropriate planning measures have been established to respond to emergency situations at the station. These planning measures include coordination with offsite agencies, where appropriate, and are periodically exercised through drills.

1.9 Operations

Operations

The *OP-1, Control and Monitor Station Equipment* process, ensures the status of station systems and components are managed to maximize safety and optimize production. The high level process requirements are:

- Operating Procedures and instructions covering both routine and non-routine activities exist and are updated as needed and in a controlled manner.
- Staff are trained and qualified to perform the required activities.
- Necessary number of qualified staff are present at all times to cover routine and upset conditions.
- Procedures are adhered to.
- Reactor Operation and plant operation are monitored to ensure design and safety limits outlined in *RD-01364-L3, Operating Policies and Principles* are complied with.
- Plant and equipment are monitored and tested such that problems are identified in a timely manner and that instruments, controls and associated indicators are maintained operational and in calibration.
- Work is controlled and documented. Work is authorized by persons having the appropriate level of authority and considers the impact on plant and personnel safety and concurrent activities.
- Operating staff know the status of systems and equipment under their control. Information on plant status is properly communicated and turned over to the incoming shift.
- Human performance tools are understood and applied.
- Systems, components and supporting equipment are labeled in the field and directly relate to operations documentation, activities and records.
- Necessary technical support is available to operations staff.

OP-1 calls out to the other three Operate core processes.

OP-2, Control Chemistry, which ensures system chemistry is maintained within specification to optimize the performance of station systems and attain design service life (refer to *Section 4.5*).

OP-3, Control Effluents, which ensures that station emissions remain within established limits and are documented to demonstrate compliance. This process applies to airborne and liquid effluents from effluent control systems installed at Point Lepreau Generating Station (PLGS). (Refer to *Section 6.2*).

OP-4, Fuel the Reactor process, which controls fuelling activities to support safe, optimal power production.

1.9 Operations, Continued

Operations (continued)

OP-1 is closely associated with;
The *MA-2, Provide Planning and Scheduling Services* process, which applies to the planning and scheduling of work on power block related structures, systems, and components during normal operations as well as planned and forced outages. The process also applies to the planning and scheduling of the installation of design modifications.

The *MS-3, Maintain Design and Safety Basis* process, which is used to assess whether planned and actual activities related to procurement, design, installation, commissioning, operations and maintenance are consistent with the documented design and design basis. This process also identifies the records associated with the design and design basis.

The standards and expectations for duty shift and fuel handling personnel for performing work at PLGS is outlined in *SI-01365-P62, Operations Expectations and Practices*. Consistent with the Nuclear Management Manual, *SI-01365-P62* indicates that safety is the first priority when making decisions and performing work. Operations staff are directed to maintain a high degree of due diligence, conservation decision making, and attention to detail with respect to nuclear safety and protecting the reactor core.

Particular attention is paid to those activities associated with core reactivity changes. Procedures involving reactivity changes are water marked to highlight nuclear safety importance. Support to key reactivity evolutions is provided by Reactor Physics staff. Oversight to activities that impact reactivity is provided by a Reactivity Oversight Committee made up of a multidisciplinary team. Outputs provide guidance to ensure that all plant evolutions affecting reactivity are controlled, safe and conservative. To achieve this purpose the Reactivity Oversight Committee analyzes station and industry events, outstanding corrective actions, effectiveness of completed corrective actions and Corrective Action Program trend analysis.

1.9 Operations, Continued

Documentation

Documents supporting these processes are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-OP1	2	Control and Monitor Station Equipment	2011 Feb. 01
PRR-00660-MS3	3	Maintain Design and Safety Basis	2010 Jul. 05
PRR-00660-MA2	2	Provide Planning and Scheduling Services	2004 Aug. 31
RD-01364-L3	17	Operating Policies and Principles	2009 Nov. 30
SI-01365-P85	5	Managing Forced Outages	2011 May 30
SI-01365-P74	6	Managing Planned Outages	2006 Dec. 15
SI-01365-P62	11	Operations Expectations and Practices	2011 Jan. 12
SI-01365-P99	7	Monitoring and Operating Station Equipment	2011 June 27
SI-01365-P01	23	Authorizing and Monitoring Maintenance	2011 Aug. 02
SDP-01368-P21	1	Authorizing and Monitoring Maintenance on Main Station Connections	2009 Jun. 23
SDP-03102-04	4	Compliance with Power Density Limits for the Normal Core	2001 Nov. 28
SDP-01368-P36	13	Meeting Operations Staffing Requirements	2011 June 7
SDP-01368-P18	3	Using Ice Plugs	2008 Apr. 7
SDP-01368-P22	4	Controlling the Guaranteed Shutdown State	2007 Apr. 3
SDP-01368-P34	2	Performing Shift Turnovers	2009 May 28
SDP-01368-P33	1	Controlling Line of Defense	2006 Feb. 17
SDP-01368-P27	1	Performing Technical Operability Reviews	2010 Sept. 24
SDP-01368-P30	1	Maintaining Plant Status Change Control	2005 Oct. 21
SDP-01368-P32	0	Controlling Heavy Water	2005 Feb. 17
SDP-01368-P26	1	Scheduling and Performing System Alignments	2010 Nov. 18
SDP-01368-P46	2	Contingency Action Plans	2011 Apr. 07
SI-01365-A110	2	Operational Decision Making	2007 Dec. 06

1.9 Operations, Continued

Operating Manuals

The complete list of Operating Manuals is contained in Table 8.

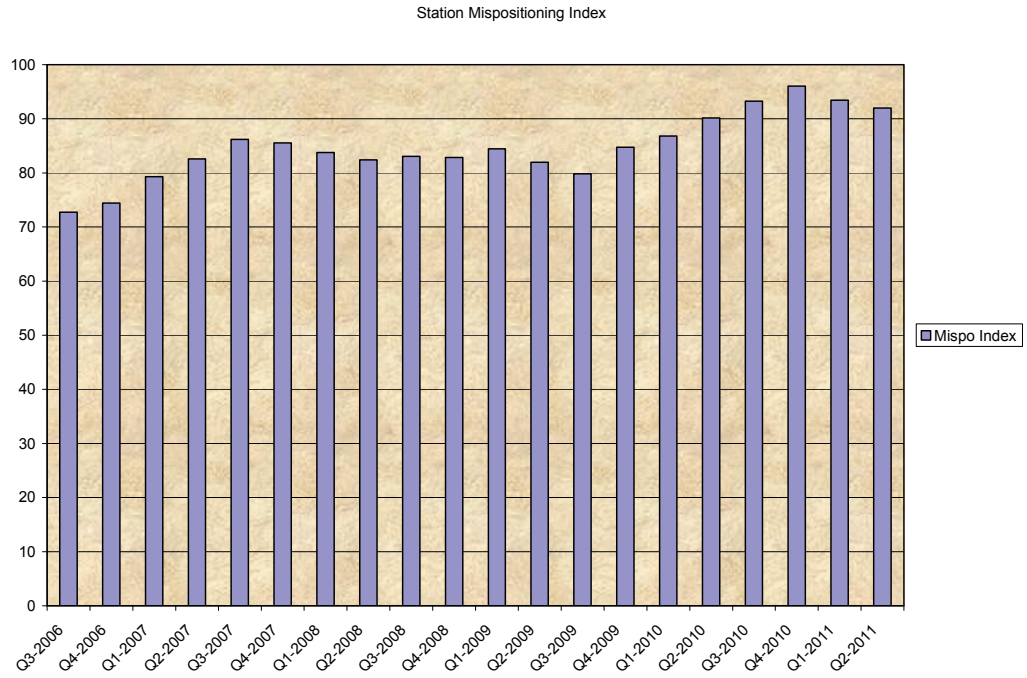
Performance Metrics

Mispositioning Index

One of performance indicators related to operation used widely across the nuclear industry is the Mispositioning Index. This is calculated per INPO's *Definition and Measurement of Mispositioned Plant Components*. The figure below shows the PLGS index.

Improvement had been realized in the operations group due to a significant effort in training on human performance tools, benchmarking to develop industry best operations processes, training on operations fundamentals, and performance monitoring. Since Q1 2011 the performance has slightly decreased, a new station trend has been identified and cause analysis initiated.

Point Lepreau Generating Station Mispositioning Index
2006 Q3 to 2011 Q2

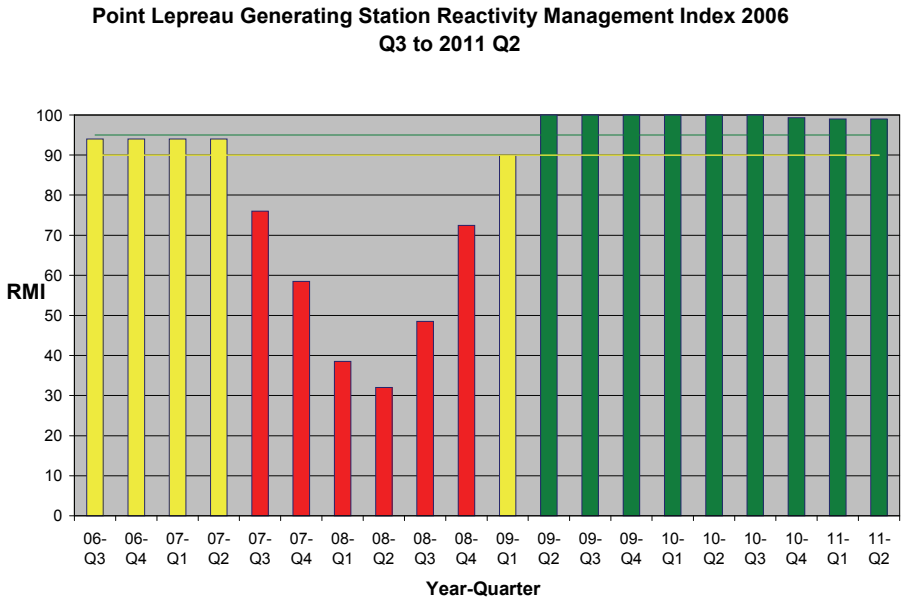


1.9 Operations, Continued

Performance Metrics (continued)

Reactivity Management Index

Starting in 2006, the Canadian nuclear industry has adopted a common performance measure related to reactivity management, referred to as the reactivity management index (RMI). This index considers events, incidents and situations involving reduction of barriers related to reactivity management as identified through the corrective action program. The RMI is reported monthly using data, weighted by safety significance, over the past 12 months (rolling average). The figure above shows the RMI since the inception in the third quarter of 2006. Performance dropped below target for a period of time as a result of the loss of liquid zone control event discussed in *ERD-34800-0709-026-A-00* and as presented to the Commission on April 02, 2008. Improvement was made in Q2 2008, the station was defueled in Q2 2008.



Current Licensing Submissions

Current licensing submissions, which support the licensing basis, are considered to be those documents listed specifically in the Power Reactor Operating Licence. Additionally, they include:

1. The Safety Report, which contains:
   - design description of safety-related features,
   - accident analyses, and
   - supporting references.
2. The Level I and II Probabilistic Safety Assessment,
3. Reliability Studies, and
4. Emergency Operating Procedures.

1.9 Operations, Continued

Emergency Operating Procedures

To supplement Operating Manuals and Operating Instructions, a set of Emergency Operating Procedures have been developed. These include Emergency Operating Procedures (EOP) and Abnormal Plant Operating Procedures (APOP). Together, they enhance Operator responses to abnormal plant events by providing approved guidance for these low probability events. The current list of procedures issued for Operations reference is as follows:

Document Number	Rev.	Document Title	Date Registered
APOP-0 CRO	1	Operator Upset Response Strategy (OURS)	2010 Feb. 18
APOP-0 SS	3	Shift Supervisor Upset Response Strategy (SSURS)	2011 Mar. 17
EOP-01	6	MCR Generic EOP	2010 Apr. 14
APOP-02	3	Dual Computer Failure	2004 Dec. 10
APOP-03	3	Loss of Feedwater	2005 Feb. 04
APOP-04	5	Loss of Instrument Air	2007 Jun. 01
APOP-05	4	Loss of Service Water	2004 Dec. 29
APOP-06	6	Loss of Class IV Power	2008 Feb. 29
APOP-07	7	Large Loss of Coolant Accident	2004 Dec. 31
APOP-08	7	Small Loss of Coolant Accident	2007 Jan. 09
APOP-09	5	Steam Generator Tube Failure	2007 Aug. 14
EOP-10	8	SCA Generic EOP	2010 Mar. 09
APOP-11	6	Generic Security Threat	2011 Feb. 02

1.10 Occupational Health and Safety

Occupational Health and Safety

Safety is the number one priority with NB Power Nuclear and all its contractors. Overall safety performance has been good and is a direct outcome of good planning, work practices, field supervision and communication.

Conventional safety requirements are incorporated into all aspects of work planning, with input from both contractor safety personnel and NB Power Nuclear safety personnel. Sustained safety focus is maintained through the use of weekly meetings with contractor safety leads, and safety issues being discussed daily at plan of day and work group meetings. In addition, training requirements for particular risk areas have been standardized (e.g. rigging and lifting, fall arrest) to facilitate alignment.

1.10 Occupational Health and Safety, Continued

Occupational Health and Safety (continued)

Safety statistics have been maintained since the start of the construction related activities in 2006, and are updated regularly through the contractor safety meeting. A comparison against similar activities across New Brunswick and against total New Brunswick activities is provided below.

Point Lepreau [lost time accidents since start of construction activities (April 2006 to end of December, 2010)]

	Contractors (LTA)	Employees	Total	FTE of Work	Frequency rate
2006	1	0	1	529	0.19
2007	1	1	2	1129	0.18
2008	2	0	2	1909	0.10
2009	1	1	2	1993	0.10
2010 (Jan to June)	2	0	2	2161	0.09
Total for all work at PLGS since April 2006	7	2	9	7721	0.12

(***Note:*** 7721 FTE is equivalent to approximately 15.3 million hours of work) Point Lepreau (lost time accident since start of construction (April 2006 to July 2011)

Province Wide

	Loss Time Accidents (LTA) NB Construction	FTE of work NB Construction	Frequency Rate NB Construction	Frequency Rate all Activities across NB
2006	272	13462	2.02	1.70
2007	306	14673	2.09	1.69
2008	337	18069	1.87	1.58
2009	291	17017	1.71	1.58
2010	285	16421	1.74	1.52

1.10 Occupational Health and Safety, Continued

Joint Health and Safety Committees

The station has a Station Joint Health and Safety Committee, in accordance with provincial requirements, to support initiatives to improve safety and to ensure an avenue for discussion of safety related issues.

In addition to the Station Committee, during the refurbishment outage a second Joint Health and Safety Committee has been established, in accordance with provincial legislation. This committee ensures that contractors on site during the outage have an opportunity to bring their issues forward for consideration and resolution.

Workplace Inspections

Regular inspections of the work place are undertaken to identify issues and concerns that need to be addressed. These inspections, sometimes undertaken in conjunction with regulatory inspections, include:

- specific safety walk-downs by Station and contractor safety staff (planned weekly walk-downs, with other random inspections at other times),
- general workplace inspections by workers in their own work areas (monthly),
- as well as more general inspections by Manager's while on field rotation (Manager is in the field every week day).

Significant issues are captured in the corrective action program, and where appropriate notifications may be raised to correct a situation.

Through these inspections, issues related to housekeeping, workplace conditions, transient combustibles are identified and addressed as appropriate.

1.10 Occupational Health and Safety, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU4	3	Provide Personnel Safety Services	2010-Feb.-16
		NB Power Corporate Safety Manual	2006
SI-01365-P80	3	Handling and Storing Hazardous Materials (WHMIS)	2010 Apr. 21
SI-01365-A040	9	Maintaining the Joint Health and Safety Committee	2011 Feb. 09
ISP-03400-IS47	2	Performing Monthly Area Inspections	2011 June 09
SDP-01368-A09	2	Conducting Loss Control Meetings	2011 July 25
03400-ISPs		Industrial Safety Procedures	Various

1.11 Decommissioning & Financial Guarantees

Decommissioning and Financial Guarantees

The source for the basis of the Point Lepreau Generating Station decommissioning financial guarantee is contained within two bodies of information.

The first, a site specific Decommissioning Cost Estimate and associated Preliminary Decommissioning Plan (PDP) undertaken by a US based decommissioning consultant, TLG Services, Inc. [References 2, 3]

The second, the Adaptive Phased Management Cost Estimate which was developed and maintained by the Nuclear Waste Management Organization (NWMO) on behalf of the nuclear energy corporations (OPG, NBPN, HQ) and AECL. [Reference 1]

1.11 Decommissioning & Financial Guarantees, Continued

History Since Last PROL Renewal

In June 2005, NB Power Nuclear (NBPN) updated the PDP and financial guarantee per PROL license conditions in effect at that time. [References 4, 5 & 6]

In September 2005, NBPN updated the station related decommissioning financial guarantee to acknowledge the decision to refurbish Point Lepreau Generating Station and extend its operating life by 25-30 years [Reference 7]

In February 2006, NBPN received confirmation from the CNSC that the aforementioned correspondence was *"acceptable and in accordance with Condition 11.3 of the current Power Reactor Operating License."* [Reference 8]

In June 2007, NBPN updated the used fuel management related decommissioning financial guarantee as a result of the Federal Governments decision to implement the NWMO's Adaptive Phased Management proposal for the long-term management strategy for used nuclear fuel. [Reference 9] An additional "top-up" to the financial was identified as required and completed in September 2007.

In June 2010, NB Power Nuclear (NBPN) submitted an updated the PDP and financial guarantee to the CNSC [References 10, 11 & 12] per PROL license conditions.

In September 2010, NB Power Nuclear (NBPN) informed the CNSC that due to ***"retubing progress over the past number of months, it has become evident that the target restart date for Point Lepreau needed revision."*** [Reference 13] This delay would require ***"revising the implementation start date for the preliminary decommissioning plan"*** and ***"re-assessing the required funding levels for the Decommissioning Financial Guarantee".*** [Reference 14]

Current Status of the Decommissioning Financial Guarantees

In January 2011, NB Power Nuclear (NBPN) informed the CNSC of the results of the re-assessment concluding ***"the re-assessment indicated that as of Sept 30, 2010 the amount of available funding ($ 507 million) is adequate to cover the financial guarantee requirements ($ 500 million)."*** [Reference 15]

NBPN received CNSC confirmation that the June 2010 submissions, and subsequent updates submissions, [References 10 - 15] meet the requirements of License Conditions 11.1 – 11.3. [Reference 16]

1.11 Decommissioning & Financial Guarantees, Continued

References

1. Report: “Choosing a Way Forward – The Future Management of Canada’s Used Nuclear Fuel – Final Study”, Nuclear Waste Management Organization, November 2005.
2. Report: N29-1533-002, “Decommissioning Cost Study for the Point Lepreau Generating Station”, Rev 0, June 2005.
3. Report: N29-1387-003, “Preliminary Decommissioning Plan for the Point Lepreau Generating Station”, Rev 2, June 2005.
4. Letter: McCarthy, J.J. to Lafrenière, K., “Point Lepreau PROL Condition 11.1 and WFOL Condition 6.1 – Update of Preliminary Decommissioning Plan and Cost Estimate”, 2005 June 30.
5. Letter: McCarthy, J.J. to Lafrenière, K., “Point Lepreau PROL Condition 11.2 and WFOL Condition 6.2 – Current Status of Decommissioning Financial Guarantees”, 2005 June 30.
6. Letter: McCarthy, J.J. to Lafrenière, K., “Point Lepreau PROL Condition 11.3 and WFOL Condition 6.3 – Update of Decommissioning Financial Guarantee”, 2005 June 30.
7. Letter - McCarthy to Lafrenière, "Update - revision to the PLGS Decommissioning Financial Guarantee", Sept. 30th, 2005.
8. Letter – Lafrenière to McCarthy, “Point Lepreau NGS Financial Guarantee”, February 22, 2006.
9. Letter –McCarthy to Lafrenière, “Point Lepreau PROL Condition 11.2 and WFOL Condition 6.2 - Current Status of Decommissioning Financial Guarantees”, June 26, 2007.
10. Letter: Parker to Rinfret, “Point Lepreau PROL Condition 11.1 – Decommissioning”, 2010 June 24.
11. Letter: Parker to Rinfret, “Point Lepreau PROL Condition 11.2 – Decommissioning”, 2010 June 29.
12. Letter: Parker to Rinfret, “Point Lepreau PROL Condition 11.3 – Decommissioning”, 2010 June 24.
13. Letter: Parker to Rinfret, “Update Point Lepreau PROL Condition 11.1-Decommissioning,” 2010-09-30.
14. Letter: Parker to Rinfret, “Update Point Lepreau PROL Condition 11.3-Decommissioning,” 2010-09-30.
15. Letter: Parker to Rinfret, “Update Point Lepreau PROL Condition 11.3-Decommissioning,” 2011-01-26.
16. Letter: Love-Tedjoutomo to Parker, “Point Lepreau Financial Guarantees and Preliminary Decommissioning Plan,” 2011-07-18.

1.12 Public Information and Community Consultation

Public Communication

The public and community information programs are managed by, and delivered through the Corporate Relations and Communications Division– NB Power Holding Corporation.

The Public Affairs Program allows the Point Lepreau Generating Station to identify key issues, concerns, individuals and groups who have an interest in the Point Lepreau Generating Station and provide timely and accurate information to those individuals and groups.

A variety of public and stakeholder consultations and communication activities have been identified and is aimed at public, stakeholder and First Nations understanding in support of the Point Lepreau Generating Station on-going operations.

NB Power recognizes the importance of communicating with the First Nations Communities in New Brunswick. Through mediums such as information sessions, educational forums and open forum discussion, representatives of NB Power are continuing to engage First Nations in meaningful conversation pertaining NB Power business, Station Operations and major projects. NB Power is also in the process of finalizing a strategic plan with the First Nations to engage in a mutually beneficial relationship to further aid the interests of both parties.

1.12 Public Information and Community Consultation, Continued

Target Audience

The target audience of groups and individuals who have the greatest interest and concern with respect to the Point Lepreau Generating Station (PLGS) include, but are not limited to:

- Host community public including the PLGS Community Relations Liaison Committee
- Provincial general public (and to lesser extent national)
- First Nations
- Local/Municipal governments
- Key community, government and regulatory stakeholders
- Media
- Union/District Labour Councils
- Regular commentators and lobby groups
- Local schools, colleges
- Individuals and groups with a heightened interest in the nuclear station project and operation
- Employees.

Audience understanding is developed through interactive relationships as well as polling and research to confirm assumption and to direct communication course changes as needed.

NB Power as a Crown Corporation is accountable to provide documentation and periodic briefings to various segments of the provincial government on station operations and important projects. These include, but are not limited to, the following:

- Business Plans
- Sustainability Reports
- Environmental Reports
- Outage Briefings
- Refurbishment Project Updates
- Face to face updates in regularly scheduled, publicly-held committee meetings related to Station operation
- Update to local municipal councils
- Presentations
- Website, mailed newsletters.

1.12 Public Information and Community Consultation, Continued

Public Opinion

NB Power keeps a record of those who attend the various briefing and public information session, along with any comments received.

Media Opinion

The Corporate Relations and Communications Division manage and coordinate access to local and provincial media on issues relating to station operations. This includes access to designated NB Power Nuclear officials for interviews. Media monitoring and media analyses are also conducted.

Public Information

NB Power realizes the importance of communicating with the public. The following are the main initiatives and tools used to communicate with the public:

- Public information meetings to keep the general public apprised of the Station operations and details of the refurbishment of the station.
- Key stakeholder meetings held throughout the province since 2002.
- *"From the Point"* newsletter is published and distributed to the immediate communities within a 20km radius of the station.
- A Community Relations Liaison Committee was established in 2003. It provides a means to exchange information between the station and local communities and to respond to questions from community members. Liaison Committee information is available on the NB Power web site.
- Media days are held at the station. Journalists from all mediums were given a briefing and tour of the station. Media interviews are conducted on a regular basis.

The station also provides access to certain areas on site to individual or groups with a special interest when possible. Such as:

- Saint John Naturalists Group
- UNB Biology and Environment Department
- St. Andrew's Marine Biology Group
- Local School Groups
- Local Fishing Community
- Local Fire Departments.

1.12 Public Information and Community Consultation, Continued

Public Information (continued)

Special visits and workshops are also conducted at the Point Lepreau Generating Station. Presentations are on various subjects such as station operation, environmental impact and refurbishment. Some of these groups include:

- New Brunswick Science and Technology Teachers,
- Association of Professional Engineers and Geoscientists of New Brunswick,
- Various departments of New Brunswick Community Colleges and universities,
- Municipal and Provincial Emergency Measure Organization.

NB Power staff also participate in various community events, such as:

- Fundy Fishermen's Day,
- Earth Day Celebration,
- Arbor Day (tree planting), and
- Fund raising activities to support local community activities and programs,
- Board of Trade activities.

Program Evaluation

The Point Lepreau Generating Station has consistently evaluated the success of the public information program through the use of quantitative research. Surveys were performed in 2000, 2003, 2004, 2006 and 2008 to measure the level of public understanding of the general operation of NB Power Nuclear as well as the ongoing refurbishment of the station. Another survey is planned in 2011.

The overall results establish that the public was informed and understood both the operations and refurbishment activities.

In addition, individual evaluation methods for each target audience are utilized to ensure respective objectives are met with each group. Such evaluation methods include, but are not limited to, the following:

- Email designed specifically for employee feedback and questions,
- surveys to target audiences
- feedback forms to customers via bills
- Comments and issues tracking – a comment database used to record and monitor all comments, correspondence and communications with the public and stakeholders.

1.12 Public Information and Community Consultation, Continued

Program Evaluation (continued)

Information line – toll free telephone line that connects to a messaging mailbox in the event the call is not answered directly. All calls are returned within two business days.

Internal Communication

Communicating with employees is an important aspect of the information program at the Point Lepreau Generating Station. As the primary advocates for the Station, information sharing and receiving is two-way directional. The primary tools used to communicate with employees include, but are not limited to, the following:

- **Face to Face** – supervisory groups, individual workgroup meetings, one-on-one interaction etc.
- **Internal memorandums** - Important status or operational changes are communicated station-wide via email.
- **Station Directors Weekly Briefing-** an email outlining the key information staff need to know about; and/or what happened last week and/or what is coming up this week.
- **Videos-** produced to capture the overall progress of work or a significant message from NB Power executive or the PLGS Station Director.
- **Safety Advisory-** used for safety issues. It is reserved for circumstances where the full and complete attention is required by all station staff.
- **PLGS News -**published monthly.
- **Daily 15 Briefing Sheet –** a daily publication is intended to provide workgroups 15 minutes to get together and discuss any successes, challenges or safety-related concerns at a time convenient for the workgroup.
- **Digital Signage -** Flat-screen monitors strategically placed throughout the station, which are updated daily. In addition, some workgroups also have flat-screen monitors located in their work area for a frequent form of secondary communication.
- **Frequently Asked Questions Bulletins (FAQs) –** produced periodically, intended for all station staff; however, distributed to the supervisory groups to encourage face to face communication with their employees.
- **Posters-** used as a supplemental tool to reinforce a message already communicated by supervisors to their staff.

1.12 Public Information and Community Consultation, Continued

Sustainability Report

NB Power produces and publishes an annual Sustainability Report. This document is produced for employees and the people of New Brunswick with a focus on our environmental, social and economic performance over the past year. The Report is a snapshot of the innovation and forward thinking that drives today's NB Power.

Community Relations Liaison Committee

The Point Lepreau Generating Station (PLGS) has an active Community Relations Liaison Committee, which has been in place for many years. The committee is a formal mechanism which interacts with, and receives information and public concerns from community members relating to the operation of the Point Lepreau Generating Station.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
Corporate Policy	-	M-2 External Presentations	--
Corporate Policy	-	M-4 Public Affairs Reporting for Point Lepreau	--
Corporate Policy	-	PA-1 Media Relations	--
Corporate Policy	-	PA-3 Corporate Intranet - Operations and Content Management	--
SI-01365-A75	0	Providing Internal and External Communications	2004 Jun. 30

1.13 Record Keeping and Reporting

Record Keeping

The *SU-9, Provide Documents and Records* process describes the production and control of documents and records at Point Lepreau Generating Station. This process applies to the production and control of controlled documents and essential records. The process for developing, revising, controlling, and distributing documents, drawings, forms, and templates ensures personnel have access to current versions of documents and specified processes and practices are used.

1.13 Record Keeping and Reporting, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU9	4	Provide Documents and Records	2010 Jun. 30
SI-01365-A93	8	Maintaining Records	2010 Jul. 28
SI-01365-A71	12	Controlling Documents	2011 Jan. 19

Regulatory Reporting

Issues are reported to the CNSC in accordance with Condition 1.6 of the Power Reactor Operating Licence, *S-99, Reporting Requirements for Operating Nuclear Power Plants*.

The objective of the regulatory reporting process is to ensure events, performance measures, and other required information is reported to the CNSC in accordance with Regulatory Standard *S-99, Reporting Requirements for Operating Nuclear Power Plants*.

The Corrective Action Program (CAP) provides a method for identifying, documenting, screening, and responding to issues in accordance with the significance of the event such that:

- Significant or recurring conditions that cause a reduction in safety margin, or have an impact on the environment or the health and safety of persons, are identified and corrective actions are taken to preclude recurrence.
- Conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment non-conformances are identified and corrected as required.
- The required regulatory reports for events are identified, written and submitted.

Requirements for regularly scheduled S-99 reports are identified inside the processes that deliver the information.

1.13 Record Keeping and Reporting, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
S-99	1	Reporting Requirements for Operating Nuclear Power Plants	2003 March
SI-01365-A63	5	Implementing the Corrective Action Process	2011 Apr. 18

1.14 Significant Changes

1.14.1 Corporate Restructuring

The New Brunswick Government announced plans in the summer of 2010 to introduce legislation to reintegrate the NB Power group of companies. NB Power informed the CNSC (Reference 1) that upon completion of the required legislative changes, NB Power Nuclear intends to request a license amendment to reflect this change. Since the announcement was made, there has been a change in the provincial government. The new provincial government has established a high level committee to provide recommendations on future energy policies. The re-integration is on hold until the decision of the committee and the new government is announced.

1.14.1A References

1. *Letter, W. Parker to F. Rinfret, "Considering the Integration of NB Power Nuclear into a Single Company", August 31, 2010.*

1.14.2 Refurbishment Outage

From Aug 2005 to April 2008 the site infrastructure was upgraded as follows:

- The Solid Radioactive Waste Management Facility was modified.
- A new administration building was constructed.
- The old administration building was renovated including modification of security entrance and exit features, to allow processing of larger number of workers.
- Construction trailers were installed and the parking lot was expanded.

1.14.2 Refurbishment Outage, Continued

On March 28, 2008 the reactor was shutdown to begin the refurbishment outage and station systems were placed in a state of lay-up consistent with good operating experience and the need for that system during the outage. The lay-up addressed the physical, chemical, changes to normal surveillance programs and needs for alternate maintenance and surveillance routines.

The major activity of the outage is the replacement of all three hundred and eighty Fuel Channels, Calandria Tubes and the entire length of connecting inlet and outlet feeder piping from the end fittings back to the headers. Directly related to Retube are a number of support activities such as defueling, the removal, storage and eventual refill of the heavy water located in the heat transport and moderator systems, the transfer of radioactive reactor component waste to the on-site Solid Radioactive Waste Management Facility, and commissioning of the retubed reactor core. In addition to the Retube related activities, a number of additional repairs, replacements, inspections and upgrades were performed to allow the station to operate safely for an additional 25 to 30 years. Further details are provided in the Application to CNSC to reload fuel and progress the startup of the reactor at the Point Lepreau Refurbishment Outage, October 2011.

The normal station infrastructure, processes and programs to support normal operation and maintenance outages as outlined in the Nuclear Management Manual[1] remained in effect during the outage, and were augmented as necessary. As Licence holder, NB Power Nuclear retained oversight responsibility for all project activities, including those that were contracted out.

[1] This in turns refers to the station processes, the licensing aspects of which are covered by the material contained in the proceeding sections of this Licence application.

1.15 Station Improvements

NB Power Nuclear is fully committed to continuous improvement and strives for operating excellence. Performance improvement is driven throughout the organization by programs such as corrective action, self assessments, benchmarking, operating experience, along with observation and coaching. Improvements requiring significant expenditures or are of a cross functional nature, are conducted through the business planning process.

1.15.1 Business Planning

NB Power Nuclear's business planning process provides an effective method of initiating and tracking improvement projects. NB Power Nuclear uses business planning to select priority projects and monitor improvement programs. Business planning is a component of the *DM-1, Direct and Manage the Business* process within the Point Lepreau Generating Station Quality Management System.

DM-1 is the process whereby management:

- sets a direction consistent with the achievement of broad objectives set by the NB Power Group of companies and NB Power Nuclear's mission,
- documents and communicates the direction through the Business Plan and supporting Operational Plans for each unit,
- allocates resources against the Plan, monitors results against the Plan, assesses the impact of issues, takes corrective actions as necessary, and
- assesses line management accountability for results against the Plan.

The Management Team monitors progress towards the achievement of the goals and objectives defined within the Business Plans and Operational Plans through recurring monthly / quarterly reporting and review meetings at the Executive, Director, Manager and unit levels. The Business Plan is updated annually, but adjustments may be made as emergent issues or new opportunities arise, during the business cycle. An emergent plan would be devised and documented to guide the balance of the year.

1.15.1A Documentation

The document supporting this process is:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-DM1	2	Direct and Manage the Business	2011 Jan. 14
PRR-00660-SU10	1	Provide Financial Services	2011 Jan. 14
SI-01365-A72	1	Developing and Implementing Business and Operational Plans	2005 Aug. 30
SDP-01368-PD19	0	Capital Program Preparation and Approval Process	2004 Dec. 03
SI-01365-A59	5	Identifying, Developing and Monitoring Performance Indicators	2011 July 18
SI-01365-A76	0	Leading and Managing Change	2004 Jul. 6
SI-01365-T81	1	Project Management	2004 Jun. 30

1.15.2 Capital Improvements

The capital plan for station upgrades is managed through the PLGS investment review committee. This plan has a ten year look ahead, with greater details in the first few years of the plan.

1.15.2 Capital Improvements, Continued

The elements of plan comprise of:

- Safety improvements such as fire protection, security, radiation protection (ALARA issues raised through the ALARA committee), and trip coverage improvements.
- Environmental upgrades as identified through the PLGS Environmental Management committee.
- Equipment performance issues such as managing obsolescence, removing deficiencies, removing operator work-arounds, and addressing degradation and ageing. These are managed thorough the equipment reliability committee.

Some of the larger tasks currently planned to take place over the licence period include:

- Fire protection upgrades (*Section 1.15.3.3*).
- Security system upgrades.
- Replacement of the condenser tube bundles.
- Replacement of the 2 low pressure turbine rotors that were refurbished after being exposed to salt water environment.
- Construction of additional dry storage canisters.
- Completion of the staged replacement of the plant digital control computers.
- Continued work on maintaining concrete structures.

In the longer term, there will be activities to extend the fence for the phase II canister site area, and activities to address heat transport system ageing.

1.15.3 Current Improvement Initiatives

The following improvement initiatives are currently being undertaken at the Point Lepreau Generating Station.

1.15.3A Pressure Boundary Program Improvements

During the current Licensing period PLGS has:

- Successfully completed the AIA (NB-DPS) surveys for a Certificate of Registration for the Pressure Boundary (QA) Program (Reference 1). Certificate was issued on January 1, 2011 for a 3 year period.
- Entered into a formal agreement (reference 2) with an Authorized Inspection Agency (AIA) designated by the CNSC for the pressure boundaries of the nuclear facility as defined by the CSA N285 series and CSA B51-03 standards and their referenced publications.
- Implemented Classification, registration, and reconciliation Procedures (references 3 & 4) approved for use by the CNSC or a person authorized by the CNSC.
- Renewed the agreement (reference 2) with the Authorized Inspection Agency (AIA) designated by the CNSC.
- Currently implementing a QA program for servicing of Overpressure Protection Devices as required by CSA N285.0-06 Clause 14.6.
- Preparation of an inspection and testing program for overpressure protection devices that is in compliance with CSA N285.0-06 Clauses 13.3 and 13.4.

For the upcoming licensing period PLGS will:

- Execute the implementation plan for compliance with N285.0-08 (June 2009 Edition) CSA B51-07. This implementation plan addresses the transition from CSA N285.0-06 and CSA B51-03 to these new standards for modifications, repairs, replacements and procurement activities.

1.15.3B References

1. *0087-00668-0001-001-IR-A-01, Pressure Boundary Program*.
2. Professional services agreement between New Brunswick Power Nuclear Corporation & Department of Public Safety Technical Inspection Branch in right of the province of New Brunswick.
3. *SI-01365-T107, Requesting Pressure Boundary Classification*, Rev. 0.
4. *SI-01365-T106, Requesting Pressure Boundary Registration and Reconciliation*, Rev. 0.

1.15.3C Corrective Action Program Improvements

PLGS has a progressive corrective action program as outlined in *Section 2.1*. Self assessments and industry reviews of the program indicated a need to improve in a number of areas. Some of these improvements have been completed, while others are still in progress.

During the past licence period, the following improvements were made.

- Improvements to management engagement (managers routinely attend daily screening meetings) and weekly Corrective Action Review Board Meetings.
- Responsibility for implementing the program was moved from the performance improvement group to the line organization. Performance improvement champions in the various units were identified and trained. This maximizes line management and organizational buy in to the program, and ensures the key learnings from operating experience, incidents and events are internalized by the line.
- A process to qualify managers and directors for membership on the Corrective Action Review Board was introduced and members were qualified.
- Standard methods for evaluating the quality of Root and Apparent causes were introduced, and systematically applied to measure and demonstrate high quality levels were being achieved. Training to selected plant staff was provided.
- Station trending program was initiated to focus on identifying common lower level issues and addressing the adverse trends before more consequential events occur. This program allows management to monitor and to react to these trends in a proactive manner.
- Corrective action program performance indicators aligned with industry standards were introduced.

While improvements to all aspects of the corrective action program continue to be made across the board, the current focus, which will continue into the upcoming licence period will be on improving the timeliness for reviews and implementation of corrective actions.

1.15.3D Fire Program Improvements

Like the other Canadian Nuclear Power Stations, PLGS has an improvement project intended to bring the plant up to current fire protection codes and standards, which have evolved considerably since the station was designed.

The main elements are comprised of:

Design
- Complete modification upgrades to detection, suppression and egress.

Analysis
- Resolve outstanding questions on Fire Hazard Assessments and Fire Probabilistic Safety Assessment.

Fire System Testing
- Expand current program to include elements not previously tested (dampers, spare sprinkler heads, etc) and new testing related to new designs.
- Training & certification.

Code Compliance
- Address outstanding issues from 3rd part annual review.
- Prepare for transition to the 2007 version of CSA- N293.

Emergency Response Team
- An improvement to fire plans, the systematic approach to training and drills (planning/evaluations/ post drill reports).
- Updating the minimum response team complement to current practice.
- Improving Emergency Response Team performance (response time/procedures and safety).

Considerable progress has been made since the program began, however progress in some areas has been slower than originally anticipated. The improvements will be complete prior to the end of the upcoming licence period, with dates identified in the Licence Condition Handbook. Compensatory measures are being put in place until the improvements are implemented to ensure the risk from fire remains acceptably low.

1.15.3E Supervisory Observation Improvements

Observation and coaching is used to mitigate risks to employees and to the business by reinforcing high standards and expectations. NB Power Nuclear undertook an initiative to improve observation and coaching of field workers during 2009. This initiative included the following:

- Training of over 300 staff on the observation and coaching program.
- 2 hr session on coaching techniques for supervisors and managers was carried out which included 60 managers and supervisors receiving in-field observation and coaching from external industry experts.
- Validation of supervisor's time to effectively complete observations with other day-to-day duties.
- Senior management support for revised expectations was demonstrated via rollout to superintendents and first line supervisors.
- During the period of October 2007 until October of 2009, approximately 3000 observations were completed. Since October of 2009 until August of 2010, approximately 6000 observations were carried out.

In addition, a "Manager of the Day" program was instituted. This utilizes a Manager in the field for a full business day, on a rotational basis, performing observations, providing feedback, and building relationships. The following business day the Manager summarizes their observations at the Plan of the Day meeting. Staff have been receptive to this program.

1.15.3F Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
SDP-01368-AS01	6	Observing and Coaching Field Activities	2011 Apr. 08

1.15.3G Post Refurbishment Organization

NB Power Nuclear is entering into a stage of significant change and attrition due to the aging demographic of its workforce. The execution of the refurbishment outage required major mobilization and redeployment of station staff. Though this situation presents the organization with significant challenges, it offers an opportunity for staff to gain valued experience, especially for the younger members.

1.15.3G Post Refurbishment Organization, Continued

As Refurbishment nears completion, there will be a redeployment of staff back to an organization focused on safe and reliable operation. The experience gained from Refurbishment and the attrition of staff, offers an opportunity to rebuild the organization with the talent necessary to develop and sustain world class performance which embraces both the technical and behavioral aspects of an innovative learning organization with people performing at their best.

The new team based recruiting approach introduced in October 2007 is being used. The new methodology is system driven, focuses on the Team and looks to expand diversity within the work group. It makes the selection of new Team members more inclusive and requires employees to take an active part in identifying their preferences, knowledge, skills and experience in a system-based employee profile. A key consideration when adding a new team member becomes the complementary fit to the Team in addition to the professional or technical knowledge, skills and abilities brought by the new member. The new Team member and the Team are supported through a formal integration process and services conducted by the appropriate Human Resources Practitioner. The established Team Based Resourcing (TBR) process is used whenever we need to fill a small number of positions in a specific area.

A portion of the reorganization has already taken place, and the remainder will continue to ensure a smooth transition to a post refurbishment organization.

1.15.3H Work Management Improvements

The effective implementation of the Work Management process is essential to the overall success of the station. It is the process that is used to prepare for, and safely and efficiently execute work. Through the effective use of the Work Management process we ensure we are executing the work with the highest priority and are keeping our maintenance backlogs to acceptable levels. This directly contributes to higher equipment reliability and reduced forced loss rate.

NBPN has undertaken an initiative to make improvements to the implementation of the Work Management process at the Point Lepreau Generating Station. This is a long-term initiative consisting of making improvements in the following areas:

- The quality and timeliness of work assessments.
- Management of work that has been placed “on-hold” due to input required by engineering.
- The identification and purchasing of parts and material.
- Overall alignment of the station organizations to the Work Management process work preparation milestones.

1.15.3I 24 Month Planned Outage Schedule

PLGS has historically operated with a planned outage every year. Significant capacity factor improvement can be achieved if the frequency is reduced, and many nuclear plants have moved in this direction. The vision for post refurbishment operation is to move to a 24 month planned outage cycle. Work is being performed to modify the necessary maintenance plans, their basis documents, and other necessary related items to support a 24 month planned outage schedule.

1.15.3J Integrated Improvement Plan

As part of the life extension related to PLGS refurbishment, NB Power Nuclear was required through CNSC Regulatory document RD-360 to produce an Integrated Improvement Plan. This plan was divided into those activities related to refurbishment and those which would carry on after the refurbishment outage. A high level list of activities related to refurbishment is provided in *Appendix A*. The following provides a short list of the other major activities:

O&M Condition Assessment Recommendations

An extensive plant condition assessment of systems, structures and components was performed as part of the life extension program. Almost all of the recommendations have been addressed, however there are a small number of residual inspections that remain to be performed. These will be completed during the upcoming licence period. Progress on this item is tracked through CNSC Action Item 101203.

Probabilistic Safety Assessment (PSA) Outcomes

As part of life extension, and to meet S-294, a level II PSA for internal events as well as for *External* events involving station fires and station floods was produced. In addition, the shut-down state PSA for internal events and a PSA based seismic margin assessment was produced. As a result performing the PSA, a number of activities and modifications were required. The majority of these changes have already been incorporated, however there are a small number of residual issues. These will be completed during the upcoming licence period. Progress on this item is tracked through CNSC Action Item 091219.

Fire Protection Upgrades

(Refer to *Section 1.15.3.3*.)

Digital Control Computer Replacement

(Refer to *Section 1.15.2*.)

1.15.3J Integrated Improvement Plan, Continued

Complete Improvements to the Safe Operating Envelope

PLGS has a safe operating envelope as defined through Operating Polices and Procedures, the Impairments Manuals, and *Section 3.0* of the Operating Manuals. This project is to improve the definition and clarity as per modern standards. This work will be completed within the upcoming licence period and is being tracked through CNSC Action Item 101210.

Complete Implementation of Severe Accident Management Guidelines

PLGS is in the process of implementing the Severe Accident Management Guidelines as originally laid out in the earlier COG project on the subject. These guidelines will give greater clarity and structure for use by the operators and the Planning Section in the event of a severe accident. As such it is an improvement to the emergency preparedness program. The project is targeted to be completed by mid November 2011. Progress is being tracked through CNSC Action Item 101216.

References

1. Letter, R. Jammal to W. Parker, "Request pursuant to Subsection 12(2) of the *General Nuclear Safety and Control Regulations: Lessons Learned from Japanese Earthquake*", March 17, 2001 (E-DOC # 3694380, 3694381).

2. Letter, W.J. Parker to Ramzi Jammal, "NB Power Nuclear reply to a Request Pursuant to Subsection 12 (2) of the General Nuclear Safety and Control Regulations: Lessons Learned from Japanese Earthquake", March 28, 2011.

3. Letter, W.J. Parker to Ramzi Jammal, "Lessons Learned from the Earthquake in Japan", April 28, 2011.

4. Letter, W.J. Parker to Ramzi Jammal, "PLGS Response to CNSC Fukushima Task Force", July 28, 2011.

5. CNSC Fukushima Task Force report, "***Nuclear Power Plant Review Criteria***", E-Doc 3743877, July 2011.

1.15.3J Integrated Improvement Plan, Continued

Manage Water Level in Reactor Building

To address the potential consequences of a highly unlikely severe accident that could lead to core disassembly, a make up line to the Calandria vault was added during the refurbishment outage. As part of the long term management of the event, methods to manage the water level in the reactor building is required. These changes will be completed during the upcoming licence period. Progress on this item is tracked through CNSC Action Item 101217.

Complete the Environmental Qualification Assessment for 60 Year Duration

The original Environmental Qualification program was based on a 30 year life time for the station. As part of life extension, the program needs to be extended to 60 years. Assessment of critical components has already been completed and any changes incorporated. The remainder of the assessments will be completed within the upcoming licence period. Progress on this item is tracked through CNSC Action Item 101215.

Corrective Action Program

(Refer to *Section 1.15.3.2*.)

Outline Strategy to Address Ageing Issues as they Affect Trip Coverage

PLGS made improvements to trip coverage as part of the refurbishment project. In addition, the primary side of the boilers were cleaned, all the feeder pipes were replaced (*with more flow assisted corrosion resistant material*), and the pressure tubes were replaced. This will restore the original thermal margins and they are expected to undergo a smaller degradation than was experienced to date. In addition, thermal performance of the newer CANDU 6 units has improved. None-the-less, PLGS will monitor the effects of heat transport system ageing and implement necessary strategies to ensure adequate trip margins are maintained. Progress on this topic is being tracked through CNSC Action Item 101212.

1.15.3J Integrated Improvement Plan, Continued

Update the Safety Report Doses with new Methodology

As part of the on-going safety analysis program, the dose to the public following design basis events will be recalculated using methods and computer codes based on modern standards. Based on spot checks, doses will still stay well below the limit. Progress on this item is tracked under CNSC Action Item 101213.

Re-do the Safety Analysis for Loss of Coolant with Loss of Emergency Core Cooling to Explicitly Include the Effect of the new Fuel Channel Annulus Spacer Design

The replacement fuel channels use a different annulus spacer design than was originally used at PLGS. The materials have a different affect at the very high temperatures that might occur should this unlikely accident occur. Sensitivity analysis (contained in the 2009 Safety Report) demonstrated that the new design is acceptable; however the analysis was not redone to give fully consistent results. As part of the on-going safety analysis program, this analysis will be re-analyzed to be fully consistent with the new design. Progress on this item is tracked through CNSC Action Item 101214.

1.15.3K Minimum Shift Complement

A minimum staff complement assessment is being conducted in accordance with the CNSC guide *G-323, Ensuring the Presence of Sufficient Qualified Staff at Class I Nuclear Facilities – Minimum Staff Complement*.

The goal of this project is to demonstrate to the CNSC that we will ensure the presence of a sufficient number of qualified workers to carry out the activities set forth in the Operating License. The scope of this project is to validate the staffing levels required to respond to the most resource-intensive conditions under all operating states, including normal operations, anticipated operational occurrences, design basis accidents, and emergencies. A gap analysis will be performed against *G-323* and an implementation plan will be created.

1.15.3L Recalculation of Derived Emission Limits

The derived emissions limits are currently calculated as per the 1987 edition of the CSA 288.1 standard. The work to calculate the limits will extend into the new licence period and the full implementation will be described in the PLGS Licence Condition Handbook.

1.15.3M Lessons Learned from Fukushima

As a result of the earthquake and subsequent tsunami that occurred in Japan in March of 2011, NB Power formed a team to review lessons learned and to identify potential areas for further improvement. This included a response for information requested from the CNSC in their letter of March 17, 2011 (References 1, 2, 3) and to provide information (Reference 4) for the CNSC Fukushima Task Force review (Reference 5) for the report they intend to produce by September 30, 2011.

The review incorporated information from tasks performed in support of Point Lepreau Generating Station (PLGS) plant life extension and the Refurbishment Project, augmented by additional specific reviews and walk-downs in response to the events at Fukushima. These activities were performed in concert with the CANDU integrated team on Fukushima made up of both the domestic and international CANDU utilities and AECL, and took into account insights from other nuclear jurisdictions.

The review concluded that the risk related to PLGS operation continues to be in line with the documented licensing basis and the safety case with its defense in depth approach remains strong. PLGS is well-equipped to manage external hazards and severe accidents.

Longer term improvement plans are currently under discussion with CNSC staff and are expected to be the topic of a site specific action item once CNSC staff reviews are complete.

1.15.3N CSA Standard, Regulatory or Guidance Documents

PLGS is currently preparing to incorporate the following (tables below) CSA standards, Regulatory and Guidance Documents into our new PROL and Licence Condition Handbook. A detailed gap analysis of each document has been performed and if necessary plans for full compliance would be described in the licence condition handbook and in the license application correspondence. The progression to the compliance with the documents listed below will assist PLGS in achieving continuous improvement of structures, systems and components.

1.15.3N CSA Standard, Regulatory or Guidance Documents, Continued

	Full Compliance at Licence Renewal
	CSA- N286-05 Management System Requirements
	CSA- N287.7-08 In-service Examination and Testing Requirements for Concrete Containment Structures for CANDU NPPs
	CSA- N294 Decommissioning of Facilities Containing Nuclear Substances
	CNSC RD-336 Accounting and Reporting Nuclear Material
	CNSC Regulatory Standard S-296 Environmental Protection Policies, Programs and Procedures at Class I NPPs
	CNSC S-210 Maintenance Programs for NPPs
	Guidance Documents Used at the time of Licence Renewal
	CNSC G-274 Security Programs for Category I,II,III Nuclear Material
	CNSC G-208 Transportation Security Plans for Category I, II, III Nuclear Material
	CNSC G-129 Keeping Radiation Exposure and Doses as ALARA
	CNSC G-278 Human Factors Verification and Validation Plans

	Implementation Plan Required at Licence Renewal
	CSA- N293-07 Fire Protection for CANDU NPPs
	CSA- N288.1 Guidelines for Calculating Derived Limits for Radioactive Material in Airborne and Liquid Effluents
	CSA – N285.5-08 Periodic Inspection of CANDU Nuclear Power Plant Containment Components
	CSA- N285.0-08 (June 2009 Edition) General Requirements for Pressure- Retaining Systems and Components in CANDU NPPs
	CSA N290.15 Requirements for the SOE of NPPs
	CNSC RD-353 Testing and Implementation of Emergency Measures
	CNSC G-323 Ensuring the Presence of Sufficient Qualified Staff at Class I Nuclear Facilities

1.15.4 Past Improvement Initiatives

The following improvement initiatives were in progress and were described at the time of the previous Power Reactor Operating Licence renewal application. These have both subsequently been completed and are described below for completeness.

1.15.4A Human Resources – Organizational Basis

On February 11, 2005 a Project Charter and Project Schedule were submitted to the CNSC outlining how Point Lepreau Generating Station proposes to establish an integrated, systematic method of linking position descriptions, qualification and training programs, and staffing plans.

The project focused on positions that routinely perform work that has impact on nuclear, personnel or environmental safety. Position descriptions were updated describing responsibilities, key interfaces and reporting relationships. Qualification and training programs were documented and the training program validated for adequacy and completeness in terms of the Systematic Approach to Training methodology.

The minimum staffing levels were defined and the composition of minimum shift complement for operations, emergency response and minimum crew complement for security were completed. Human resources and succession planning for staffing levels were completed based on employee mobility and attrition

1.15.4B Feeder Cracking

Prior to Refurbishment, PLGS Primary Heat Transport (PHT) feeders were affected by degradation mechanisms not anticipated in the original design:

- Feeder thinning
- Feeder cracking.

Although first discovered at PLGS, PHT feeder thinning was subsequently confirmed to be an industry wide phenomenon. To address the issue, the CANDU Owner's Group (COG), initiated the Feeder Thinning Project. Major components of that project were:

- To develop a mechanistic understanding of feeder wall thinning.
- To determine and recommend potential changes in materials to mitigate wall loss.

1.15.4B Feeder Cracking, Continued

The COG study concluded Flow Accelerated Corrosion (FAC) to be the active degradation mechanism and confirmed wall thinning to be confined to outlet feeders. Assessment of inspection data established that the rate of thinning was predictable and statistically quantifiable. Although the COG study concluded that FAC wall thinning could not be eliminated in ASTM A106 carbon steel feeders, the rate of FAC wall loss could be significantly reduced by the presence of low levels of chromium.

All feeder pipes are scheduled for replacement during the Refurbishment Outage with improved material. Replacement feeder pipes are specified with a chromium content of 0.3% to 0.4% by weight. Further, the minimum wall thickness for 2-inch feeders was raised from 0.218 inches to 0.250 inches to provide extra margin for wall loss. Based on predictive modeling, these material specification changes are designed to provide assurance that outlet feeder piping will achieve the required 24 Effective Full Power Year (EFPY) design life post-refurbishment. Replaced feeders will be inspected for wall thinning to meet or exceed the requirements of CSA N185.4-09. Inaugural baseline thickness inspections are to be carried out on 100% of outlet and 25% of inlet feeders during the Refurbishment Outage.

Prior to refurbishment, PLGS experienced two through-wall cracks on the extrados of outlet feeder bends directly downstream of the Grayloc® hub, one in late 1996 and a second in 2001. Between 2001 and the shutdown for Refurbishment in 2008, comprehensive ultrasonic (UT) inspections specifically designed to detect cracking were carried out during each scheduled maintenance outage on outlet and inlet feeders. Sixteen more outlet feeders were replaced due to cracks detected by inspection. Post-removal inspection confirmed partial through-wall cracks on 13 of them. Follow-up investigation concluded the failure mechanism to be stress corrosion cracking primarily due to residual stresses left from fabrication. PLGS lower feeder bends were “cold bent” without subsequent stress relief. No other CANDU station has experienced feeder cracking to date.

The Technical Specification for fabrication of feeder pipes to be installed during Refurbishment was designed to eliminate feeder cracking as a credible degradation mechanism. All feeders have been stress relieved to remove residual stresses from the cold bending process.

In summary, NB Power Nuclear is confident that PHT feeders will achieve the required 24 Effective Full Power Year (EFPY) design life post-refurbishment and that feeder cracking has been eliminated as a credible degradation mechanism.

2.0 Performance Assurance

2.1 Quality Assurance

Quality Assurance

The Quality Assurance Program for the Point Lepreau Generating Station consists of planned verification, assessment, and review activities that are performed to ensure quality of operations. These activities are documented in an overall quality assurance program called the Management System.

The program includes related management activities and is implemented to provide adequate confidence that safety-related equipment, systems and structures perform according to stated requirements during the course of their service lifetime.

NB Power Nuclear has chosen to include a description of its quality activities into a Nuclear Management Manual. This manual describes the Management System and the high-level policies, principles, and processes through which the station achieves its goals and performance objectives. Further information is provided in sub-tier documents such as Process References, Reference Documents, and Station Instructions.

Corrective Action

To minimize the potential for repeat performance problems, it is essential that events and event precursors are investigated and appropriate actions implemented in a timely manner.

By using a systematic process of event investigation to identify the causes of events, the process significantly contributes to the Station's continual improvement initiatives in the areas of safety, quality and reliability.

Station events may be formally reportable to the CNSC or to other Regulatory Agencies, or may simply be an undesirable occurrence that was not planned or expected. All staff in the organization are encouraged to report and record events via the Corrective Action Program (CAP). Implementation of associated corrective actions minimizes the potential for recurrence of similar events.

2.1 Quality Assurance, Continued

Trending

Trending identifies degrading station or potentially degrading conditions based on the analysis of previous events. These low level issues can be viewed as precursors to more significant events. The objective of the trending program is to proactively identify an adverse trend so that appropriate actions can be directed by management to prevent a significant event. Corrective actions that address these deficiencies are implemented through the Corrective Action Program.

Operating Experience

The Operating Experience Program is designed to learn from industry experience, station events, best practices, and results of research and development. The objective of the Operating Experience Program is to prevent the reoccurrence of station and industry events through the effective sharing and use of industry operating experience.

Evaluation of Point Lepreau Generating Station and Industry Operating Experience provides an opportunity to capitalize on "Lessons Learned". The Operating Experience Group screens both Point Lepreau Generating Station and Industry experience to identify such opportunities.

"Lessons Learned" are communicated to Point Lepreau Generating Station staff and relevant external contacts.

Self Assessment

The self assessment program assists in evaluating the effectiveness of programs, processes, or performance areas. Self assessments are structured in an objective process where NB Power Nuclear assesses the effectiveness of their program against predetermined standards and expectations. The intent of a self assessment is to improve in a proactive manner.

Benchmarking

Benchmarking is the process of looking outside the organization to identify, evaluate and implement leading industry practices. When a performance gap has been identified, benchmarking is a tool that can be used to identify opportunities used by other organizations to correct gaps and provide continuous improvement and superior performance. It also provides a fresh perspective and lessons learned from other organizations that can be applied to PLGS.

2.1 Quality Assurance, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
NMM-00660	6	Nuclear Management Manual	2011 Aug. 30
PRR-00660-DM4	4	Assess and Improve Performance	2010 Nov. 30
SI-01365-A63	5	Implementing the Corrective Action Process	2011 Apr. 18
SDP-01368-CA07	1	Identifying Trends	2010 Jun. 16
SI-01365-T32	7	Using Operating Experience	2011 June 3
SI-01365-A62	7	Self Assessments	2011 June 3
SDP-01368-AS04	0	Performing Benchmarking	2002 Oct. 24

Performance Metrics

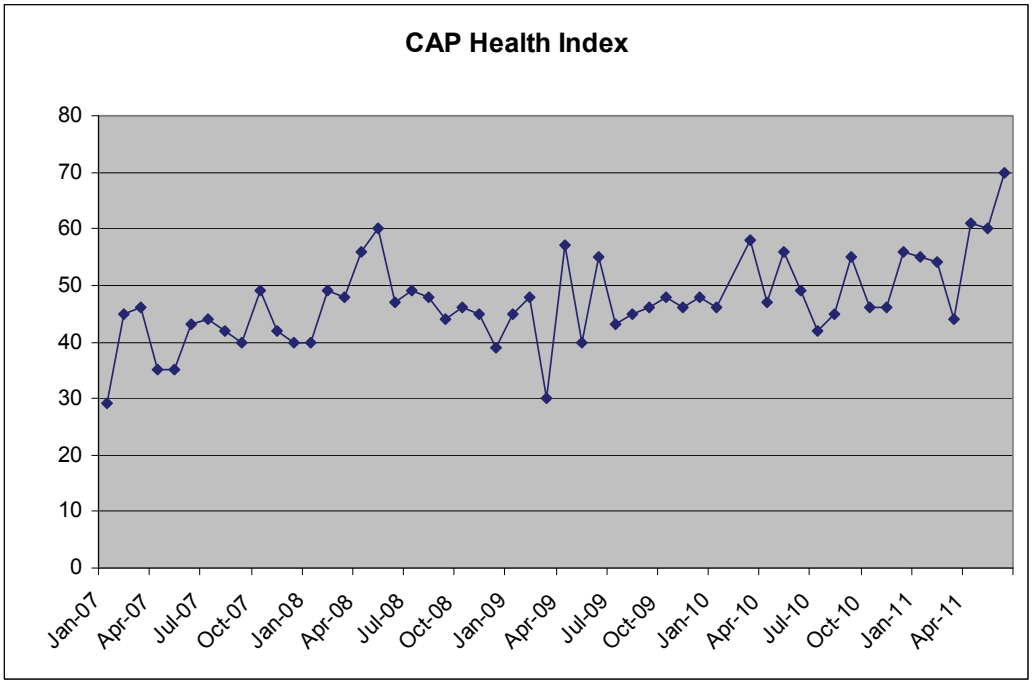
The CAP Health Index is the main metric for evaluating performance improvement and the corrective actions program. The index is a monthly compilation of five (5) inputs. The inputs include:

- Effectiveness Reviews.
- Quality Analysis of apparent cause evaluations and OPEX quality.
- Timeliness of corrective actions.
- Timeliness of condition evaluations.
- Participation in the trending program.

Our performance in the last few months has increased the CAP Health Index to 70 due to the CAP plan initiatives. Previous to the plan, the highest the index reached was 60. The focus is now on our corrective actions to address timelines. Prior to the introduction of the CAP Health Index following industry benchmarking, performance was measured in terms of overdue actions and condition evaluations. Improvements to the corrective action program are discussed in *Section 1.15.3.2*.

2.1 Quality Assurance, Continued

Performance Metrics (continued)



2.2 Independent Assessments

Independent Assessment Group

The Independent Assessment Group (reporting to the Business Excellence Director) performs assessments to confirm that the Management System is established and implemented effectively. These independent assessments:

- are carried out in accordance with approved procedures by persons who have neither performed nor verified the activities being evaluated and who have sufficient authority to ensure effective assessments
- are performed at the specific request of the Business Excellence Director or NB Power Nuclear management
- periodically cover the Management System activities
- are frequent enough to confirm that the requirements of the Management System continue to be met.

The results of Independent Assessments are documented and reported to the appropriate level of management, so actions can be taken to resolve the identified problems.

2.2 Independent Assessments, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
SDP-00667-QP29	4	Conducting Independent Assessments	2010 Nov. 30
SI-01365-A88	8	Performing Internal Independent Assessments	2010 Dec. 14

2.3 CNSC Inspections and Action Items

CNSC Staff

The CNSC staff performs Type I and Type II Inspections of licensee programs and processes in a systematic manner that ensures all safety areas are reviewed in a given timeframe. This systematic review process ensures that the CNSC are able to report to the Commission on a yearly basis an assessment of the performance of the licensees. The findings of inspections are recorded in regulatory reports and sent to the licensees under formal correspondence and tracked with specific Action Item numbers to track the items to closure.

Correspondence from a Regulator is entered into the Corrective Action Program and assigned to a department to track a commitment or Action Item. Resolution options are evaluated and the impact of the resolution strategy on station resources is assessed. A formal response is prepared and forwarded to the Regulator. To track the progress of Action Items and commitments, Bi-Annual Action Item Progress Meetings with the Action Item Leads, Managers, and the CNSC are held.

2.3 CNSC Inspections and Action Items, Continued

Documentation

The document supporting this process is:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-DM2	2	Manage External Relationships	2011 Jan. 14
SI-01365-A66	6	Managing Regulatory Commitments and Action Items	2011 Feb. 15
SI-01365-A63	5	Implementing the Corrective Action Process	2011 Apr. 18
SI-01365-A72	1	Developing and Implementing Business and Operational Plans	2005-Aug.-30
SI-01365-A93	8	Maintaining Records	2010 Jul. 28
SI-01365-P90	7	Identifying and Prioritizing Work	2010 Nov. 18
SDP-01368-A06	7	Preparing and Reviewing Outgoing Regulatory Correspondence	2009-Apr.-01
SDP-01368-A19	1	Controlling Designated and Classified Information	2008-Jun.-12

2.4 Human Factors

Human Factors

Point Lepreau Generating Station staff recognizes that an understanding of the role of human factors in safety, supported by individual, supervisory, and leadership behaviors, will minimize the risk of human error related events.

Human factors considerations are an integral part of the design process at Point Lepreau Generating Station, and are incorporated into the *MS-1, Develop Modifications* process. An impact assessment performed in preliminary design considers the following items to determine the potential human factors involvement in the modifications:

2.4 Human Factors, Continued

Human Factors (continued)

- workplace layout and workstation design,
- environment (lighting, noise, thermal, vibration,
- logic and control layout, instrumentation and computer control system design,
- workload analysis, job design, and the ability to interpret and analyze data,
- factors impacting construction, operation, and maintenance,
- presentation, organization and display of information,
- arrangement of panels,
- emergency planning, and
- anthropometry

Based on the identified human factors considerations, design requirements related to human factors are documented and addressed during detailed design activities. Guidance is provided to designers within the process documentation.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-MS1	5	Develop Modifications	2010 Jul. 05
STD-01140-ES01	2	Design Considerations List	2001 Jun. 25
SI-01365-T73	12	Responding to Requests for Design Modifications	2011 June 28
SDP-01340-DS05	0	Modification Design Requirements	2002 Apr. 19
SDP-01340-DS71	1	Incorporating Human Factors In Design	2011 Aug. 24

2.4 Human Factors, Continued

Refurbishment Human Factors Documentation

Human Factors Documentation developed specifically for the Refurbishment Project includes the following. While the 4 Design Guides (DG) listed below were prepared specifically for Refurbishment they will continue to be used post refurbishment for human factor considerations.

Document Number	Document Title
87RF-00334-0001-001-HFP-A-01	Human Factors Engineering Program Plan
87RF-03900-0001-001-DG-A-00	Main Control Room Unit Panels and Field Control Panels
87RF-03900-0001-002-DG-A-00	Design Guide, CRT Based Displays
87RF-03900-0001-003-DG-A-00	Design Guide, Maintenance Inspection and Testing
87RF-03900-0001-004-DG-A-00	Design Guide, Annunciation

Hours of Work

As part of NB Power Nuclear's commitment to safety within human factors, *SI-01365-A106, Controlling Hours of Work for Regular Shift Workers* and *SI-01365-A45, Controlling Hours of Work for Regular Day Workers* identify the following:

- Responsibilities of staff and station leadership
- Limitations
- Approval for Exceptions
- Monitoring for Symptoms of Fatigue
- Monitoring Effectiveness of Limits.

Standard practice is to rollout expectations for Controlling Hours of Work for both Regular Day Workers and Regular Shift Workers prior to planned maintenance outages as a refresher for staff and leadership.

2.4 Human Factors, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
SI-01365-A106	2	Controlling Hours of Work for Regular Shift Workers	2006 Oct. 23
SI-01365-A45	11	Controlling Hours of Work for Regular Day Workers	2011 July 08

Human Performance

In addition to the human factors program, Point Lepreau Generating Station management recognize that an understanding of the role of human performance in safety, supported by individual, supervisory and leadership behaviors, will minimize the risk of human error related events.

The program at PLGS includes:

- delivering human performance training.
- conducting timely analysis or investigations of human performance issues.
- maintaining up-to-date knowledge of human performance developments in industry, regulatory, and international environments.
- responding to Performance Indicators trends.
- observing and coaching field activities which mitigates risk to employees and to the business by reinforcing high standards and expectations.
- identifying and reporting problems.
- use of a human performance simulator for dynamic learning in error prevention techniques.
- the Human Performance Steering Committee which is responsible for guiding and implementing the Human Performance Program.
- the *PLGS Human Performance Strategic* Plan maintained by the Human Performance Steering committee (which identifies and prioritizes methodologies, tools and defences that can be applied at PLGS) and schedules the implementation of measures to improve human performance at the station.

The outputs are then used as the basis for implementing corrective actions.

2.4 Human Factors, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
SDP-01368-AS01	6	Observing and Coaching Field Activities	2011 Apr. 08
SI-01365-A63	5	Implementing the Corrective Action Process	2011 Apr. 18
SI-01365-A62	7	Self-Assessments	2011 June 03
IR-00105-01	1	Human Performance Program	2009 Apr. 22

Wellness

The Fitness for Duty Program at NB Power Nuclear is an integrated approach at holistic wellness. We have a team dedicated to positive wellness programming, monitoring and support. Fitness for Duty is a physical and mental health status that permits the performance of essential job duties in an affective manner and protects the health and safety of other workers and the public.

A Fitness for Duty Program is a set of planned activities and processes coordinated by employees, supervisors, and Human Resources to ensure that personnel are capable of performing duties and responsibilities associated with their position. We also have a Fitness for Duty Program that was established in 2008/08/19 as well as modification to our Hours of Work Policy that was revised at the same time (2008/09/03) to reflect fatigue management. The Fitness for Duty Program is initiated by the supervisor and supported by Human Resources. Some of the programs dedicated to people performing at their best include,

Healthy Employees through Accommodation & Learning (H.E.A.L.) is a NB Power accommodation program promoting people at their best. The program encourages engagement in the work force during illness or injury and allows employees to participate in accommodation or learning activities that otherwise would result in sick time. We strive to engage workers in meaning full work that meets their abilities.

2.4 Human Factors, Continued

Wellness (continued)

First Line Leadership Training - New leaders are trained to deal with a variety of people and business challenges. This training begins with the individuals own personal leadership style, the behavioral aspects of work, and how leaders develop trusting relationships with staff. This training explores human performance, motivation, satisfiers and practices of positive reinforcement, coaching and feedback. This is a multi-block training program over a number of weeks.

Security and Supervision Training - The objective of this training is to increase the Supervisors ability to detect insider threat by developing awareness to recognize and respond to behaviors that indicate a risk to the security, safety, or health of employees, facilities, or to the public. To this end, Supervisors are accountable for managing these and require skills and training to recognize behaviors of concern or abnormal behaviors of individuals of concern and understand the support network available to assist with required actions.

Managing Relationships in the Work Place - The Relationship Management Program is a tool intended to improve relationships between employees and supervisors with a vision to employees and teams performing at their best. The Supervisor learns what the employee requires to be successful, the skills and knowledge they bring to the table, as well as any barriers to performance. The employee has the opportunity to receive a clear vision of the department as well as discuss their professional aspirations or request clarification on any topic. Stronger relationships lead to stronger teams.

Prevention Programs - To help achieve our vision of Healthy Employees in a Healthy Environment, the Well-being Strategy for NB Power group of companies focuses on learning and support and addresses the need of employees and their families before, during and after issues that may affect their well-being. By implementing a comprehensive, integrated Well-being Strategy, employees are:

- offered programs to identify health risk
- assisted in their recovery should they become ill or injured
- offered learning opportunities to enhance their total Well-being.

Offer physical fitness instruction to ensure individuals continued ability to meet physical requirements of job, where such requirements exist.

2.4 Human Factors, Continued

Wellness (continued)

Supportive Programming - Our employees enable us to perform at the standards that we do at NB Power. Their regular attendance is necessary for our success and theirs; we are committed to assisting employees in achieving and maintain a high standard of attendance that emphasizes the value we place on each individual and a healthy work force. This program identifies potential for high risk in attendance and offers assistance to individuals and supervisors. With early intervention the seriousness of a condition may be minimized.

Accommodation - Regardless of lifestyle occasionally employees require assistance in recovery or accommodation in the workplace due to a medical, physical, or mental condition. NB Power group of companies is dedicated to Healthy Employees through Accommodation and Learning also known as H.E.A.L. This is a structured program to assist employees in reaching optimal well-being. It is a voluntary program to help employees recover from illness, injury, or surgery at home through participation in alternate work or learning. Permanent accommodation may be necessary when an employee's previous level of functioning is not possible. Successful accommodation initiatives require the cooperation, input, and support of all parties: the employer, the employee seeking accommodation, the medical advisors, bargaining agents, and the employees in the workplace community.

Employee and Family Assistance Program (EFAP) - The Employee and Family Assistance Program (EFAP) is a support program developed jointly between the NB Power Group and the International Brotherhood of Electrical Workers (IBEW). It is a voluntary, confidential, short-term counseling, advisory and information service for employees and dependant family members. The EFAP can help with personal problems that affect the employee's family life, work life, or general well-being.

Records Maintenance Legal - NB Power Nuclear employs two types of professional health care providers; Occupational Health Nurses and Paramedics**.** These professionals respect the right of people to have control over the collection, access, use, and disclosure of their personal information. Reasonable measures are taken when conversing with a person receiving care to prevent confidential information in the conversation from being over heard. The collection, use, storage, and disclosure of health information is in accordance with privacy laws. We respect policies that protect and preserve people's privacy, including safeguarding information and medical files. Medical files are maintained indefinitely.

2.4 Human Factors, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
IR-00583-01	0	Fitness for Duty Program	2008 Aug.19
SDP-01368-A31	2	Implementing the Fitness for Duty Program	2011 Mar. 17
SI-01365-A106	2	Controlling Hours of Work for Regular Shift Workers	2006 Oct. 23
SI-10365-A45	11	Controlling hours of Work for Regular Day Workers	2011 July 08
HR-53		Relationship Management	2010 Oct. 12
SDP-01368-A20	1	Managing Relationships	2010 Apr. 28
HR-16		Employee & Family Assistance Program	2010 Oct. 12
HR-14		Employment-Related Harassment	2010 Oct. 12
HR-25		Drug and Alcohol Abuse	2010 Oct. 12

2.5 Staffing and Training

Staffing

SU-1, Provide Human Resources assures that people with required knowledge, skills, formal education and behaviours are available to effectively implement station processes.

The following are the key activities for this process:

- Identify human resource and organizational development strategies
- Develop and implement approved policies and programs
- Monitor and evaluate program effectiveness
- Establish and maintain the Collective Agreement
- Establish and maintain organizational plans
- Prepare position descriptions and staff positions
- Manage employee issues
- Administer compensation and benefits programs
- End employment relationships.

NB Power Nuclear Human Resources ensures that staffing levels within Operations remain adequate into the future through recruitment of new and retention of existing licensed staff.

2.5 Staffing and Training, Continued

Staffing (continued)

The Collective Agreement between NB Power Holding Corporation and Local 37 of the International Brotherhood of Electrical Workers for the Generation Nuclear Operational Group was recently ratified and is in effect until December 31, 2013.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU1	2	Provide Human Resources	2011 Jan. 26

Training

Training is a process in which employees receive "initial" and "continuing" training pertinent to the position in which they maintain. Details of the Point Lepreau Generating Station Systematic Approach to Training (SAT) are contained in our process document; *PRR-00660-SU03, Provide Training*. This document in combination with internal training procedures defines the key activities involved in our training process. Station initiatives are reviewed by the systematic approach to training process to identify needs. Training effectiveness is reviewed on a regular basis to ensure that staff remains competent in their relevant job function.

Certified Staff

RD-204, "Certification of Persons Working at Nuclear Power Plant" defines requirements aiming to ensure that persons seeking a certification or renewal of a certification by the Canadian Nuclear Safety Commission for a person referred to in the license of a nuclear power plant are qualified to carry out the duties of that position in accordance with the Nuclear Safety and Control Act and the regulations covered by this act.

Point Lepreau Generating Station meets these requirements for operations by the following defined training programs:

- *IR-97177-02, Shift Supervisor Incremental Training Program*
- *IR-97177-01, Control Room Operator Candidate Training Program*
- *IR-97179-01, Certified Staff Continuing Training Program*.

2.5 Staffing and Training, Continued

Senior Health Physicist

Over the license period, PLGS has designed and developed the training program for the Senior Health Physicist. This training program was designed based on the requirements specified in RD-204, "Certification of Persons Working at Nuclear Power Plant" and station specific job and task analysis results.

PLGS Refurbishment Training

Training needs associated with modifications performed during the PLGS refurbishment outage are determined in accordance with the *SU-3, Provide Training* process. Refurbishment work affecting the training program ranges from relatively minor valve modifications to complete replacement of system components such as turbine control systems.

Dedicated resources from the Operations Training Department and the Maintenance organization have been assigned to coordinate the training needs related to the PLGS Refurbishment. These individuals work with the line organization and subject matter experts to complete training needs assessments and the subsequent design and delivery of required training. Training delivery is a combination of vendor supplied and in-house delivery.

The specific details of the required training are documented in the following information reports:

- *IR-08400-01, Training Material Development for Refurbishment Outage Modifications*
- *IR-08410-01, Refurbishment Project Operations Training Program Description*
- *IR-08410-03, Refurbishment Project Comprehensive Training Program Description*
- *IR-08410-04, Refurbishment Project Maintenance – Chemistry-Fuel Handling Training*.

2.5 Staffing and Training, Continued

Station Training Programs

Initial and continuing training programs for station staff are designed, developed, delivered and evaluated in accordance with the SU3, Provide Training Process.

Over the license period, PLGS has completed the following key training initiatives.

Human Performance Simulator

We have developed a HU Simulator to enhance the delivery of HU Fundamentals training as well as other station training. The simulator consists of mock-ups, designed to simulate plant conditions and to assist with learning transfer. Dynamic Learning Activities have been designed to reinforce expectations with respect to pre-job briefs, human performance event free tools, procedure use and adherence, conduct of maintenance and field operations. The HU simulator is utilized for the delivery of the following:

- Human Performance Fundamentals and Event Free Tools
- General Employee Training
- Conduct of Maintenance
- Conduct of Operations
- Pre-Job Briefing
- Supervisory Observation Training
- Foreign Material Exclusion.

Cranes and Rigging Training Improvements

We have made significant changes to our Lifting and Rigging Training Program. Improvements include:

- Development of Supplemental Worker Cranes and Rigging training. This training was developed using internal and external industry operating experience and industry best practices.
- Revised our training courses for both rigging and cranes to reflect industry best practices. Revisions included more emphasis on practical exercises and use of HU event free tools.
- On-the-Job (OJT) and Task Performance Evaluations (TPE) training for rigging and site specific cranes.
- Refresher Training. Developed using industry operating experience. This training has a five (5) year re-qualification frequency.

2.5 Staffing and Training, Continued

Supply Training Program

We have established a Supply Training Program. A job and task analysis was performed for all supply positions and an Initial and Duty Area Specific training program defined. All supporting training material has been developed and staff are progressing through the program. Training and qualifications to address the requirements of PLGS's Pressure Boundary Quality Assurance Program have been established.

Maintenance Training

Key improvement activities completed over the licensing period:

- Revised our "Initials" training program for Mechanical, Electrical, Instrumentation and Control (EI&C) and Service Maintenance to align with industry recommendations and guidelines (WANO).
- Revisited the Job and Task Analysis results for each job family and established "Duty Area" specific training and qualification streams. These defined training areas will assist us in the development of long term training schedules to address the needs of the maintenance organization.
- Continuing Training Days have been established on a quarterly basis for Mechanical and EI&C to address the "flexible" continuing training component of each program. These training days typically address recent changes to documentation or process and performance issues identified by the line organization.
- Established the training requirements for Supplemental Workers prior to independent work assignments.
- Training and qualifications to address the requirements of PLGS's Pressure Boundary Quality Assurance Program have been established. This involved the development of training to support key positions required by the Pressure Boundary Program.

Management and Leadership

The Management and Leadership Development Program is designed to develop leadership, managerial, and administrative skills for frontline and mid-level leaders, as defined in *QTP-08410-QT01, Management and Leadership Training and Qualification Program*.

The program encompasses:

- Initial Training,
- Continuing Training,
- Leader Forums,
- Individualized Coaching, and
- Mentoring for Succession.

2.5 Staffing and Training, Continued

Engineering Training Program

Engineering Training Program established in accordance with WANO Guidelines for Engineering Training. Currently progressing with job and task analysis for all engineering disciplines to bring the engineering training program to SAT Compliance. Quarterly Technical Forums being conducted with all engineering staff to ensure awareness of station modifications resulting from the PLGS Refurbishment.

Fuel Handling Training

Fuel Handling training program established in accordance with SAT methodology. Program implementation on-going. Refresher training being developed and planned to refresh activities that have not been done for the duration of the refurbishment outage. Main focus of this refresher training is for fuel handling operations and Panel Skills.

Security Training

The Security Department has an established a training program to manage the special needs of the site security organization. Security training programs to meet CNSC qualification standards for response personnel has been established and continues to be delivered.

Training Management System

Enhancements made to the Training Management Systems (TMS) and the Task Qualification (TQS) interface to simplify determination of employee qualifications. Task listings and associated qualifications for the following job families entered into the system since the last license period:

- Fuel Handling
- Emergency Preparedness & Environment
- Independent Assessment Group.

Our current focus is to align all the tasks in the system with our Management System. This will eliminate duplicate tasks in the data base and will allow for easier determinations of employee qualifications.

2.5 Staffing and Training, Continued

Training Facilities

"Smart" boards installed in all classrooms. One classroom set-up with a wireless network and laptop computers to facilitate computer based training. New mock-ups procured for the maintenance skills shops to improve our training delivery. Mock-ups for:

- Inverter Maintenance.
- Programmable Digital Comparators (PDC's).
- Valve Packing.
- Installed a Breathing Air Compressor in the mechanical skills shop to allow for maintenance training simulations in tritium atmospheres (wearing plastic suits).
- Welding Shop Improvements (new electric welders and improved ventilation in the welding training shop).
- SG Engine Head Practice Unit (Used for SG Head Torquing Training).
- Various tooling to support Swagelok, Bearing installation and pipe threading training.

Training Performance Indicators

Monthly Training Report Cards established to report training program performance to the line organization. Indicators include training attendance, training observations, TRG meeting performance, post course effectiveness evaluations, and training Corrective Action Program status. Training attendance has improved through better scheduling and improved communication with the line organization. Ongoing work to improve evaluation of training effectiveness. We have created an internal plan to address and improve on this aspect of our SAT based training programs (see next section).

2.5 Staffing and Training, Continued

Future Plans

Below are improvement initiatives currently progressing or planned for PLGS Training:

- ***Training Process Improvements***. Process improvements to enhance our Training Needs Assessment and Analysis process.
- ***Training for Performance Improvement***. Shifting from a training focus to an expanded performance improvement perspective. This will be accomplished through process improvement (better tools to analyze the need for training) and improved training presence in the line organization, strong working partnerships with the line, as well as a focus on learning transfer to facilitate worker, team and organizational performance.
- ***Training Review Group (TRG) Improvements***. Improving our TRG function to focus on addressing performance issues and to engage the line in evaluating the effectiveness of delivered training.
- ***Senior Training Council***. Re-establishment of the Senior Training Council. This forum is comprised of station senior management with the purpose of providing strategic direction for our stations training programs.
- ***Establishing long term training plans***. Development of longer term (2 year) training schedules to address Initial Training needs as well as "Fixed" and "Flexible" continuing Training needs.
- ***Skills Shop Improvements***. Procurement or development of more mock-ups for the maintenance skills shops to facilitate increased hands-on training. Also to help with the development of just in time training sessions for infrequently performed tasks.

Documentation

The documents supporting the training program are listed in Table 6.

3.0 Design and Analysis

3.1 Safety Analysis

Safety Analysis

Safety analyses performed to support the operating licence were divided into two distinct categories to meet requirements at the time of the inaugural application for an operating licence for Point Lepreau Generating Station. One involved a deterministic approach aimed at demonstrating Special Safety System performance. The other was associated with a probabilistic approach whereby time-ordered plant responses to specific events were assessed.

The deterministic analyses are summarized in the PLGS Safety Report. Analyses of the outcome of pre-selected events called design basis events are performed. These analyses are done to show that the Special Safety Systems are capable of mitigating the consequences of these events, and to determine any constraints or limits on the operation and maintenance of the station. The selection of events was developed by the station designer and cover events that are included in Regulatory Guides. Additional analyses are performed to assess less probable events, which further enhance confidence in the safety systems.

In addition to the analyses performed in support of the inaugural operating licence, there is an on-going management of safety analysis issues at the Point Lepreau Generating Station. This assures that changes to the plant design and operation, along with new information coming from operating experience or research and development initiatives; do not have a detrimental effect on public risk. In addition, NB Power participates with the other Canadian Nuclear Utilities to address residual generic safety issues raised by CNSC staff. Relevant new analyses are incorporated into the Safety Report on a three (3) year cycle. The most recent edition of the Safety Report (2009) includes all of the analysis performed to support refurbishment.

As part of our design process, changes are reviewed for their impact on nuclear safety. These can include changes to fuel design, nuclear design, process and control systems, electrical and distribution systems and instrumentation and control systems. Any changes which impact the safety case are analyzed, documented and included in the next revision of the Safety Report.

3.1 Safety Analysis, Continued

Safety Analysis (continued)

The original probabilistic safety assessments were referred to "Safety Design Matrix Studies". As part of the refurbishment project, these have been superseded by a level II Probabilistic Safety Assessment (PSA), compliant with CNSC Standard S-294. The results of the level II PSA are also summarized in 2009 Safety Report, which demonstrates compliance with prescribed overall plant safety limits for the frequency of severe core damage and large radiological releases from the containment structure. The probabilistic safety assessment estimates the frequencies for various plant damage states and external plant release categories considering plant response following various postulated design basis initiating events. The cause and effect sequences for determining these frequencies encompass plant design; operations and maintenance practices; human reliability and the potential for common cause failures that could reduce inherent redundancies in system design.

In the probabilistic safety assessment, event trees were developed to identify the plant response to various initiating events, and include success and failure of mitigating actions by plant operators or plant systems until a stable plant state was achieved; either in a plant damage state or external plant release, or in a condition where the event was terminated prior to damage being incurred. Quantities of radionuclides released within containment were also addressed. Fault trees were prepared to determine the likelihood of mitigating system failure from various failure modes of a system. The likelihood of operator error were included in the event trees considering post-accident stresses and factors that could influence event diagnosis and task execution. The likelihood of operator error or common cause failures that could reduce mitigating system redundancy or result in system impairment were included in fault trees.

Procedures and programs are being developed to assure that changes to plant design, operation, maintenance, along with new industry experience, are reflected in updates to the probabilistic safety assessment. Reserved risk estimates and new risk insights will be reported on a triennial basis and also included in each update of the safety report.

Additional Safety Analysis

Since the last revision of the Safety Report in 2009, no major analysis has been performed.

3.1 Safety Analysis, Continued

Safety Report

The safety report was revised and issued to the Canadian Nuclear Safety Commission in December 2009. The report includes:

Safety Report Part 1 – Design Description (2009 Edition)
Safety Report Part 2 – Accident Analysis (2009 Edition) Volume 1
Safety Report Part 2 – Accident Analysis (2009 Edition) Volume 2
Safety Report Part 2 – Accident Analysis (2009 Edition) Volume 3
Safety Report Part 3 – Appendices (2009 Edition) Volume 1
Safety Report Part 3 – Appendices (2009 Edition) Volume 2.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-MS1	5	Develop Modifications	2010 Jul. 05
PRR-00660-MS3	3	Maintain Design and Safety Basis	2010 Jul. 05
SDP-01368-SA01	0	Safety Analysis	2001 Apr. 09
87RF-03600-DG-001	2	PSA Fault Tree Analysis Guide For Probabilistic Safety Assessment	2007 Jul. 27
87RF-03600-DG-002	1	Accident Sequence Quantification Guide For PSA	2006 Mar. 30
87RF-03611-AB-001	1	PLGS PSA – Human Reliability And Recovery Analysis	2006 Jul. 25
87RF-03611-AB-002	1	PLGS PSA Methodology – Overview	2004 May 21
87RF-03611-AB-004	1	PLGS PSA Methodology – Common Cause Failure Analysis	2004 Jul. 08
87RF-03612-AB-001	0	Methodology For PSA Based Seismic Margin Assessment	2002 Aug. 12
87RF-03613-AB-001	2	PLGS - Fire And Flood PSA Methodology	2006 Aug. 23
IR-01500-16	1	PSA Insight into Systems Important to Safety and Identification of Risk Related Structures, Systems and Components	2010 May 03

3.1 Safety Analysis, Continued

Computer Software Quality Assurance

Point Lepreau Generating Station has integrated analytical, scientific, and design software quality assurance into the quality management system to ensure that computer programs being developed and/or used are compliant with the Canadian Standards Association N286.7 quality assurance standard.

This process applies to analytical, scientific, and design computer programs used at Point Lepreau Generating Station, including those employed by contractors. These programs are used to perform or support:

- design and analyses of safety-related equipment, systems, structures, and components,
- deterministic and probabilistic safety analyses,
- reactor physics and fuel management calculations, and
- transfer of data between computer programs or pre/post-processing calculations associated with the above processes.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU7	1	Provide Information and Technology Services	2011 Jan. 17
SI-01365-T101	0	Requesting IT Services	2004 Jul. 12
SI-01365-T83	1	Developing and Modifying Analytical, Scientific and Design Computer Programs	2004 Jul. 08
SI-01365-T84	1	Implementing Analytical, Scientific, and Design Computer Programs	2004 Jul. 08
SDP-01368-SA03	0	Safety Analysis – Code and Data Archiving	2002 Aug. 29
DP-03105-04	1	Physics Code Configuration Management	2001 Mar. 28

3.2 Design Documentation

Design Documentation

The description of the systems and equipment at Point Lepreau Generating Station, including the design and operating conditions are described in:

- Point Lepreau Nuclear Generating Station Safety Report, Part 1–Design Description, 2009 Edition, Rev. 0,
- Design Manuals and Addenda,
- Design Revision Records, and
- Design Guides identify requirements and standards, which must be met in the design of various systems of a nuclear power plant.

The documents listed above are stored as permanent records at Point Lepreau Generating Station.

The safety analysis program, which demonstrates the adequacy of the design of the Point Lepreau Generating Station, is identified in the Safety Report.

Documentation

The document supporting the System Classification is:

Document Number	Rev.	Document Title	Date Registered
01345-3000-001-SCL-A-03	3	System Classification List	2007 Dec. 12

Overpressure Protection Report

The Overpressure Protection Report, which describes the overpressure protection for nuclear systems at Point Lepreau Generating Station, has been submitted to NB Department of Public Safety and the Canadian Nuclear Safety Commission.

Documentation

The document supporting this process is:

Document Number	Rev.	Document Title	Date Registered
01320-0001-001-OPR-A-02	2	Overpressure Protection Report for Nuclear Systems	2002 May 06

3.2 Design Documentation, Continued

Design Manuals

A list of Design manuals is summarized in Table 4 for information.

3.3 Configuration Management & Change Control

Modifications

The *MS-1, Develop Modifications*, *MS-2, Implement Modifications,* and *MS-3, Maintain Design and Safety Basis* processes have been established at Point Lepreau Generating Station to satisfy design change control requirements in accordance with the Point Lepreau Nuclear Management Manual. Commissioning requirements are detailed in the *MS-2* process.

The *MS-1, Develop Modification*, *MS-2, Implement Modifications,* and *MS-3, Maintain Design and Safety Basis* processes contains the following elements:

- Procedures for initiating, approving, and controlling design changes or modifications to systems, structures, equipment and components.
- Review requirements to assure that design modifications are necessary and/or improve safety, reliability, or plant efficiency.
- Assessment requirements to assure that design basis, licensing and Nuclear Safety requirements are not adversely impacted.
- Design requirements that specify that design work be done in accordance with engineering standards and codes, nuclear and regulatory standards, and Operational Requirements.
- Implementation and commissioning requirements, which are consistent with the approved design basis, licence conditions, and design requirements.
- Maintenance of required documentation to preserve a record of the design configuration of the plant.
- Human Factors requirements.

3.3 Configuration Management & Change Control, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-MS1	5	Develop Modifications	2010 Jul. 05
PRR-00660-MS2	4	Implement Modifications	2010 Jun. 29
PRR-00660-MS3	3	Maintain Design and Safety Basis	2010 Jul. 05
PRR-00660-OP1	2	Control and Monitor Station Equipment	2011 Feb. 01
SI-01365-T72	8	Commissioning of Modifications	2010 Oct. 27
SI-01365-T73	11	Responding to Requests for Design Modifications	2010 Jul. 12
SI-01365-T74	6	Installation of Modifications	2010 Aug. 26
SI-01365-T79	4	Control and Monitor Temporary Modifications	2008 Sept. 08
SI-01365-T80	6	Closing Out a Modification	2010 Nov. 30

Equipment Status, Work Control and Operations

To assure that the plant is operated, maintained and modified within the limits prescribed by the design and licence basis, the following processes have been established at Point Lepreau Generating Station:

- *OP-1, Control and Monitor Station Equipment*
- *MA-2, Provide Planning and Scheduling Services*
- *MA-3, Perform Maintenance*.

The process ensures that plant status changes are controlled. It applies to changes in plant status resulting from operations, maintenance, or temporary design modifications, including all work that requires work authorization and meets the criteria for a Plant Status Change Record.

The station Work Control process is the Work Clearance Application in SAP. In addition to configuration control for maintenance and operations purposes, this process addresses work planning, authorization, safe working environment, testing requirements, and documented auditable records and work history.

3.3 Configuration Management & Change Control, Continued

Equipment Status, Work Control and Operations (continued)

Operating staff are trained to operate systems and equipment in accordance with the design and licence basis. Processes and procedures are in place to maintain configuration control during plant operation and to accommodate permanent and temporary plant changes.

Field equipment and systems, including software, are assigned a unique identification to assure that operations activities are correctly implemented, verified, and recorded. This identification is required to effectively support operational configuration management. Configuration management for the above activities is achieved via the Station Operating Procedures and Equipment Status Control Processes.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-OP-1	2	Control and Monitor Station Equipment	2011 Feb. 01
PRR-00660-MA-2	2	Provide Planning and Scheduling Services	2004 Aug. 31
PRR-00660-MA-3	4	Perform Maintenance	2011 Apr. 06
RD-01364-P10	3	Color Codes and Labeling for Equipment Identification	2010 Mar. 10
SDP-01368-P34	2	Performing Shift Turnovers	2009 May 28

3.4 Fire Protection

Program Summary

Point Lepreau Generating Station has a functional organizational structure; however, work is managed using processes which have clearly identified Process Owners. While the Fire Protection Program is part of the *SU-4, Provide Personnel Safety Services* process, other Process Owners have responsibility for elements of the fire protection program described in *IR-71400-07, Fire Protection Program*. The responsible Process Owners develop and implement their process documentation to ensure their processes meet the requirements of applicable acts, licenses, etc. They also implement and maintain their process to ensure continuing effectiveness.

3.4 Fire Protection, Continued

Program Summary (continued)

The purpose of the Fire Protection Program at Point Lepreau Generating Station is as follows:

- Ensure that fires do not significantly increase the risk of radiological releases to the public,
- Protect plant operating personnel and the general public from the hazards of fire,
- Minimize interruptions of power generation due to fire, and
- Minimize economic loss resulting from fire damage to structures, equipment, and material.

Fire Program Aspects

The station design takes into account the potential for fire as it relates to nuclear safety, personnel safety, and asset protection. Personnel safety is provided through design by providing clearly marked egress routes, fire barriers, emergency lighting, signage and alarms/public address communications. Nuclear safety and asset protection is provided through plant equipment layout (redundancy, separation, use of fire barriers), automatic detection and suppression appropriate to the type of hazard in the area. The design is supported by analysis such as fire hazard assessments and the Fire Probabilistic Safety Assessment, which along with fire protection codes and standards, identify constraints on station maintenance and operation. Designs under go a third party review to ensure changes do not unknowingly undermine fire safety. In addition, there is an annual third party review to identify any deficiencies. As the station is not self insured, there is also a yearly insurance inspection in which fire protection is a major focus.

Fire system and equipment performance is demonstrated through testing and monitored through system health monitoring. Fire system testing covers:

- Separation (barriers, fans & dampers, doors, penetrations)
- Detection (fire panels, detectors),
- Suppression (pumps, valves, sprinklers, deluge, foam, hoses, extinguishers etc)
- Egress (exit signs, emergency lighting, egress routes marked & unobstructed).

Fire system operation and maintenance is governed by a fire system operating manual. The fire system impairments manual identifies the necessary operational aspects, timelines for repair and compensatory measures to be taken.

3.4 Fire Protection, Continued

Fire Program Aspects (continued)

Fire prevention is achieved through:

- good housekeeping (clean as you go) approach in maintenance
- Control of transient combustibles
- Procedures for hot work
- Monthly area inspections
- Supervisory observations & daily manager in the field program (through use of the corrective action program).

Response to fires is provided on a 24/7 basis by a trained Emergency Response team backed up by local and regional fire departments and emergency preparedness plans.

The Emergency Response Team members undergo yearly physical testing, are provided the necessary equipment and are trained on:

- Fire plans & procedures
- Knowledge of hazards (permanent & temporary (e.g. impairments, transient combustible loading)
- Fire fighting exercises and drills.

Documentation

The high level documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
IR-71400-07	3	Fire Protection Program	2009 Aug. 13
PRR-00660-SU4	3	Provide Personnel Safety Services	2010 Feb. 16
ISP-03400-IS37	8	Control of Fire Hazards During Hot Work Activities	2011 May 10
ISP-03400-IS38	5	Control of Transient Combustibles	2010 Jan. 28
OM-71401-01	2	Fire Protection Impairments and Limitations	2011 Feb. 14

3.4 Fire Protection, Continued

Fire Prevention Performance

There have been 17 small fires over the time period of July 1, 2006 until June 30, 2011, mostly related to hot work and to a lesser extent electrical shorts, combustible fluid, and mechanical heating. In all cases the flames were small and were extinguished by personnel performing fire watches or workers in the immediate area. Although the Emergency Response Team was called upon for some incidents, their services were not required. While all instances of open flame are of a concern, the number is small given the amount of hot work and other work activities performed over the period.

Fire Program Improvements

Like the other Canadian Nuclear Power Stations, PLGS has an improvement project intended to bring the plant up to current fire protection codes and standards, which have evolved considerably since the station was designed. These improvements are outlined in *Section 1.14.3.3*.

4.0 Equipment Fitness for Service

4.1 Maintenance

Maintenance

The Maintenance organization supports the safe and reliable operation of the Point Lepreau Generating Station through the conduct of safe, quality, and efficient maintenance in a manner that is consistent with the goals of high Equipment Reliability combined with excellent Human Performance.

The Maintenance organization consists of three departments including Production Electrical, Production Mechanical and Facilities. These three (3) departments are aligned closely with Procurement Engineering, Systems Engineering, Programs Engineering, Work Management, and Outage Management to support equipment fitness for service requirements.

Foundational programs within the Maintenance Department include Foreign Material Exclusion, Supervisory Observation and Coaching, Pre-Job Briefings, Electrical Safety, Human Performance, and the Corrective Action Program.

The process establishes preventive and corrective maintenance activities to maintain systems, structures, and components that, if not maintained properly, could result in an unreasonable risk to:

- the health and safety of the public and plant personnel
- reliable plant operation
- station security
- the environment
- the design and safety basis
- resource and cost effectiveness.

This process defines a single conceptual approach to:

- determining the need for maintenance on systems, structures, and components,
- ensuring that maintenance is performed safely, effectively, and efficiently, and
- ensuring that work is effectively and efficiently coordinated to meet safety, quality, and production requirements.

This process applies to the development of the maintenance program for all systems, structures, and components at Point Lepreau Generating Station.

4.1 Maintenance, Continued

Documentation

The documents supporting this program are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-ME1	2	Establish Maintenance Programs	2011 Jan. 19
PRR-00660-MA2	2	Provide Planning Scheduling Services	2004 Apr. 06
PRR-00660-MA3	4	Perform Maintenance	2011 Apr. 06
SI-01365-T89	1	Establishing the Maintenance Program	2004 Sept. 23
SI-01365-P92	11	Maintenance Expectations and Practices	2010 Nov. 24
SI-01365-P93	1	Assigning and Preparing Maintenance Staff	2010 Apr. 09
SI-01365-P67	13	Performing Maintenance and Modifications Fieldwork	2011 Jan. 24
SI-01365-P22	5	Controlling Measuring and Test Equipment	2009 Oct. 02
SDP-01368-P01	0	Performing Formal Troubleshooting	2003 May 13
SDP-01368-P02	10	Foreign Material Exclusion	2011 Apr 08
SDP-01368-P08	7	Planning and Performing Pressure Tests and Leak Checks	2010 Dec. 10
SDP-01368-P09	4	Welding and Brazing	2010 Apr. 27
SDP-01368-P10	7	Performing Non-Destructive Examination	2010 Dec 15
SDP-01368-P11	5	Using Cranes and Hoisting Apparatus	2009 Nov. 13
SDP-01368-P12	2	Performing on-line Leak Suppression	2008 Jan. 23
SDP-01368-P50	0	Repairing or Modifying Fire Barrier Penetration Seals	2007 Nov. 15
SDP-01368-P16	0	Operating the Tool Cribs	2005 Sept. 15

4.1 Maintenance, Continued

Periodic Inspection

Periodic Inspection as it applies to the Point Lepreau Generating Station, is the mandatory inspection of pressure retaining systems and components including their supports. Periodic Inspections have been carried out prior to, and at intervals following the initial start-up of the plant. Periodic inspections are designed to provide assurance that unacceptable degradation in component condition and integrity has not occurred and the likelihood of a failure that could endanger the radiological health and safety of persons has not increased significantly since the plant was put in service.

Original equipment and components have undergone the required inaugural inspections and undergo periodic inspection by CSA Standards N285.4, Periodic Inspection of CANDU Nuclear Power Plant Components, and N285.5, Periodic Inspection of CANDU Nuclear Power Plant Containment Components. PLGS was shut down in March 2008 for station Refurbishment, the scope of which includes replacement of components requiring periodic inspection including PHT pressure tubes and fuel channel feeder pipes. New components requiring periodic inspections are integrated into the existing station Periodic Inspection Program including required inaugural inspections.

PLGS submitted Periodic Inspection Program documents updated to the 2009 edition of CSA N285.4 in April 2010 [Reference 1]. The submission excluded program documents for Supplementary Inspections as follows:

- Clause 12, Fuel Channel Pressure Tubes – Supplementary Inspection
- Clause 13, Fuel Channel Feeder Pipes – Supplementary Inspection
- Clause 14, Steam Generator Tubes – Supplementary Inspection.

PLGS had previously submitted equipment program documents to the CNSC for supplemental inspection of pressure tubes, feeders and steam generators to meet the requirements of the 2005 Edition of CSA N285.4. The Fuel Channel Management Plan, EPP-31100-FC01, was formally submitted to the CNSC by letter dated 20 December 2007. The Feeder Pipe Management Plan, EPP-33126-FP-01, and the Steam Generator Management Plan, 31100-SG01, were formally submitted by letters dated 23 March 2007 and 01 May 2006 respectively.

Upon review, the CNSC declined acceptance of the PLGS Periodic Inspection Program as updated to CSA N285.4-09 [Reference 2] citing deficiencies related to Clauses 3-11 and the failure to provide documents updated to meet the Supplementary Inspection Requirements of N285.4-09 Clauses 12, 13 and 14.

4.1 Maintenance, Continued

Periodic Inspection (continued)

PLGS has committed to submission of Periodic Inspection Program documents compliant with the requirements of the 2009 Edition of CSA N285.4, Clauses 1-14 inclusive, for review and acceptance by the CNSC within 90 days of achieving 100% sustained full power post-refurbishment.

PLGS maintains a formal program to meet the requirements of CSA N285.4-M90, Periodic Inspection of CANDU Containment Components. Inspections are performed and reported as specified in the Program documents to comply with the standard.

In November 2008, CSA N285.5-08 was published to replace CSA N285.4-M90. PLGS intends to update the current station program to fully meet the requirements of the 2008 Edition. The first phase of program revision will be a gap analysis between the current program and the requirements of the 2008 edition of N285.5. NBPN will submit the revised program to the CNSC for review and acceptance by 31 March 2013.

Documentation

The key documents supporting this program are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-ME1	2	Establish Maintenance Program	2011 Jan. 19
87-PIPD-03642-Vol.1	1	Periodic Inspection Program Containment Components – Background and Rationale	1993 Jan. 11
87-PIPD-03642-Vol.2	2	Periodic Inspection Program Containment Components – Inspection Program	1995 Jan. 27
EPP-03641-PIP1	2	Equipment Program Plan for Periodic Inspection Program (PIP) CSA N285.4	2010 Apr. 28
IR-03641-0016	1	Pt. Lepreau NGS Periodic Inspection Program (PIP) Program Update to CSA N285.4-05 and N285.4-09	2010-Apr. 07
EPP-31100-FC01	0	Fuel Channel Management Plan (Note 1)	2007 Dec. 19
EPP-31100-SG01	1	Steam Generator Management Plan (*Note 1*)	2006 Aug. 28
EPP-33126-FP01	1	Feeder Piping Management Plan (*Note 2*)	2007 Mar. 07

4.1 Maintenance, Continued

Documentation (continued)

***Note 1*:** CSA N285.4-05 is the governing standard for the current revision of this Equipment Management Plan. This program document is being revised to meet the requirements of the 2009 Edition of N285.4. The revised EPP will be submitted to the CNSC for review and acceptance within 90 days of achieving 100% sustained full power post-refurbishment.

***Note 2*:** CSA N285.4-05 is the governing standard for the current revision of this Equipment Management Plan. *EPP-33126-FP01*, Rev 1 will not be revised. The PIP requirements for feeder pipes, including the supplemental requirements of Clause 13, will be integrated into PIP Document *EPP-03641-PIP1* which is currently under revision per [Reference 2] for submission to the CNSC for review and acceptance within 90 days of achieving 100% sustained full power post-refurbishment.

References

1. Letter D. Parker to F. Rinfret, "PLGS Transition to CSA N285.4-09, AI 071206", 2010 Apr. 28.

2. Letter F. Rinfret to W. Parker, "PLGS Transition to CSA N285.4-09, AI 071206", 2010 Sept. 08.

Inaugural Inspection Reports

Inaugural Inspection Reports submitted to the Atomic Energy Control Board are referenced in Table 3.

Confirmatory Inspection Reports

Confirmatory Inspection Reports submitted to the Canadian Nuclear Safety Commission are referenced in Table 3.

Periodic Inspection Reports

Periodic Inspection Reports submitted to the Canadian Nuclear Safety Commission are referenced in Table 3.

4.1 Maintenance, Continued

Maintenance Procedures

A complete listing of current maintenance procedures is available on the NB Power Nuclear Drawing and Document Browser.

Inspection and Test Certificates

The Inspection and Test Certificates that were initially issued by the New Brunswick Department of Public Safety – Technical Inspection Services for equipment operation are stored in the Point Lepreau Generating Station vault.

The ongoing monitoring and inspection of pressure vessels is performed according to Station Instruction *EPP-03644-PV01, Equipment Program Plan for Pressure Vessels* (Rev. 1) 2008 July 14. PLGS maintains a history file for each vessel.

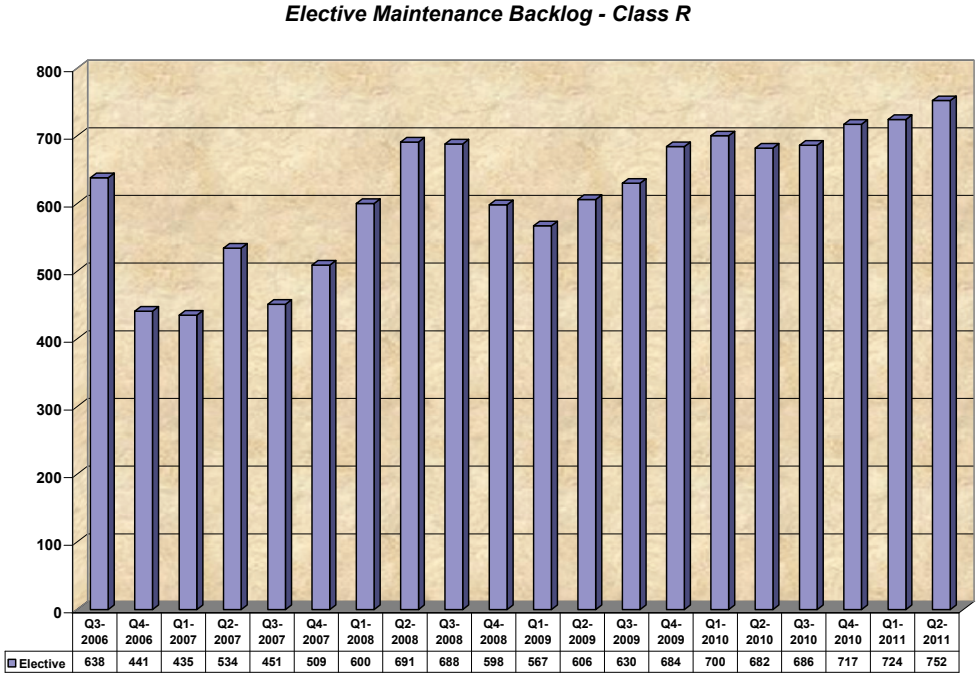
Outage Management Performance

Planned outages are conducted at the Point Lepreau Generation Station to perform inspections, and preventive and corrective maintenance of plant equipment that can only be done when the unit is off line. Outages are planned and executed focussing on nuclear, radiological, and industrial safety and schedule discipline. Outages involve many plant organizations and individuals working together and, as such, require high levels of coordination. The overall responsibility for this coordination has been assigned to the Outage Management Department.

Prior to the Refurbishment Outage the Point Lepreau Generating Station planned maintenance outage cycle frequency was 12 months. After the Refurbishment Outage the planned outage cycle will move to a 24 month frequency. This is being done to optimize overall outage durations and align with current industry best practices.

4.1 Maintenance, Continued

Elective Maintenance Backlog

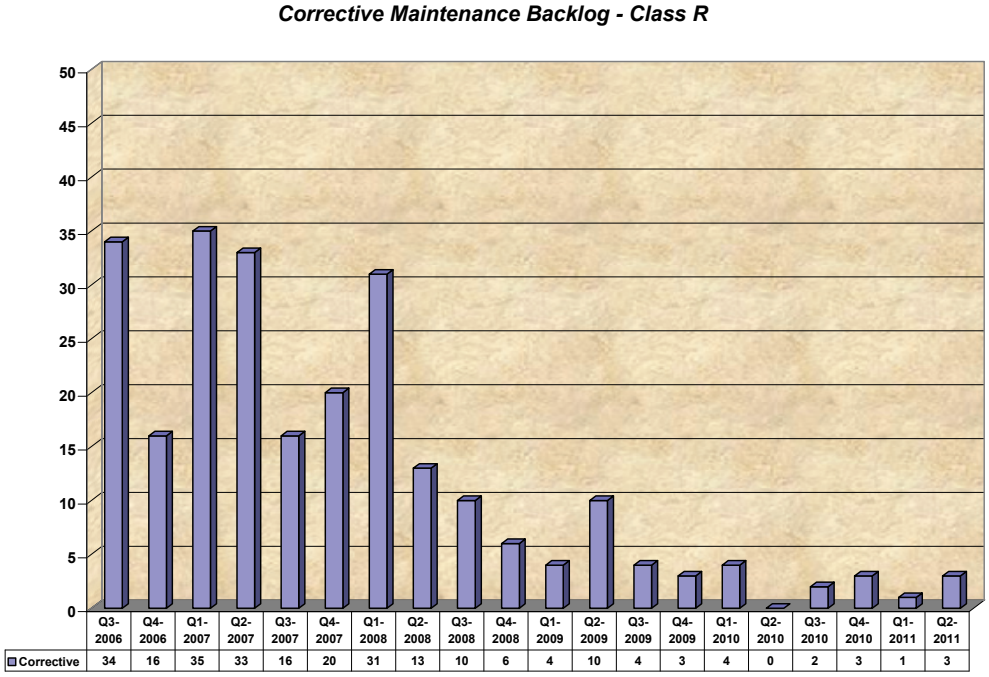


Elective maintenance is work required to address a deficiency on power-block systems, structures, or components (SSCs) in which the identified potential or actual degradation is minor and does not threaten the component's design function or performance criteria.

There has been an increase in the elective maintenance backlog during the Refurbishment Outage as the short-term station focus had been on completing orders which could only be done with the plant in the shutdown state.

4.1 Maintenance, Continued

Corrective Maintenance Backlog

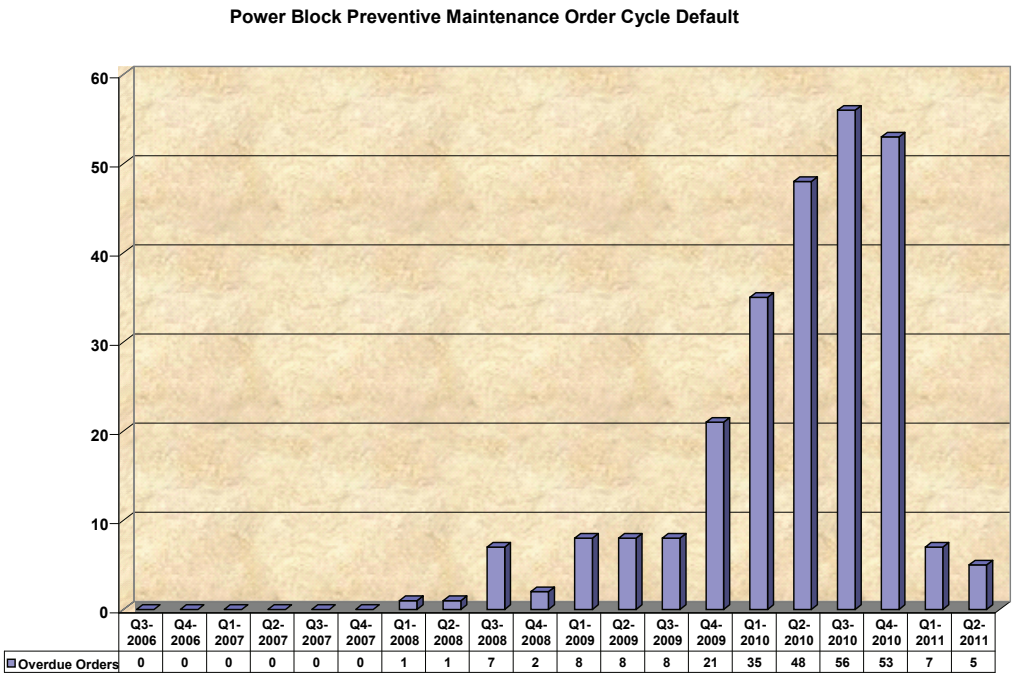


Corrective maintenance is work required to address a deficiency on power-block SSCs where the SSC has failed or is significantly degraded to the point that failure is imminent (within its operating cycle/PM interval) and no longer conforms to or is incapable of performing the SSC's design function.

There has been a decrease in the corrective maintenance backlog over the past few quarters primarily due to the completion of outstanding corrective maintenance orders and the reduction in the number of new corrective orders generated as there are many systems that are not in service during Refurbishment.

4.1 Maintenance, Continued

Power Block Preventive Maintenance Order Cycle Default



Cycle default preventive maintenance (PMs) orders are PMs on power-block SSCs that were not completed prior to their overdue date.

Prior to the Refurbishment Outage the number of PMs had been kept to a minimum. There has been a recent increase in the number of PMs in cycle default primarily due to the inability to complete this work due to plant configurations during Refurbishment.

4.2 Performance Engineering

System Health Monitoring

System Health Monitoring at Point Lepreau Generating Station has the following objective:

Ensure equipment health and reliability by providing a standard System Health Monitoring and Management process. Specifically, this entails:

4.2 Performance Engineering, Continued

System Health Monitoring (continued)

- A selection criteria and list of plant systems for inclusion in the program.
- A methodical approach to analyzing systems for critical equipment.
- A structured approach to establishing component degradation mechanisms.
- Establishing monitoring methods and activities to detect actual degradation mechanisms.
- Developing comprehensive System Health Monitoring Plans for each selected system.
- Routine reporting of system health.
- Continuous monitoring of an Equipment Reliability Index which reflects key areas of performance beyond those used for generation and system health alone. This indicator uses 16 key sub-indicators which have a weighted value to add up to 100 as the highest score. This program is aligned with other stations according to COG and EPRI Equipment Reliability Guidelines.

Station Process *ME-2, Monitor and Manage System Health* has been developed to define the above elements of the program and establish the appropriate responsibilities.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-06600-ME2	2	Monitor and Manage System Health	2011 Jan. 19
SI-01365-T54	5	System Health Monitoring	2007 Jan. 15
SDP-05000-02	3	System Health Monitoring Plan Preparation	2008 Aug. 01
SDP-01368-SHM1	0	Performing System Health Monitoring	2003 Oct. 14
SDP-05000-03	3	System Health Monitoring Field Walkdowns	2008 Aug. 01

4.2 Performance Engineering, Continued

Plant Life Management

The approach to plant life management at Point Lepreau Generating Station is based on the implementation of two core processes: *ME-2, Monitor and Manage System Health* and *ME-1, Establish Maintenance Programs*.

Through these processes, Point Lepreau Generating Station sets out the measures to prevent, limit, or mitigate the physical degradation of systems, structures, and components due to such aging mechanisms as corrosion, wear, vibration, mechanical forces, hydride blistering, heat, cold and radiation. Plant life and aging management are aspects of these station processes and are addressed specifically by the following station activities:

- Preventive Maintenance: Preventive measures designed to limit and manage the physical degradation of systems, structures and components due to aging mechanisms that could result in unacceptable risk to the health and safety of persons, to the environment, or to national security.

- Equipment Programs: Formal aging management programs to ensure that nuclear and non-nuclear systems, structures and components covered under the program are maintained within their design basis and are tested and inspected in compliance with applicable codes, standards and regulations.

- System Health Monitoring: A structured program to monitor and manage the condition and performance of equipment within station functional systems. Equipment and components are monitored and trended for functional readiness and degradation by system specialists through operating parameter surveillance and system walkdowns.

- Mandatory Surveillance: A program of surveillance and testing activities (e.g. special safety system testing) performed and reported at defined intervals mandated or claimed in relevant licenses, codes and standards, Safety Design Matrices, Probabilistic Safety Assessment or reliability analysis. A list of mandatory surveillance requirements is submitted in the "Annual Reliability Report".

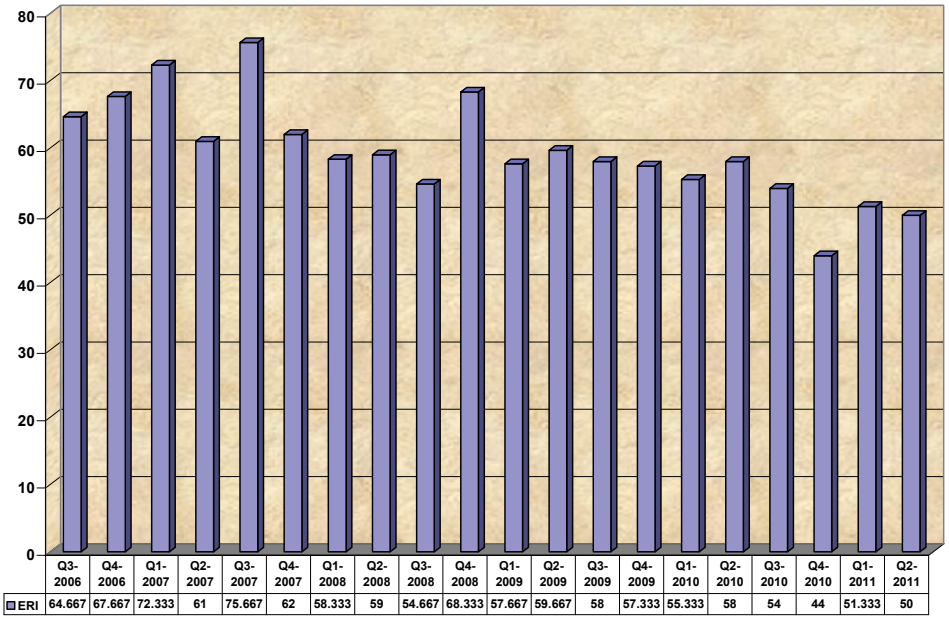
In addition to the aforementioned, on-going station activities, Point Lepreau Generating Station has performed a number of Plant Life Management studies, which include life assessments and reliability centered maintenance assessments of various structures, systems and components.

4.2 Performance Engineering, Continued

Plant Life Management (continued)

The Point Lepreau Generating Station plans to implement a station wide Aging Management Program under the guidance of CNSC Regulatory Document *RD-334, Aging Management for Nuclear Power Plants*, issued for use in June 2011. The first step will be development of a strategic plan for implementation based on a gap analysis between established station aging management programs and processes and the requirements set out in *RD-334*. The goal will be to develop an integrated station-wide aging management program which includes both nuclear and balance-of-plant systems, structures and components with safety-related function.

Equipment Reliability Index (ERI)



	Q3-2006	Q4-2006	Q1-2007	Q2-2007	Q3-2007	Q4-2007	Q1-2008	Q2-2008	Q3-2008	Q4-2008	Q1-2009	Q2-2009	Q3-2009	Q4-2009	Q1-2010	Q2-2010	Q3-2010	Q4-2010	Q1-2011	Q2-2011
ERI	64.667	67.667	72.333	61	75.667	62	58.333	59	54.667	68.333	57.667	59.667	58	57.333	55.333	58	54	44	51.333	50

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-ME1	2	Establish Maintenance Programs	2011 Jan. 19
PRR-00660-ME2	2	Monitor and Manage System Health	2011 Jan. 19

4.2 Performance Engineering, Continued

Documentation (continued)

Document Number	Rev.	Document Title	Date Registered
SI-01365-T23	10	Developing and Controlling the Mandatory Surveillance Program	2010 Dec. 14
SI-01365-T40	3	Enhanced Inspection of Secondary Side Pipework for Protection of the Main Control Room and Secondary Control Room	2002 Nov. 19
SI-01365-T54	5	System Health Monitoring	2007 Jan. 15
SI-01365-T89	1	Establishing the Maintenance Program	2004 Sept. 23
SDP-01368-MD06	0	Thermography Program	2002 Aug. 13
SDP-01368-TE01	0	Developing and Implementing Equipment Programs[2]	2004 Feb. 13
SDP-01368-TE02	1	Defining Preventive Maintenance	2004 Sept. 23
EPP-03641-PIP1	2	Equipment Program Plan for Periodic Inspection (PIP) CSA N285.4[3]	2010 Apr. 28
EPP-03646-FC01	0	Equipment Program Plan for Flow Accelerated Corrosion	2006 Aug. 04
EPP-03644-PV01	1	Equipment Program Plan for Pressure Vessels	2008 Jul. 14
EPP-21000-RB01	0	Reactor Building Management Plan	2011 Jun. 16
EPP-30834-RV01	0	Equipment Program Plan for Safety Relief Valves[2]	2004 Nov. 23
EPP-30839-MV01	0	Equipment Program Plan for Motorized Valves	2005 Jan. 19
EPP-30839-PV01	0	Equipment Program Plan for Air Operated Valves	2005 Nov. 30
EPP-31100-FC01	0	Fuel Channel Management Plan[2]	2007 Dec. 19
EPP-31100-SG01	1	Steam Generator Management Plan[2]	2006 Aug. 23
EPP-60010-EQ01	2	Environmental Qualification Program	2008 May 09

[2] Equipment Programs are now under development for station heat exchangers and station snubbers.

[3] Under Revision

4.3 Reliability

Reliability

Regulatory *Standard S-98, Reliability Programs for Nuclear Power Plants,* describes the expectations of a program to ensure that Systems Important to Safety are sufficiently reliable to mitigate the likelihood of severe core damage or large early radioactive releases following a postulated initiating event.

The Reliability Program at Point Lepreau Generating Station cuts across several processes, the most prominent effected being:

- *ME-2, Monitor and Manage System Health*
- *MS-3, Maintain Design and Safety Basis*
- *MA-2, Provide Planning and Scheduling Services*
- *OP-1, Control and Monitor Station Equipment*.

Information Report *IR-01500-12, Reliability Programs,* provides guidance on how these processes interface in support of the Reliability Program at Point Lepreau Generating Station. It also provides the overall program approach being applied, the technical elements falling within scope of the program, and guidance for those elements. The required work activities are documented in *Appendix B* of *IR-01500-12, Reliability Programs*.

Mandatory Surveillance

Systems Important to Safety are expected to perform to certain reliability criteria. To assure that the Systems Important to Safety meet these criteria, reliability analyses are produced to reflect the current design, operating, and maintenance practices. Surveillance, which is credited in these analyses, or otherwise committed for performance at regularly scheduled intervals, is termed Mandatory Surveillance. The Mandatory Surveillance Program includes activities to assure that mandatory tests of Systems Important to Safety are developed, scheduled, performed, reviewed, and reported.

A list of mandatory surveillance requirements is submitted in the *Annual Reliability Report*.

Documentation

The primary documents supporting the Mandatory Surveillance Program are:

Document Number	Rev.	Document Title	Date Registered
SI-01365-T23	10	Developing and Controlling the Mandatory Surveillance Program	2010 Dec 14
SI-01365-T89	1	Establishing the Maintenance Program	2004 Sept. 23
IR-01500-12	0	Reliability Program	2004 March 30

4.3 Reliability, Continued

Reliability Analysis

Reliability analyses of Systems Important to Safety are extracted directly from the Level 2 Probabilistic Safety Assessment (PSA), developed to meet the requirements of Regulatory Standard S-294, and includes all potential modes of failure that could adversely affect system safety performance. Those reliability analyses are used to show that these systems meet acceptable reliability criteria or are dispositioned to demonstrate that their impact on overall plant safety is acceptable. Surveillance frequencies represent the maximum mean interval within which the surveillance must actually be performed, where the actual performance intervals include appropriate scheduling tolerances as specified in program documentation.

The computerized reliability analyses are updated each year to include system changes and the latest site-specific failure data. These changes, and the corresponding impact on predicted unavailability or frequency of failure, are identified in the Annual Reliability Report.

The predicted unavailability of the Systems Important to Safety listed below are derived using fixed intervals for routine surveillance, and are compared against established (administrative and prescribed) system unavailability targets.

If the target for a safety function is exceeded, corrective actions are initiated to improve performance. Provided the predicted unavailability or predicted frequency of failure, as applicable, for a System Important to Safety is:

- maintained below the system unavailability target, or
- not increased beyond the value reported in the last Annual Reliability Report for those systems exceeding the unavailability target, or
- demonstrated (for a support system) to have negligible effect on the supported system predicted unavailability, then
- reliability claimed in the reliability analyses remains substantiated, and credited intervals may be adjusted as necessary (governed by station procedures and good reliability practice) to balance safety and reliability with operational considerations.

4.3 Reliability, Continued

Risk Indicators

Acceptance criteria for the PSA are presented below. The Level 1 limit and goal are presented as a frequency of occurrence, otherwise known as Severe Core Damage Frequency (SCDF). The Level 2 limit and goal are presented as a frequency of occurrence, but in this case the term is Large Release Frequency (LRF). For the PSA-Based Seismic Margin Assessment, the limits for the Level 1 and Level 2 PSA are presented in terms of seismic capacity, referred to as the HCLPF (High Confidence Low Probability of Failure), with units of 'g' acceleration due to gravity.

For the Internal Events, Fire and Flood PSA, the results at Level 1 and Level 2 are compared to the values listed below. The limit represents a threshold whereby a combined result above the limit would constitute an unacceptable level of risk. The region between the limit and the goal is an area which is acceptable, but efforts are expected to be made to reduce the level of risk on a cost-benefit basis. Achieving a frequency below the goal represents a satisfactory level of risk.

For the PSA-Based Seismic Margin Assessment, the limit corresponds to the Review Level Earthquake (RLE), and is a pass or fail threshold against which the resulting plant seismic capacity is compared. In this case, a HCLPF value higher than then the one listed below is satisfactory.

PSA LEVEL	INTERNAL EVENTS, FIRE AND FLOOD			PSA-BASED SEISMIC MARGIN ASSESSMENT	
	METRIC	LIMIT (Events/Year)	GOAL (Events/Year)	METRIC	LIMIT
LEVEL 1	Severe Core Damage	1E-04	1E-05	HCLPF	0.30g
LEVEL 2	Large Releases	1E-05	1E-06	HCLPF	0.40g

4.3 Reliability, Continued

Documentation

The Reliability Analysis reports listed below form a baseline reference only. The electronic reliability models were modified during development of the PSA, with all changes reported in the PSA document submissions, and further controlled changes to the electronic reliability models and data occur on a regular basis and are reported in the Annual Reliability Report along with the commensurate change in predicted unavailability or frequency of system failure.

The documents supporting the Reliability Analyses are:

Document Number	Rev.	Document Title	Date Registered
87RF-03611-AR-005	1	Fault Tree Analysis of Shutdown Systems 1 and 2	2008 Jun. 10
87RF-03611-AR-006	0	Fault Tree Analysis of Emergency Core Cooling System	2004 Oct. 26
87RF-03611-AR-015	0	Fault Tree Analysis for Containment Systems	2007 Dec. 20
87RF-03611-AR-021	0	Fault Tree Analysis for Emergency Power Supply System	2006 Aug. 08
87RF-03611-AR-002	0	Fault Tree Analysis for Electrical Distribution System	2006 Oct. 02
87RF-03611-AR-003	0	Fault Tree Analysis for Feedwater System	2004 Jun. 01
87RF-03611-AR-004	1	Fault Tree Analysis for Service Water Systems (SWS)	2006 Oct. 24
87RF-03611-AR-007	0	Fault Tree Analysis for Moderator System	2006 Apr. 18
87RF-03611-AR-008	0	Fault Tree Analysis for Shutdown Cooling System	2005 Nov. 07
87RF-03611-AR-013	0	Fault Tree Analysis for Pressure & Inventory Control System	2006 Oct. 02
87RF-03611-AR-016	0	Fault Tree Analysis for Setback and Stepback System	2006 Mar. 06
87RF-03611-AR-017	0	Fault Tree Analysis for EWS	2006 Jul. 05

4.3 Reliability, Continued

Documentation (continued)

Document Number	Rev.	Document Title	Date Registered
87RF-03611-AR-019	0	Fault Tree Analysis for Turbine Trip on Overspeed	2005 Dec. 14
87RF-03611-AR-022	0	Fault Tree Analysis for Instrument Air System	2006 Oct. 03
87RF-03611-AR-023	1	Fault Tree Analysis for Boiler Pressure Control System	2006 Sept. 14
87RF-03611-AR-024	0	Fault Tree Analysis for Fuel Handling System	2006 Oct. 12
87RF-03611-AR-028	0	Fault Tree Analysis for End Shield Cooling System	2006 Dec. 04
87RF-03611-AR-029	0	Fault Tree Analysis for HTT	2007 Apr. 23
87RF-03611-AR-032	0	Fault Tree Analysis for Make-Up System to Calandria Vault	2008 Oct. 24
IR-34980-01	0	Reliability Study for Annulus Gas System	1998 Dec. 30
IR-63720-03	0	Reliability Study for Automatic Gadolinium Addition	2000 Jun. 13
IR-63720-04	0	Executive Summary for LZC Light Water Drain Valves Reliability Study	2000 Jun. 13

4.4 Environmental Qualification

Environmental Qualification

The objective of the Environmental Qualification Program is to assure that required safety related equipment will not fail as a result of a harsh environment produced by Design Basis Accidents.

The scope of the program includes:

- identification of equipment and components that require Environmental Qualification,
- identification methods necessary to qualify the equipment and components to survive design basis accidents, and
- maintenance of environmentally qualified equipment and components for the life of the station.

Documentation

The following documents form the basis for the Point Lepreau Generating Station Environmental Qualification Program. They refer to the expected conditions at Point Lepreau Generating Station and the equipment that was considered by the designer to require Environmental Qualification.

Document Number	Rev.	Document Title	Date Registered Date
0087-68000-0003-001-DG-A	1	AECL - PLGS Qualifying Safety Related Electrical, Instrumentation and Control Equipment for Environmental Service Conditions	1975 Rev. 1: 2005
TDS-87-68000-013 DGS		AECL – Environmental Qualification of Safety Related Equipment	1982
DG XX 6800 4		Safety Related Systems Requirements for Environmental Service Conditions	1981
DGA-68000-0003-001	1	Qualifying Safety Related Electrical & Instrumentation & Control Equipment for Environmental Service Conditions	2011 Oct. 28

4.4 Environmental Qualification, Continued

Documentation (continued)

Document Number	Rev.	Document Title	Date Registered Date
IR-68000-01		Environmental and Seismic Qualification Safety Related Electrical Equipment	1986
IR-68000-12		Derivation of Environmental Qualification Accident Test Profile	Rev.1: 1999 Rev.2: 2006
IR-60010-50		Normal Environmental Conditions	1998 Rev.1: 2006
IR-60010-82		EQ Identification of Harsh Environmental Areas Outside the Reactor Building	2002 Rev.1: 2006
TD-E87-68000-210-005		AECL - Review of New Environmental Qualification Requirements (Manual)	1983 Aug. 02
SI-01365-P65		Establishing Equipment Environment Qualifications	Rev. 2, 2006

Environmental Qualification Process Elements

The four elements of the environmental qualification process at Point Lepreau Generating Station are:

- Safety Analysis
  This is the set of documentation which defines the safety function, mission time and relevant design basis accident for the Environmental Qualification equipment.

- Qualification Verification
  This is the process of analysis and/or testing to demonstrate the qualification of the equipment.

- Field Implementation
  This is the process of fieldwork required to upgrade the equipment to the Environmental Qualification status.

- Preservation of Environmental Qualification
  This is the process of maintaining the Environmental Qualification status for the life of the station.

4.4 Environmental Qualification, Continued

Environmental Qualification Process Elements (continued)

Point Lepreau Generating Station is primarily in a Preservation of Environmental Qualification status at the present time. The other phases will only apply to new designs, since we have completed our Environmental Qualification of the station.

Documentation

The process of qualifying systems, equipment and components at the Point Lepreau Generating Station has followed a rigidly defined and structured program in which the procedures and sequence of activities have been specified in detail in *SI-01365-P65, Equipment Environmental Qualification*.

The EQ list was originally derived by AECL, but as the EQ program progressed and concepts were refined, the AECL list was revised based on current safety analysis requirements. The new EQ list and its derivation process and associated design basis are described in the following information reports.

Document Number	Rev.	Document Title	Date Registered
IR-60010-60	2	Derivation of EQ Requirements for the Emergency Core Cooling System (ECC)	2010 Sept. 27
IR-60010-75	1	Derivation of EQ Requirements for the Airlock System and the Containment Sealing Door	2011 Mar. 29
IR-60010-77	0	Derivation of EQ Requirements for the Fuel Handling System	2004 Jun. 21
IR-60010-89	0	Derivation of EQ Requirements based on EOP/APOP	2004 Jun. 28
IR-60010-92	1	Derivation of EQ Requirements for the Dousing System	2010 Oct. 21
IR-60010-108	1	Derivation of EQ Requirements for Containment Isolation System, Local Air Coolers, and EWS/BMW	2011 Jan. 20
IR-60010-109	1	Derivation of EQ Requirements for SDS #1	2011 Aug. 27
IR-60010-110	1	Derivation of EQ Requirements for the Shut-Down Cooling System	2011 Sept. 23

4.4 Environmental Qualification, Continued

Documentation (continued)

Document Number	Rev.	Document Title	Date Registered
IR-60010-119	1	Derivation of EQ Requirements for SDS #2	2010 Oct. 21
IR-60010-120	0	Derivation of EQ Requirements for the Heat Transport System	2004 Jun. 18
IR-60010-130	3	Derivation of EQ Requirements for the Boiler Auxiliaries	2011 Dec. 01
IR-60010-133	1	Derivation of EQ Requirements for Main Moderator System and Moderator Cover Gas System	2011 Apr. 06
IR-60010-134	3	Derivation of EQ Requirements for the Recirculating Cooling Water (RCW) System	2011 Mar. 10
IR-60010-135	0	Derivation of EQ Requirements for Reactor Regulating System (RRS)	2004 Jun. 17
IR-60010-136	1	Derivation of EQ Requirements for the Instrument Air System	2009 Nov. 30

4.5 Chemistry Control

Chemistry Control

The Chemistry Control program is the set of chemical specifications supported by chemistry monitoring, analysis, and procedures, ensuring system chemistry is controlled within specifications to:

- optimize the performance of station systems,
- prevent degradation of system components to avoid safety issues, and
- reliably achieve design service life.

This applies to station systems containing liquids, steam, and gases, as well as online and laboratory chemical analysis systems that support station chemistry control.

4.5 Chemistry Control, Continued

Chemistry Control (continued)

The Chemistry Control program includes the following elements:

- Chemistry specifications are defined in operating manual *OM-78210, Plant Chemistry Control*.
- The design basis for chemistry control requirements and associated specifications are defined in the following technical basis documents:
  - *87-03081-TBD-002, Chemistry Control for the Moderator and Auxiliaries Including Liquid Injection Shutdown System*
  - *87-03081-TBD-003, Chemistry Control for the Primary Heat Transport System*
  - *87-03081-TBD-004, Steam Cycle Chemistry Control*
  - *87-03081-TBD-005, Reactor Auxiliary Systems Chemistry Control*
  - *87-03081-TBD-006, Service Water Chemistry Control*.
- Chemistry parameters are monitored and controlled to assure timely detection and correction of abnormal conditions.
- Chemistry data associated with instrumentation and process systems is reviewed and evaluated to identify chemistry control observations, performance characteristics, measurement uncertainties, analytical errors and long term trends.
- Bulk and laboratory chemicals, corrosive and cleaning agents, and other hazardous consumable products are effectively controlled. Handling, storage, labeling, and use are in accordance with station instruction *SI-01364-P80, Handling and Storing Hazardous Materials Chemicals* and station departmental procedure *SDP-01368-A23, Workplace Hazardous Materials Information System (WHMIS)*.
- Consumable materials that may subject process components and equipment to degradation are controlled in accordance with technical basis document *87-03081-TBD-010, Technical Basis Document for Consumable Materials Used on Components and Equipment Susceptible to Degradation*.

Procedures, equipment, and materials used for chemical analyses, sampling, and control, are maintained to assure the accuracy of analytical and process measurements.

4.5 Chemistry Control, Continued

Chemistry Control (continued)

Chemistry performance indicators are compiled on a monthly basis to track chemistry control compliance and instrumentation availability, domestic water quality, and human performance trends. The performance indicators include: CNSC Chemistry Index, CNSC Chemistry Compliance Index, WANO Chemistry Indicator, Water Treatment Plant Clarifier Outlet Turbidity Indicator, Gas Analysis System Availability Indicator, and Chemistry Group Device Mispositioning Index.

For the period July 1, 2006 to March 31, 2008, the CNSC Chemistry Index average was 98.93 and the WANO Chemistry Indicator average was 1.00. For the period July 1, 2006 to June 30, 2008, the CNSC Chemistry Compliance Index average was 99.31. During the station refurbishment period beyond the dates stated to June 1, 2011, these indicators were not applicable.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
OM-78210	13	Plant Chemistry Control	2008 May 05
PRR-00660-OP2	2	Control Chemistry	2011 Feb. 01
SDP-01368-A23	2	Workplace Hazardous Materials Information System (WHMIS)	2011 Jan 14
SI-01365-P94	1	Controlling Station Chemistry	2005 Jan. 06
SI-01365-P80	3	Handling and Storing Hazardous Materials	2010 Apr. 21
87-03081-TBD-002	1	Chemistry Control for the Moderator and Auxiliaries Including Liquid Injection Shutdown System	2009 Apr. 28
87-03081-TBD-003	1	Chemistry Control for the Primary Heat Transport System	2009 Apr. 28
87-03081-TBD-004	1	Steam Cycle Chemistry Control	2009 Apr. 30
87-03081-TBD-005	1	Reactor Auxiliary Systems Chemistry Control	2009 Apr. 29
87-03081-TBD-006	0	Service Water Chemistry Control	2009 Apr. 29
87-03081-TBD-010	1	Technical Basis Document for Consumable Materials Used on Components and Equipment Susceptible to Degradation	2010 Jun. 18

5.0 Emergency Preparedness

Emergency Preparedness

The Emergency Preparedness program is described in *SU-5, Provide Emergency Preparedness* process and associated documentation. The process addresses radiological and conventional emergencies, including severe accidents (events that are beyond design basis for response).

Major components of the process are as follows:

- assist off-site authorities in planning and preparing to limit the effects of a release,
- notify off-site authorities of an impending or actual release,
- report information to off-site authorities during and after a release,
- assist off-site authorities to deal with the effects of a release,
- test the implementation of procedures utilized to prevent or mitigate the effects of a release,
- prepare response schemes,
- document roles and responsibilities both on and off-site,
- provide facilities and equipment,
- provide communications equipment,
- conduct an exercise and drill regime,
- provide an emergency response team,
- conduct effectiveness audits of the program, and
- assist in business continuity planning and preparations (pandemic planning, severe weather preparations, other major emergencies).

Documentation

On-site Emergency Preparedness is described in the following documents:

Document Number	Rev.	Document Title	Issue Date
PRR-00660-SU5	2	Provide Emergency Preparedness	2006 Oct 23
SDP-01368-EP01	0	Preparing the Basis for Emergency Planning	2004 Jan. 06
SDP-01368-EP02	2	Preparing and Implementing Emergency Procedures, Drills and Exercises	2011 Aug. 25
SDP-01368-EP03	1	Maintaining the Contingency Roster	2010 Aug. 10

5.0 Emergency Preparedness, Continued

Documentation (continued)

Document Number	Rev.	Document Title	Issue Date
SDP-01368-EP04	6	Organizing and Maintaining the Emergency Response Team	2010 Dec. 21
IR-78600-02	0	Technical Planning Basis-Radiation Emergency	2004 Mar. 11
IR-78600-03	0	Technical Planning Basis – Medical Alerts and Emergencies	2005 Apr. 28
IR-78600-04	0	Technical Planning Basis – Chemical Emergencies	2005 Nov. 07
IR-78600-06	0	Pandemic Response Plan	2009 Apr. 28
IR-78600-SAMG-11	0	Technical Basis for CANDU Severe Accident Management Volume 1 (Confidential)	2007 Nov. 26
IR-78600-SAMG-12	0	Technical Basis for CANDU Severe Accident Management Volume 2 (Confidential)	2007 Nov. 26
SI-01365-EP01	2	Preparing and Maintaining the Emergency Response Plan	2010 Nov. 5
SI-01365-EP02	0	Emergency Response Plan	2004 Aug 30

Off-Site Emergency Preparedness is described in the New Brunswick Emergency Measures Organization (NBEMO) Off-site Plan Volume #2.

6.0 Environmental Performance

6.1 Environmental Protection

Environmental Protection

The Environment Committee of the Board of Directors meets regularly, and the Director of Environmental Affairs provides regular updates on environmental issues. The Environment Committee provides relevant details to the Board of Directors at regular meetings.

NB Power Nuclear is involved in a number of industry wide programs and initiatives including:

- National Pollutant Release Inventory (under Canadian Environmental Protection Act),
- The Environmental Commitment and Responsibility Program.

The Point Lepreau Generating Station site has been identified as a Canadian Important Bird Area under the Migratory Birds Act.

Corporate Policies

The following Corporate Policies are listed as NB Power Requirements listed in the *SU-2, Provide Environmental Services* process and govern environmental policy issues at Point Lepreau Generating Station:

- Environmental Policy (G-4),
- Reporting Environmental Spills (G-7),
- Purchasing Environmentally Safe Products (MA-11).

6.1 Environmental Protection, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU2	4	Provide Environmental Services	2011 Feb. 18
RD-01364-L1	2	Derived Emission Limits for Radionuclides in Airborne and Liquid Effluents	1996 Jan. 19
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26
RD-01364-L15	7	Operational Environmental Radiation Monitoring Program	2000 Jan. 05
79100-2011-001-QTR2-A-00	0	Solid Radioactive Waste Management Facility Quarterly Report Second Quarter 2011	2011 Aug. 11 (Quarterly)
ACR-07000-2009	0	Environmental Radiation Monitoring Data 2009	2010 Apr. 30 (Yearly)
SDP-01368-A23	2	Workplace Hazardous Material Information System (WHMIS)	2011 Jan. 14
SI-01365-P80	3	Handling and Storing Hazardous Materials	2010 Apr. 21

ISO 14001

Point Lepreau Generating Station has implemented an Environmental Management System (EMS) and has been certified as compliant with ISO 14001. It was re-registered in the fall of 2010 by BSI Management Systems.

NB Power Nuclear's Corporate Environmental Policy drives the elements of the Environmental Management System from the top level of the organization. The Corporate Environmental Policy was signed and issued by the President and Chief Executive Officer on August 6, 2004.

The Environmental Management System considers all conventional and radiological activities, including contractors', which may create an impact on the environment.

Point Lepreau Generating Station has identified Significant Environmental Aspects and developed objectives and targets for continual improvement under the Environmental Management System. An Environmental Management System Coordinator tracks day to day performance.

6.1 Environmental Protection, Continued

ISO 14001 (continued)

As part of maintaining its accreditation, the station is audited annually by its ISO Registrar. The auditors randomly check how Point Lepreau Generating Station's Significant Environmental Aspects are being maintained. Findings of the auditors are reviewed with station management. Major findings, if identified, must be resolved in a specific time frame, usually determined by the auditors. Every three years, the station undergoes an ISO re-registration audit.

In addition, issues raised through either regulatory or station initiatives may be tracked through the Environmental Management System. Specifically, in 1999/ 2000 an Ecological Effects Review (also known as a Ecological Risk Assessment) was undertaken:

- to demonstrate that General Nuclear Safety and Control Regulations 12.1(f) is being met, and
- to support the licence renewal process.

The Ecological Effects Review did not identify any major issues.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
SI-01365-P101	3	Developing and Maintaining The Environmental Management System	2011 May 18
IR-07300-02	3	PLGS Ozone Depleting Substances and Other Halocarbons Regulations	2010 Oct. 06
SI-01365-A78	5	Performing Outgoing Shipments	2007 Aug. 15
0087-07020-7000-001-ENA-A-01	1	Point Lepreau Ecological Effects Review Final Report	2007 Apr. 04

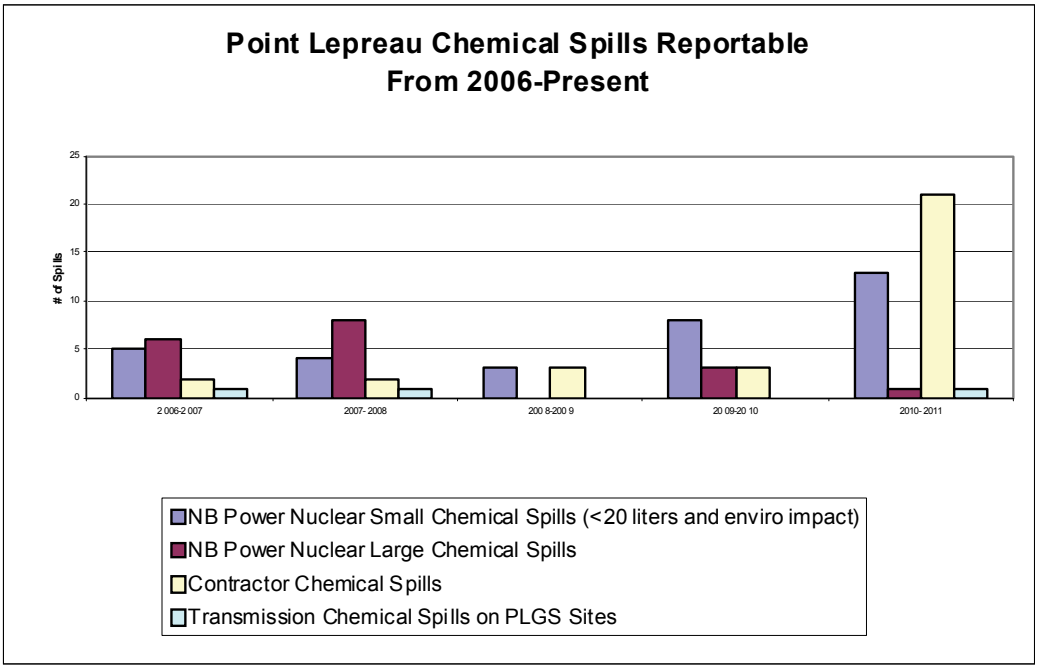
6.1 Environmental Protection, Continued

Performance Metrics

Chemical Spills

PLGS tracks the spills that occur on the property and breaks them down into the following categories: Small Spills (<20L), Large Spills (>20L), Contractor Spills and Transmission Spills. Reasoning for the 20L breakdown is due to the timeline for the reportability aspect, either Emergent or within 24hrs. The overall number of spills reported on the site remained steady since 2006, when tracking was initiated, until 2009. The total amount of spills reported on site increased dramatically in 2010/2011. This doesn't necessarily indicate a negative trend, as it demonstrates both PLGS and Contract staff's environmental awareness and the requirement to report spills as they occur. The attached graphs support these findings.

The New Brunswick Department of Environment issues PLGS an Approval to Operate which deals with releases to water through various effluent streams. If a condition is violated, a report is required to be sent to the Department of Environment in the form of *Form # PL-0590, Environmental Contingency Report*. Spills are also captured, and reported through these forms. The attached indicators show the trends from 2006-2010 on an annual basis for reports that have been sent from PLGS. PLGS operated under Approval to Operate I-5350, up until May 1, 2011, at which time PLGS's Approval was split to two separate Approvals. I-7479 for the Industrial Wastewater and I-7480 for Domestic Wastewater. While the administrative references changed the limits reported remain the same.



6.2 Effluent and Environmental Monitoring

Liquid Waste Management

Radioactive liquid wastes from various systems are routed to storage tanks in the Service Building. The contents of the tanks are sampled and analyzed for radioactivity prior to release into the station cooling water discharge. Provisions exist to reduce activity levels in the wastewater, if required. Discharge from the tanks is monitored and controlled to ensure that the release levels do not exceed operational targets, which are significantly below the Derived Emission Limits.

The bulk of waste oil generated at Point Lepreau Generating Station is inactive in nature and is disposed of through approved waste management agencies (off site) in accordance with provincial and federal guidelines. Waste oil containing low levels of radioactivity may be disposed of by burning in the Auxiliary Boiler as approved by the Canadian Nuclear Safety Commission as well as the New Brunswick Department of Environment. Activity in the oil is measured prior to burning, and emissions are added to other environmental emissions to assure that the total emissions are accounted for and reported.

Documentation

The documents supporting this process are:

Document Number	Rev	Document Title	Date Registered
RD-01364-L1	2	Derived Emission Limits for Radionuclides In Airborne and Liquid Effluents	1996 Jan. 19
PRR-00660-OP-3	1	Control Effluents	2011 Feb. 01
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26
SI-01365-L20	0	Online Monitoring and Control of Liquid and Airborne Effluents	2003 Dec. 23
OM-79210	15	Radioactive Liquid Waste Management	2011 Feb. 24
SI-01365-P102	5	Controlling Waste	2011 Aug. 10
RD-01364-L15	2	Operational Environmental Radiation Monitoring Program	1999 Dec. 15

6.2 Effluent and Environmental Monitoring, Continued

Gaseous Waste Management

Ventilation air from the Reactor Building and Spent Fuel Bay is filtered through high efficiency particulate air filters and charcoal filters prior to discharge to the exhaust stack. Exhaust from other areas, which have potentially contaminated ventilation air, is also routed to the stack after filtration by high efficiency particulate air filters. Some areas of the Reactor Building utilize the Vapour Recovery System to reduce the tritium content in the air, which results in lower emissions. The Containment Isolation system will prevent the release of Reactor Building air if abnormal gamma activity is detected in the airflow. Emissions are monitored continuously to alert operators to unanticipated changes. Samples from the stack monitor are analyzed in detail to verify that emissions do not exceed the operational targets, which are more restrictive than regulatory limits.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-OP3	1	Control Effluents	2011 Feb. 01
RD-01364-L1	2	Derived Emission Limits for Radionuclides in Airborne and Liquid Effluents	1996 Jan. 19
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26
SI-01365-L20	0	Online Monitoring and Control of Liquid and Airborne Effluents	2003 Dec. 23
OM-67883	19	Gaseous Effluent Monitor	2011 Aug. 05

6.2 Effluent and Environmental Monitoring, Continued

Provincial Licences

The following Approvals and Licences, issued by the New Brunswick Government, are in effect.

Regulation	Approval No.	Expires
Regulations 97-133, Clean Air Act	I-6570 Air Quality Operating Licenses	2013 Nov. 30
Regulation 87-126, Clean Environment Act	Domestic Wastewater Treatment System Industrial Wastewater Treatment System	2016 Apr. 30 2016 Apr. 30
Regulation 87-97, Clean Environmental Act	2984 Petroleum Storage Site Licence	2011 Sept. 30
Section 90, Electricity Act	Electricity Act Licence (Generator)	2014 Mar. 31

Effluent Monitoring Program

The Derived Emission Limits (DEL) for the station are based on the 1987 version of CSA Standard N288.1. A revision to meet the current N228.1 is planned for December 2012.

Effluent emissions from the station have remained low throughout the licensing period. Airborne releases averaged 3.0E-2% DEL from the start of quarter one 2006 to the end of quarter two 2011, with lower activity measured during Refurbishment as short-lived nuclides have decayed and heavy water systems are laid up. Liquid emissions averaged 3.8E-2% DEL during this period, with a peak of 1.4E-1% in 2008 due to flushing of the moderator system.

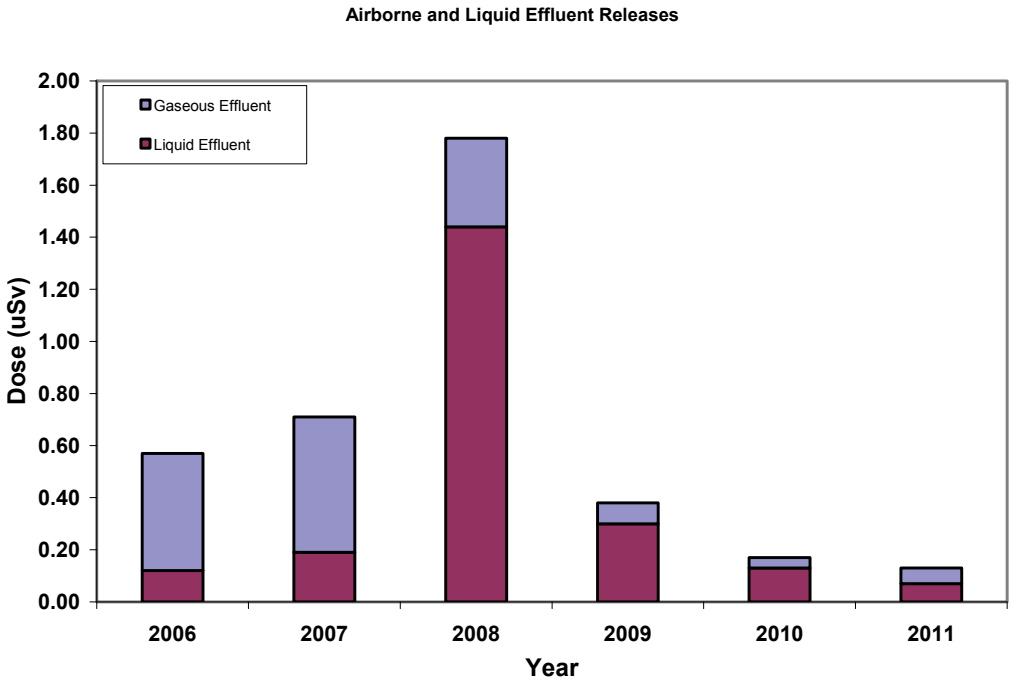
Environmental Radiation Monitoring Program

The environmental radiation monitoring program assesses the radiological impact of the station and the Solid Radioactive Waste Management Facility on the environment and the public. Monitoring results are submitted in the annual compliance report to the Canadian Nuclear Safety Commission.

The estimated dose to the critical groups in the public averaged 0.3 uSv from airborne emissions and 0.4 uSv from liquid emissions from the start of quarter three 2006 to the end of quarter two 2011. These estimates are derived from the measured effluent releases in % DEL. The annual compliance report for the environmental radiation monitoring program reports airborne dose estimates that are lower than the effluent estimates. For the environmental program estimate, internal dose from C-14 emissions is based on a cow herd at the actual distance of 40 kilometres, rather than the conservative distance of 1.5 kilometres that is used for DEL calculations.

6.2 Effluent and Environmental Monitoring, Continued

Environmental Radiation Monitoring Program (continued)



Documentation

The documents supporting this program are:

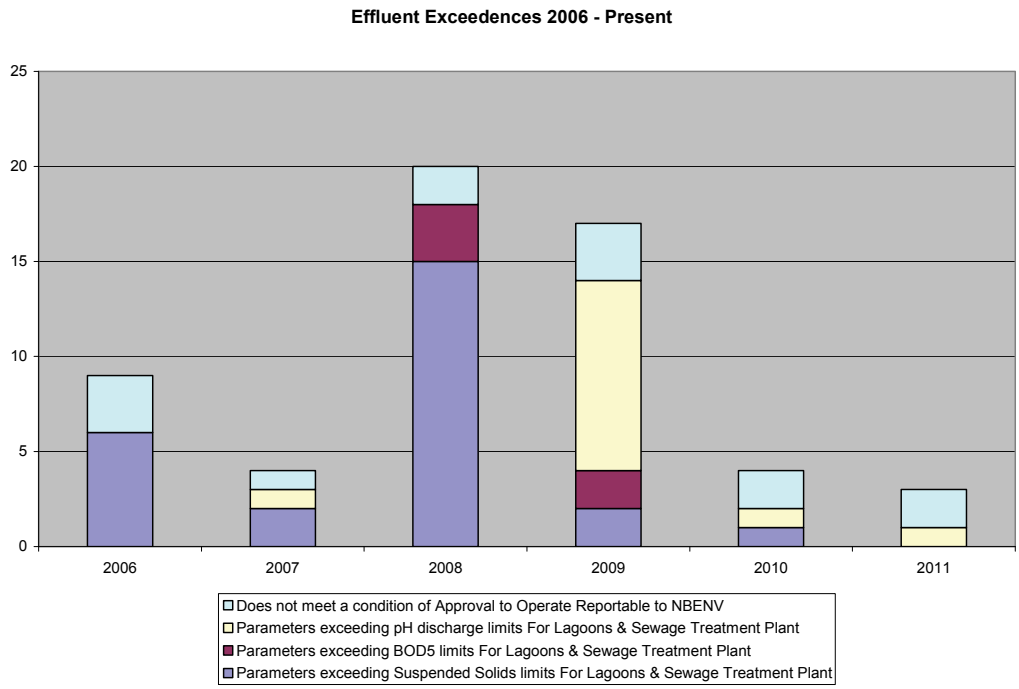
Document Number	Rev.	Document Title	Date Registered
RD-01364-L1	2	Derived Emission Limits for Radionuclides in Airborne and Liquid Effluents	1996 Jan. 19
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26
79100-2011-001-QTR2-A-00	0	Solid Radioactive Waste Management Facility Quarterly Report Second Quarter 2011	2011 Aug. 11 (Quarterly)
RD-01364-L15	7	Operational Environmental Radiation Monitoring Program	2000 Jan. 05
ACR-07000-2010	0	Environmental Radiation Monitoring Data 2010	2011 Apr. 29 (Yearly)
SI-01365-P80	3	Handling and Storing Hazardous Materials	2010 Apr. 21
SDP-01368-A23	2	Workplace Hazardous Material Information System (WHMIS)	2011 Jan. 14

6.2 Effluent and Environmental Monitoring, Continued

Performance Metrics

Effluent Exceedences

Although Effluent Exceedences are also reported through the *Form # PL-0590, Environmental Contingency Report*, a separate indicator is present to track the trend of these releases. This indicator narrows the releases down to the following categories: Suspended Solids exceedence, Biological Oxygen Demand Exceedences, pH Exceedences and "Other" Approval to Operate Exceedences. The parameters that define what PLGS release criteria are for both the Inactive Lagoons as well as the onsite Domestic Sewage Treatment Facility are listed in our Approval to Operate I-5350 issued by the New Brunswick Department of Environment. The attached graphs show these trends from 2006 to present. Effective 2011/05/01, Approval to Operate I-5350 issued through the New Brunswick Department of Environment was replaced with two separate Approvals to Operate, I-7479 for the Industrial Wastewater and I-7480 for Domestic Wastewater.



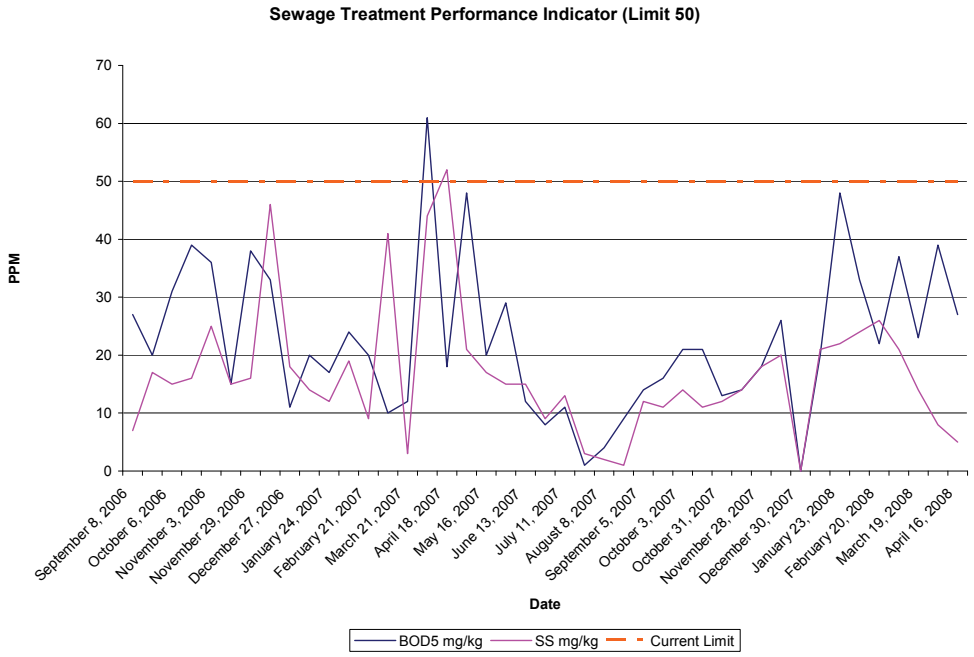
6.2 Effluent and Environmental Monitoring, Continued

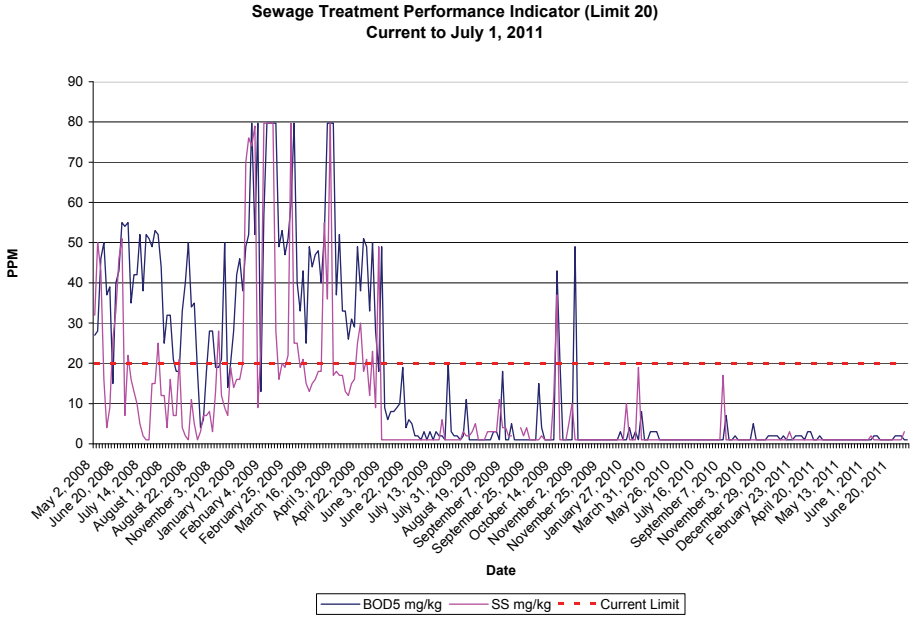
Sewage Treatment Plant Performance

The onsite Domestic Sewage Treatment Facility has a trend developed to capture the Biological Oxygen Demand (BOD5), Total Suspended Solids (TSS) and pH on the effluent as an indicator of performance for the facility. Prior to May 1, 2008, the reporting limits for the effluent were set at 50 ppm for both TSS and BOD5, after May 1, 2008 the discharge limits dropped to 20ppm for both. As per the indicators trend, the Sewage Treatment Facility was taxed to meet these limits, even when at 50ppm with 650 people on site. The facility is sized to handle up to 700 people and when the Refurbishment Outage began, site population rose to over 2,000 people which led to a continuous exceedence throughout the summer of 2008. This resulted in the requirement to modify the facility, which was done in the form of installing a Membrane Bioreactor filtration unit, which ensured results continuously reading around 1ppm to negligible. The attached graphs show this trend.

6.2 Effluent and Environmental Monitoring, Continued

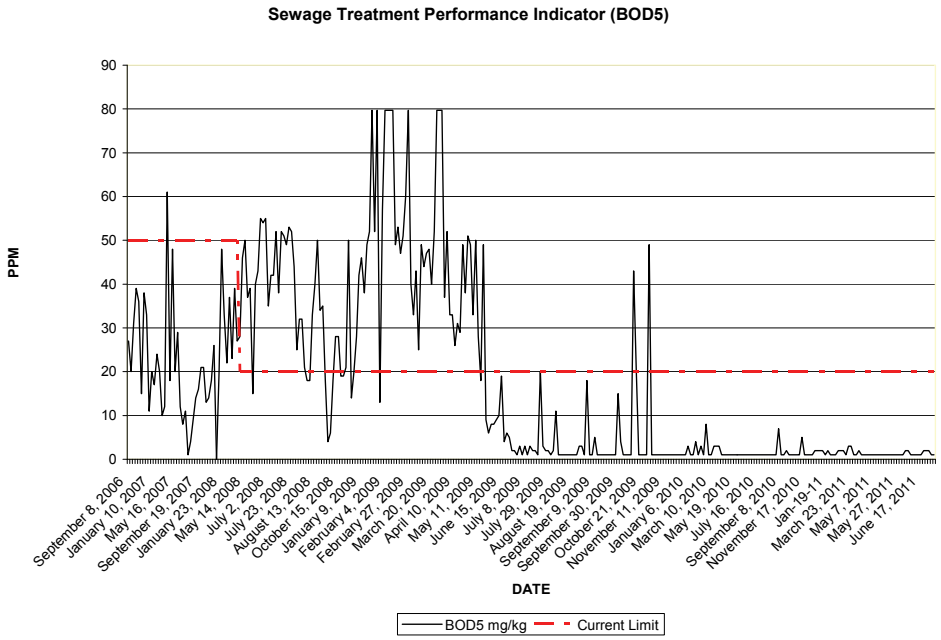
Sewage Treatment Plant Performance (continued)

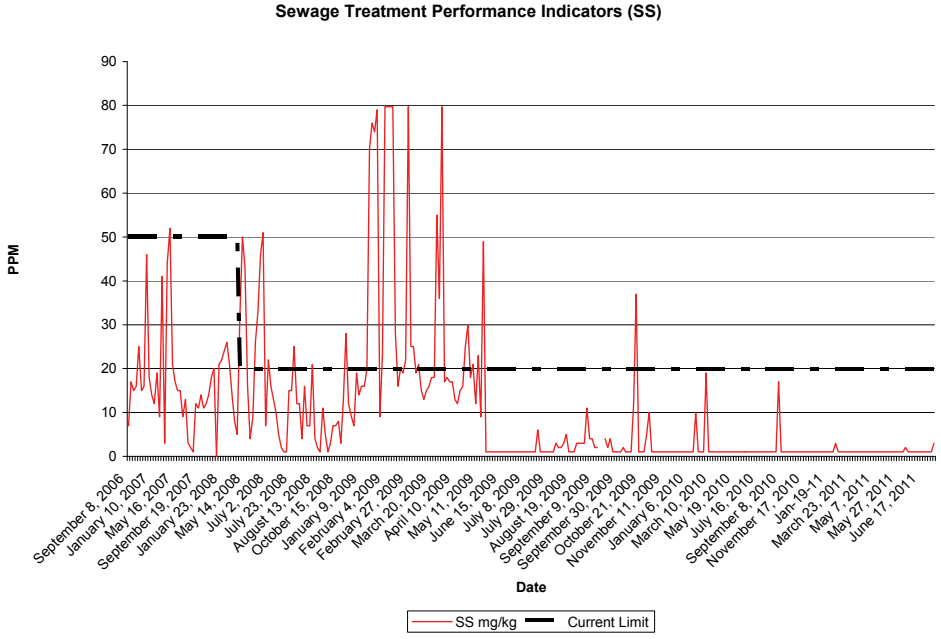




6.2 Effluent and Environmental Monitoring, Continued

Sewage Treatment Plant Performance (continued)





7.0 Radiation Protection

7.1 Radiation Protection

Radiation Protection

Radiation protection and ALARA requirements are also incorporated in detailed work plans, and where appropriate, in job specific ALARA plans and radiation exposure permits (REPs). These plans are developed with input from experienced radiation protection staff, and are approved by NB Power. In the field, the radiation control group through dedicated protection assistants, provide guidance and support to the workers to allow the work to be completed safely and in accordance with ALARA.

Individual and collective doses are being well managed, in spite of some refurbishment activities taking longer than originally planned and the resultant increase in the overall outage duration. Individual doses remain well below any administrative or legal limits - the single highest dose received by an individual in 2010 was 11.9 mSv while 90% of the workers received less than 1.5 mSv. Anticipated collective dose for the outage has increased due to the outage extension, tooling issues and refinement of the manpower estimates for the required work. The collective dose for the retube and refurbishment portion of the outage is expected to be approximately 12.7 p-Sv.

During the refurbishment outage, the radiation protection program has adapted successfully to address several issues, including:

- Clean up of highly contaminated tools such as the volume reduction system.
- Anticipating and managing alpha contamination with no significant radiation dose issues.
- Managing higher number of people on dose records than anticipated prior to the outage.

In summary:

- All doses to individuals have been within regulatory limits.
- Collective doses to workers are being maintained as low as reasonably achievable, noting that the extension of the outage has resulted in a re-estimate of the total dose for the project to be higher than originally anticipated.
- The potential for spread of contamination has been well controlled.
- Radiological releases to the environment are consistent with that expected for the outage and remain well within regulatory limits.
- Conditions associated with the environmental assessment and follow up actions have been met.

7.1 Radiation Protection, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU4	3	Provide Personnel Safety Services	2010 Feb. 16
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26
IR-03541-03	1	Personnel Dosimetry Services Program	2009 Oct. 01
SI-01365-A11	10	Radiation Protection Qualifications	2002 May 22
IR-03541-04	0	ALARA Program	2008 Jul. 02
IR-03400-02	1	Respiratory Protection Program	2011 June 07
PRR-00660-SU12	5	Provide Materials and Services	2010 Dec. 07
SI-01365-A78	5	Performing Outgoing Shipments	2007 Aug. 15
IR-03541-04	0	ALARA Program	2008 Jul. 2

Performance

Effective Doses to Workers

The following table describes doses to workers at PLGS over the current licensing period:

AVERAGE AND MAXIMUM EFFECTIVE DOSES TO WORKERS						
Dose Statistic	**2006**	**2007**	**2008**	**2009**	**2010**	**Regulatory Limit**
Total Persons Monitored	1750	2033	3712	4093	3519	
Average Effective Dose (mSv)	0.51 mSv	0.33 mSv	1.62 mSv	0.98 mSv	0.39 mSv	
Maximum Individual Effective Dose (mSv)	12.1 mSv	9.2 mSv	23.1 mSv	15.9 mSv	11.9 mSv	50 mSv/year

7.1 Radiation Protection, Continued

Performance (continued)

Worker Dose Control

General:

The following table provides a summary of collective doses to workers at PLGS during 2006 to 2010. Collective dose is the sum of all doses to all individuals at the facility, including PLGS personnel and contractors. The total collective dose is further broken down by internal and external dose.

PLGS						
Year	**Collective Dose**		**Collective Dose**		**Total Collective Effective Dose (person-mSv)**	**Maximum Individual Dose (mSv)****
	Routine Operations (person-mSv)	**Outages & Refurbishment (including forced outages) (person-mSv)**	**Internal Dose (person-mSv)**	**External Dose (person-mSv)**		
2006	*156*	*745*	*131*	*770*	*901*	*12.1*
2007	*129*	*535*	*68*	*596*	*664*	*9.2*
2008[*]	*55*	*5,943*	*374*	*5,624*	*5,998*	*23.1*
2009	*Not Applicable*	*4,082*	*123*	*3960*	*4,082*	*15.9*
2010	*Not Applicable*	*1375*	*50*	*1325*	*1375*	*11.9*

[*] Refurbishment began in April 2008.
** As of 2011 June the maximum individual dose was 8.2 mSv.

Packaging and Transport of Nuclear Substances

There have been three reportable events during the licensing period. For one, activated material had been added to a box of inactive equipment that was shipped off-site. Another incident occurred when a shipment of low activity samples for disposal left site without the required documentation, which had been prepared. The other concerned a low activity radioactive shipment received by a worker who was not qualified to do so. In addition, an informal inspection identified deficiencies in station procedures that resulted in a temporary suspension of radioactive shipments until documentation was improved. Further improvements are being tracked through the Corrective Action Program.

7.1 Radiation Protection, Continued

Background Information

The shipment of radioactive materials is discussed in *SI-01365-A108, Radiation Protection Directives*, which states that it shall be performed "in accordance with *SU-12, Provide Materials and Services*. All such shipments require the approval of Health Physics".

The Directives also define an "expert in radiation protection" as any Yellow or Green qualified person. This statement helps define how the station satisfies *SOR/2000-208, Packaging and Transport of Nuclear Substances Regulations*, which requires that radioactive shipments be opened in the presence of an expert in radiation protection.

Only "trained, certified Radiation Control personnel control and facilitate the shipment of radioactive material off-site"; according to *SI-01365-A78, Performing Outgoing Shipments*.

Programs, Reference Documents and Regulations

The following list includes, but is not limited to the programs, reference documents and regulations that cover the safe packaging and transport of nuclear substances and radiation devices.

- *Nuclear Safety and Control Act*
- *SOR/2000-208, Packaging and Transport of Nuclear Substances Regulations*
- *Transportation of Dangerous Goods Regulations*
- *IAEA Safety Standards Series No. TS-R-1, Regulations for the Safe Transport of Radioactive Material, 1996 Edition*
- *SI-01365-A108, Radiation Protection Directives*
- *SI-01365-A78, Performing Outgoing Shipments*
- *SU12, Provide Materials and Services*.

7.2 Solid Waste/Spent Fuel Management

Radioactive Waste/Spent Fuel Handling

The objective of the Point Lepreau Generating Station Radioactive Waste/Spent Fuel Handling Program is to provide for the safe and reliable disposition/storage of solid radioactive wastes, and spent fuel, which are by-products of the nuclear reaction process. Estimated amounts of radioactive waste and the solid radioactive waste management system is described in the Solid Radioactive Waste Facility Safety Report, June 2007 Edition.

Solid waste and irradiated fuel generated at the station are placed in storage at the Solid Radioactive Waste Management Facility (SRWMF). Waste is stored at Phase I of the facility, and irradiated fuel is stored at Phase II. Waste from retubing and other operations completed during the Refurbishment Outage is stored at the Phase III.

Solid Radioactive Waste Management

The Solid Radioactive Waste Management Facility - Phase I and Phase III are located within the station exclusion boundary. The design provides a simple and reliable means of managing solid radioactive wastes such that the public, processing personnel, and the environment are adequately protected from radioactive hazards. To accomplish this, waste is stored in above-ground, rectangular, reinforced concrete structures. The structures are designed to provide interim storage of station waste, including waste generated from retubing operations, for at least 50 years.

All solid radioactive waste generated by the station is packaged appropriately at the site. The station has instituted a Likely Clean Program as a radioactive waste reduction strategy. Waste generated in Zone 3 areas that is believed to be uncontaminated is placed in the Likely Clean receptacles. This waste is screened to determine the appropriate disposal location. Based on the results of that screening, radioactive waste is processed for medium term storage and is sent to the Solid Radioactive Waste Management Facility Phase I. Non-radioactive waste is sent to a provincially licensed Regional Sanitary Landfill or to an appropriate external agency for disposal.

7.2 Solid Waste/Spent Fuel Management, Continued

Solid Radioactive Waste Management (continued)

The Solid Radioactive Waste Management Facility - Phase I and Phase III are located within the station exclusion boundary. The design provides a simple and reliable means of managing solid radioactive wastes such that the public, processing personnel, and the environment are adequately protected from radioactive hazards. To accomplish this, waste is stored in above-ground, rectangular, reinforced concrete structures. The structures are designed to provide interim storage of station waste, including waste generated from retubing operations, for at least 50 years.

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Non-radioactive waste is sent to a Provincially licensed Regional Sanitary Landfill or to an appropriate external agency for disposal.

NB Power had historically considered all waste generated in Zone 3 to be radioactive. Starting in 2003, waste had been retrieved, re-evaluated, and re-processed to remove the non-active portion from active storage. Under this process, stored waste from the SRWMF was returned to the station, monitored and sorted to remove any non-radioactive materials, then repackaged for storage. The non-radioactive portion was sent to disposal as discussed above. Facility changes required to support the plant and outage operations have temporarily suspended waste retrieval activities.

Inventories of the waste stored at the facility are provided to the Canadian Nuclear Safety Commission four times per year in the Solid Radioactive Waste Management Facility Quarterly Report.

Spent Fuel Management

Spent fuel bundles removed from the reactor are placed into the Spent Fuel Bay for cooling and shielding. Following an initial period in the Spent Fuel Bay (currently a minimum of 7 years), the fuel is transferred to the Dry Storage Facility which is identified as the Phase II section of the Solid Radioactive Waste Management Facility. At this facility, the spent fuel bundles are stored in above-ground cylindrical, reinforced concrete structures. These structures are designed to provide maintenance free storage for an interim period of at least 50 years. As of March 31, 2010, a total of 81000 bundles are currently stored at the Phase II Facility. A maximum of 8100 bundles may be transferred in any year, depending on the availability of bundles for transfer.

7.2 Solid Waste/Spent Fuel Management, Continued

Spent Fuel Management (continued)

Requirements for transfers of spent fuel between the Spent Fuel Bay and the Solid Radioactive Waste Management Facility are incorporated into the Power Reactor Operating License. An International Atomic Energy Agency (IAEA) Inspector is present during the entire transfer to observe that the process prevents loss, illegal use, possession, or removal of a nuclear substance.

Documentation

The documents supporting this program are:

Document Number	Rev.	Document Title	Date Registered
0087-79100-3010-001-SR-A-00	0	Solid Radioactive Waste Management Facility Safety Report June 2007 Version	2008 Sept. 16
RD-01364-L23	6	Solid Radioactive Waste Management Facility Operating Policies and Principles	2008 Sept. 15
SI-01365-P102	5	Controlling Waste	2011 Aug. 10
OM-79100	7	Solid Radioactive Waste Management Facility	2011 Mar. 23
OM-79190	4	Radioactive Waste Handling Equipment	2002 Jun. 05
EP-78600-R023	0	Shift Supervisor Action Following an Accident at the SRWMF or Canister Site	2005 Mar. 24
RD-01364-L7	7	Physical Accounting of Fuel	2009 Nov. 30
OM-35370	4	Spent Fuel Dry Storage	2007 Sept. 13
MM-79100-SP01	0	Solid Radioactive Waste Collection and Packaging	2001 Dec. 13
MM-79100-SP02	0	Waste Retrieval from SRWMF	2003 Sept. 04
MM-79100-SP03	2	Transportation of Radioactive Waste to Solid Radioactive Waste Management Facility	2008 May 23
OM-79150-A-04	4	Spent Filter Flasks	2001 Jun. 29

7.2 Solid Waste/Spent Fuel Management, Continued

Hazardous Waste Management

A list of Workplace Hazardous Material Information System (WHMIS) regulated materials was prepared by Point Lepreau Generating Station and submitted to Canadian Nuclear Safety Commission staff. Updated lists are available upon request.

Hazardous materials on the site and in off-site shipments are managed through compliance with the following policies and procedures.

Document Number	Rev.	Document Title	Date Registered
SI-01365-P102	5	Controlling Waste	2011 Aug. 10
SDP-01368-A23	2	Workplace Hazardous Material Information System (WHMIS)	2011 Jan. 14
SI-01365-P80	3	Handling and Storing Hazardous Materials	2010 Apr. 21
SI-01365-A78	5	Performing Outgoing Shipments	2007 Aug 15

Inactive Waste Management

Inactive solid wastes are recycled, where possible, or disposed of off-site at a Provincially licensed Regional Sanitary Landfill. Inactive wastes are handled and monitored through compliance with the following policies and procedures:

Document Number	Rev.	Document Title	Date Registered
SI-01365-P102	3	Controlling Waste	2011 Apr. 08
OM-07320	1	Inactive Solid Waste Handling/Disposal	2001 Jul. 06
MM-79100-SP01	0	Solid Radioactive Waste Collection and Packaging	2001 Dec. 13
MM-79100-SP02	0	Waste Retrieval from SRWMF	2003 Sept. 04
MM-79100-SP03	2	Transportation of Radioactive Waste to Solid Radioactive Waste Management Facility	2008 May 23
SI-01365-A78	5	Performing Outgoing Shipments	2007 Aug. 15

7.2 Solid Waste/Spent Fuel Management, Continued

Documentation

Waste and spent fuel are handled and monitored through compliance with the following policies and procedures:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU2	4	Provide Environmental Services	2011 Feb. 18
PRR-00660-SU4	3	Provide Personnel Safety Services	2010 Feb. 16
PRR-00660-SU12	5	Provide Materials and Services	2010 Dec. 07
SI-01365-A78	5	Performing Outgoing Shipments	2007 Aug. 15
SI-01365-P102	5	Controlling Waste	2011 Aug. 10
SDP-01368-A23	2	Workplace Hazardous Material Information System (WHMIS)	2011 Jan. 14
SI-01365-P80	3	Handling and Storing Hazardous Materials	2010 Apr. 21
OM-35300	7	Spent Fuel Storage and Handling	2010 Mar. 25
MM-35370-SP01	0	Spent Fuel Dry Storage Canister Preparation and Closure	1999 Nov. 09

Waste Transfers

In the third Quarter of 2007, 2 canisters were filled, BK4 and BK5. This ended the fuel transfer campaign for the year. Fuel transfers have not taken place throughout the duration of the current Refurbishment Outage as personnel responsible for these activities have been seconded to support other areas important to ensure the successful completion of the Outage. The 2007 campaign ensured enough free space was available in the Spent Fuel Bay to support the emptying of the core contents, and also have the contingency space available. As no spent fuel has been generated throughout Refurbishment, the requirement to perform fuel transfers did not exist. Transfers will resume when the unit is restarted. As of June 30, 2010, one hundred and fifty canisters had been filled.

Since 2003, a total of 1407.67 m^3 of waste has been sent to the SRWMF Phase I and III, with a total of 103.54 m^3 reclaimed from the facility for reprocessing. As of June 30, 2010, a total of 2142.83 m^3 of waste is in storage at the Phase I Facility and a total of 725.20m3 of waste is in storage at Phase III.

7.2 Solid Waste/Spent Fuel Management, Continued

Principle Activities

Principle activities at the SRWMF:

- Transfer and loading of radioactive wastes to Phase I
- Transfer and loading of spent fuel into canisters at Phase II
- Transfer and loading of radioactive wastes to Phase III.

Primary Support activities at the SRWMF:

- Security
- Safeguards
- Radiation Protection
- Maintenance
- Occupational Health and Safety
- Plant Life Management
- Emergency Preparedness
- Routine sampling and analysis of surface run-off
- Routine radiological sampling and analysis
- Facility Support
- Periodic construction of additional spent fuel canisters.

7.3 Action Levels

Action Levels

Action Levels are dose levels or some other numerical value that, if reached, may indicate a loss of control of the Radiation Protection Program.

Action Levels are identified in *SI-01365-A108, Radiation Protection Directives*. Radiation exposures are controlled by means of administrative dose limits, job planning through the ALARA program, instrumentation, respiratory protection, access control, and signposting.

The Action Levels for Point Lepreau Generating Station are:

- a Nuclear Energy Worker receives an unexpected acute whole body dose in excess of 2 mSv
- an administrative dose limit has been exceeded without the approval of the Senior Health Physicist
- loose contamination from the station, other than through an approved effluent pathway, in excess of 1 Contamination Control Limit (CCL) is detected in Zone 1 or outside the inner security fence
- a total weekly airborne release exceeds 10% weekly DEL
- a total monthly liquid effluent release exceeds 10% monthly DEL
- the average annual radioactivity concentration in water samples from the SRWMF exceeds the Canadian Drinking Water Standard (this is 7000 Bq/L for tritium).

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26

Performance

There have been four incidents of an Action Level being exceeded during the current licensing period. Two involved the detection of loose contamination greater than specified limits in Zone 1 or off-site. The contamination was cleaned up or returned to the station, and corrective actions were implemented to improve controls on the release of materials. Additional improvements are in progress. Two others concerned the exceeding of an administrative dose limit; one due to an unmonitored neutron dose to two visitors and the other due to a discrepancy between the PAD and TLD readings. Correction action plans to prevent recurrence have been completed.

8.0 Security

8.1 Nuclear Substance Control

Nuclear Substance Control

Heavy water and reactor fuel at Point Lepreau Generating Station are two of the prescribed substances which are controlled.

A Heavy Water Accounting Program for Point Lepreau Generating Station has been developed. The purpose of this program is to provide a means of maintaining correct records of the heavy water inventory and ensuring that heavy water with different isotopic and tritium concentrations is kept segregated. It also allows Point Lepreau Generating Station to limit releases to the environment and personnel exposures.

A Fuel Accounting System has been developed to document the movement of fuel to and from the station; and on site between the new fuel storage room, the reactor, the irradiated fuel bays, and the dry fuel storage canisters; and to allow for the tracing of specific fuel bundles. In addition, the Fuel Management Program assures that accurate records are maintained. The International Atomic Energy Association periodically audits these records as part of their Safeguards Program.

The Consolidated Nuclear Substance and Radiation Device Licence, held by NB Power, is incorporated into the Power Reactor Operating Licence. Condition 13.7 requires an annual compliance report to be submitted by March 31 each year.

To demonstrate the integrity of sealed Radiation sources, regularly scheduled leak testing is performed once every six months, as well as following any incident which may have resulted in damage to a source.

The current inventory lists are located in Table 5.

NB Power Nuclear has designated staff which are trained and qualified in the transport packaging of radioactive material.

8.1 Nuclear Substance Control, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
RD-01364-L7	7	Physical Accounting of Fuel	2009 Nov. 30
SI-01365-P96	1	Handling, Storing and Inspecting New Fuel	2007 Nov. 23
RD-01364-L26	4	Shipment of Radioactive Materials	1999 Apr. 01
RPP-03400-SV31	2	How to Perform Radioisotope Sealed Source Leak Test	2011 June 17
SI-01365-A108	0	Radiation Protection Directives	2006 Oct. 26
PRR-00660-OP-4	2	Fuel the Reactor	2011 Jan. 24

Federal Licences

The following Licences, issued by the Canadian Nuclear Safety Commission Licences, are in effect:

Licence	Licence No.	Expires
Power Reactor Operating Licence	PROL17.01/2012	2012 Jun. 30
Nuclear Substance and Radiation Device Licence (Fredericton HP Lab)	13681-1-14.0	2014 Sept. 30
Dosimetry Services Licence	13681-2.14.0	2014 Sept. 30

8.2 Security

Security

Security procedures and physical protection measures in place at the Point Lepreau Generating Station have been designed and implemented to assure compliance with the provisions of the Nuclear Security Regulations, S-298, RD 363, and all Point Lepreau Security Department Procedures. NBPN has an exemption from the Nuclear Security Regulation for the Solid Radioactive Waste Management Facility that expires on November 27, 2011. The request to extend the exemption has been sent to the CNSC and is under review.

With all requirements in place, this assures the Point Lepreau Security Department provides the means to detect, deter and respond to unauthorized entry to, and unauthorized activity within the protected area's. Security measures exist in all protected area's where fissile material is stored or used. This provides protection related to Nuclear Safety, personnel safety, and support to Canada's obligation to the non proliferation treaty (*Section 9*).

Point Lepreau Generating Station is currently meeting all requirements under Regulatory Documents S-298, RD-363 and is following all commitments under the Point Lepreau Generating Station Security Report.

The Point Lepreau Generating Station Security Report L-25 also outlines the robustness studies and program that is in place at the station.

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU-6	1	Provide Security Services	2007 Mar. 21
RD-01364-L25	12	Security Report	2011 Aug. 30
SDP-14000-SE02	4	On-Site Transportation of Category II Nuclear Material	2007 Aug. 15
SI-01365-A94	7	Complying with Security Requirements	2010 Apr. 29
SI-01365-A116	2	Security Expectations	Confidential
		Security Procedures	Confidential
SDP-14000-SE19	5	Controlling And Maintaining Weapons, Ammunition And OC Aerosol Spray	Confidential
SDP-14000-SE25	0	Organizing and Maintaining the Security Response Force	Confidential

Cyber Security

In response to CNSC Action Item 081213 New Brunswick Power performed a cyber security self-assessment for safety-related systems and site-security systems at PLGS. This assessment found no cyber security vulnerabilities related to these systems. New Brunswick Power is presently developing a cyber security program to cover these systems.

9.0 Safeguards

Safeguards

Point Lepreau Generating Station implements International Atomic Energy Agency (IAEA) Safeguards in accordance with Canadian obligations to the IAEA, under the International Treaty on Non-Proliferation of Nuclear Weapons and associated Agreements made by Canada under the Treaty.

The Safeguards Program outlines the IAEA safeguard controls used at Point Lepreau Generating Station to:

- provide support and information to the IAEA,
- prevent the theft or diversion of nuclear fuel,
- ensure the timely detection and reporting of any such theft or diversion,
- interface with IAEA personnel or IAEA Safeguards equipment,
- monitor and control the transfer of nuclear fuel to and from, and within, the station, including transport to the Dry Fuel Storage Facility,
- establish and maintain a system of accounting for nuclear fuel,
- generate reports required under agreements signed by Canada, and
- establish and maintain IAEA safeguard controls.

Regular visits by IAEA inspectors occur on site to review the status of our records, monitoring equipment, procedures, and worker practices to assure that all fuel is safeguarded and accounted for.

The Safeguards Program ensures that information is gathered and the required reports are prepared and submitted in accordance with current Licence Conditions. The Reports include:

- Fissionable and Fertile Substance Reports
- Reactor Spent Fuel Summary Reports
- Physical Inventory Listing and Material Balance Report
- Physical Inventory Verification Report
- Transfer Reports.

9.0 Safeguards, Continued

Documentation

The documents supporting this process are:

Document Number	Rev.	Document Title	Date Registered
PRR-00660-OP4	2	Fuel the Reactor	2011 Jan. 24
OM-30100	7	IAEA Integrated Safeguards System	2008 Dec 09
SI-01365-P95	2	Maintaining IAEA Safeguards	2011 Aug. 19

10.0 Additional Prerequisites

Additional Prerequisites

The following items are additional prerequisites that support the Point Lepreau Generating Station Operating Licence.

Nuclear Liability Insurance

Nuclear Liability Insurance, as required under the Nuclear Liability Act, came into effect at Point Lepreau Generating Station on the date of commencement of fuel loading, namely 1982 Mar. 26. Insurance requirements are maintained on an annual basis. The New Brunswick Power Nuclear Corporation's Nuclear Energy Liability Insurance Policy number is OF-17. The policy is underwritten by the Nuclear Insurance Association of Canada (NIAC).

NB Power Nuclear is aware of new proposed legislation to increase the required coverage and we are prepared and able to comply with the proposed changes when implemented by the federal government.

11.0 Refurbishment Commissioning and Return to Service

Refurbishment Commissioning and Return to Service

Detailed plans have been produced to commission the design modifications that have been made, and to verify system operation for those systems that were placed in a laid up state. The strategy for returning PLGS to service after the outage is as follows:

In general, commissioning takes place immediately upon completion of the specific field installation and hence is an on-going activity and a pre-requisite to a system (or part of system) being transferred back to Operations. NB Power Nuclear is following the commissioning procedure for modifications outlined in the normal station process documentation. When commissioning is complete, a *Commissioning Completion Assurance Report* is produced. The Commissioning Completion Assurance report is a commissioning summary which includes: commissioning specification and objectives, commissioning plan reference, acceptance criteria and commissioning outcomes (including dispositions if commissioning objectives were not met) and an outstanding minor deficiency list if required.

For those field activities that are modifications but by their nature do not require commissioning, an *Installation Completion Assurance Report* is produced to provide confirmation of installation review and approval.

For those activities that are not modifications, an *SAP*[4] *Completion Assurance Report* is produced. The SAP Completion Assurance Report includes the SAP order number and cover sheet.

The approach for core surveillance and testing activities during restart following refurbishment has been prepared and concurrence with CNSC staff has been reached. Evidence of completion will be provided by the *Core Surveillance and Testing Report* and will include the acceptance criteria and confirmation that the criteria were met or how the results have been dispositioned if the criteria were not met.

The overall process to return the station to service will ensure the readiness of systems for operation at the appropriate point in time in the return to service schedule. A determination of system readiness is based on confirmation that the associated maintenance and commissioning requirements have been completed at the relevant hold point. The system readiness review will ensure all required systems are available prior to proceeding to a new plant state as well as a confirmation that all project commitments have been completed.

[4] SAP® Systemanalyse und Programmentwicklung ("System Analysis and Program Development") is a (Trade Mark) database for tracking work orders, work permits…etc.

11.0 Refurbishment Commissioning and Return to Service, Continued

Refurbishment Commissioning and Return to Service (continued)

Based on a review of CNSC Regulatory Document *RD-360, Life Extension of Nuclear Power Plants* and Condition 12.2 of the PLGS Operating Licence requirements, the following four formal hold points have been agreed to with CNSC staff:

Phase A – Prior to Loading Fuel
Phase B – Prior to Removing the Guaranteed Shutdown State
Phase C – Prior to Exceeding 0.1% Reactor Power
Phase D – Prior to Exceeding 35% Reactor Power.

Information outlining how these hold points map into the various run up plateaus is illustrated in Table-11.A.

The request for approval to proceed to each successive commissioning phase will be based on the submission of a completion assurance document for each phase. In addition, NB Power Nuclear will submit a Completion Assurance Document following sustained operation at 100% Reactor Power which will detail the verification activities that were completed between 35% and 100% Reactor Power.

Restart Readiness

PLGS operated at power until the start of the refurbishment outage on March 28, 2008. The refurbishment outage is being conducted in accordance with the Nuclear Management Manual and the various programs and processes that govern normal operation and maintenance. Thus all the key programs remained in place throughout the outage. The small number of routines that were suspended due to plant state are being reintroduced at the appropriate time. For those systems that were laid up during the outage, the regular preventative maintenance program routines are being reinstated as part of returning the systems to operations.

Operating documentation for the design modifications that took place during the outage are being revised and issued. Certified and non-certified operator training has continued throughout the outage and specific training on the design modifications is being conducted. Specific just in time training on startup with a fresh core will be completed prior to fuel loading. Key technical and maintenance staff have been involved in the factory acceptance testing of new equipment, as well as in the commissioning of the modifications. Quarterly meetings have taken place between NB Power Nuclear and CNSC staff to verify the level of training during this period.

11.0 Refurbishment Commissioning and Return to Service, Continued

Restart Readiness (continued)

As some station staff were temporarily assigned to project groups to support the outage, a plan for returning these personnel to their post refurbishment work group has been developed. This plan is being implemented in phases and was also developed to address succession planning issues. The plan will ensure a smooth transition to an operating station.

To ensure that station staff have retained the necessary operational mindset, a restart readiness strategy has been developed and station staff are engaged as appropriate milestones are approached. This plan builds on the fundamentals of human performance, error prevention, observation and coaching and document adherence and includes specific plans and workshops related to key expectations.

NB Power Nuclear is confident that station staff will be sufficiently prepared to return the unit to service.

11.0 Refurbishment Commissioning and Return to Service, Continued

Restart Readiness (continued)

Table 11.A

Commissioning Phase (RD-360)	Plateau/Hold Point	CNSC Approval
Phase A – Prior to Fuel Load	1. Moderator Refill	
	2. Fuel Load	**Commission Hearing &CNSC designated officer Approval**
Phase B – Prior to GSS Removal	3. Primary Heat Transport System Refill	
	4. Primary Heat Transport System Pressurization	
	5. GSS Removal	**CNSC designated officer Approval**
Phase C – Prior to exceeding 0.1%	6. Primary Heat Transport System Warm-up	
	7. Reactor Power at 0.1% FP	**CNSC designated officer Approval**
Phase D – Prior to exceeding 35%	8. Reactor Power at 1% FP	
	9. Establishing Access Control (2%)	
	10. Reactor Power at 7% FP	
	11. Turbine Run	
	12. Reactor Power at 14% FP	
	13. Reactor Power at 35% FP	**CNSC designated officer Approval**
	14. Generator Synchronizing to Grid	
	15. Reactor Power at 75% FP	
	16. Reactor Power at 100% FP	

12.0 Post Refurbishment Operation

Post Refurbishment Operation

This Section covers the period from when the reactor achieves high power operation following the startup from the Refurbishment outage to the end of the requested licensed period of June 30, 2017.

As per the information on the Refurbishment outage contained in *Section 12*, the station programs and processes outlined in sections 1 to 10 apply to the post refurbishment period. Consistent with the period leading up to the outage, the management of plant ageing is through systems health monitoring and the preventative maintenance programs.

Although it was never the intention of the Refurbishment project to "restore the plant to a new condition", findings from the condition assessments performed in Phase-1 of the project, coupled with the supporting plant life management studies of critical structures, systems and components, has given NB Power Nuclear the confidence that the plant can be operated safely and reliably for an additional 25 to 30 years. Equipment that was appropriate to modify, repair, replace or inspect during the refurbishment outage timeframe was either included in the project scope or performed as part of the O&M portion of the outage. The remaining systems, structures and components (SSC's) are able to be maintained through the normal on-going station O&M or capital programs. This conclusion was possible because Point Lepreau Generating Station has a good approach to managing the health of important SSC's, and has invested significant money, time and effort into keeping plant systems in good condition. As a specific example, the condition assessment for the primary heat transport system included the boilers, which in turn was supported by a dedicated life assessment study that concluded that Point Lepreau Generating Station had a good on-going maintenance program (and appropriate system chemistry and operating procedures) to support boiler health and that no major boiler work was required as part of the project. It was decided however, that the timing was appropriate to include a primary side tube clean (vacu-blast) as part of the O&M portion of the outage.

Although the condition assessment process in conjunction with system health monitoring and proactive maintenance program is essential, it is also important to ensure that those SSC's that will be placed in a laid up state during the refurbishment outage, are placed in the appropriate condition and receive the necessary actions so that no adverse conditions will result. To this extent NB Power is expending considerable effort and using industry operating experience to ensure that the lay-up of systems is done in an appropriate manner to ensure that the overall condition is not degraded during the refurbishment outage.

12.0 Post Refurbishment Operation, Continued

Post Refurbishment Operation (continued)

In summary, NB Power Nuclear will continue in the post refurbishment period to follow the processes and programs outlined in the Nuclear Management Manual and will operate in accordance with the requirements outlined in the Nuclear Safety and Control Act and regulations, Operating Licences and permits as it currently does. Since excellent system performance is key to ensuring safety and operational success, it will continue to be a key focus area for the Corporation going forward.

13.0 Tables

Table 1: Probabilistic Safety Analysis (PSA)

The following is a current list PSA Reports submitted to the CNSC in support of the Point Lepreau Generating Station Operating Licence			
Document Number	***Rev.***	***Document Title***	***Date Registered***
87RF-03500-AR-015	1	Severe Accident Analysis MAAP4 - Station Blackout	2009 Nov.16
87RF-03500-AR-016	1	Severe Accident Analysis MAAP4 - Small LOCA Scenarios	2009 Aug.13
87RF-03500-AR-017	1	Severe Accident Analysis MAAP4 - Shutdown State Scenarios	2009 Aug.19
87RF-03500-AR-018	1	Severe Accident Analysis MAAP4 - Stagnation Feeder Break	2009 Aug. 13
87RF-03500-AR-019	1	Severe Accident Analysis MAAP4 - Steam Generator Tube Rupture	2009Jul. 20
87RF-03500-ASD-018	0	Safety Assessment in Support of PSA	2007 Oct. 30
87RF-03500-SAB-011	1	Severe Accident progression and Consequence Assessments using MAAP4	2008 May 01
87RF-03600-DG-001	2	PSA Fault Tree Analysis Guide	2007 Jul. 27
87RF-03600-DG-002	0	PSA ASQ Guide	2006 Mar. 30
87RF-03611-AB-001	1	PSA HRA Methodology	2006 Jul. 25
87RF-03611-AB-002	1	PSA Overview Methodology	2004 Jan. 05
87RF-03611-AB-004	1	PSA CCF Methodology	2004 Jan. 07
87RF-03611-AR-001	0	Event Trees Report Phase 1	2002Sept. 01
87RF-03611-AR-002	0	Fault tree Analysis for EDS	2006 Oct. 02
87RF-03611-AR-003	0	Fault tree Analysis for Feedwater System	2004 Jun. 01
87RF-03611-AR-004	1	Fault tree Analysis for SWS	2006 Oct. 24
87RF-03611-AR-005	1	Fault tree Analysis of Shutdown Systems 1 and 2	2008 Jun. 17
87RF-03611-AR-006	0	Fault tree Analysis of ECC System	2004/10/26
87RF-03611-AR-007	0	Fault tree Analysis for Moderator System	2006/04/18
87RF-03611-AR-008	0	Fault tree Analysis for Shutdown Cooling System	2005/11/07
87RF-03611-AR-009	0	Derivation of IE Frequencies	2006 Oct. 13
87RF-03611-AR-010	0	Event Tree report for Full Power Operation	2004 Oct. 01
87RF-03611-AR-011	0	Event Tree report for Shutdown State	2006 Mar. 06
87RF-03611-AR-012	0	HRA for Post Accident Operator Actions	2006 Apr. 04
87RF-03611-AR-013	0	Fault tree Analysis for Pressure & Inventory Control System	2006 Oct. 02
87RF-03611-AR-014	0	MAAP Parameter Flies	2006 Nov. 24

13.0 Tables, Continued

Table 1: Probabilistic Safety Analysis (PSA) (continued)

The following is a current list PSA Reports submitted to the CNSC in support of the Point Lepreau Generating Station Operating Licence			
Document Number	***Rev.***	***Document Title***	***Date Registered***
87RF-03611-AR-015	0	Fault tree Analysis for Containment Systems	2007 Nov. 28
87RF-03611-AR-016	0	Fault tree Analysis for Setback and Stepback System	2006 Mar. 06
87RF-03611-AR-017	0	Fault tree Analysis for EWS	2006 Jul. 05
87RF-03611-AR-019	0	Fault tree Analysis for Turbine Trip on overspeed	2005 Dec. 14
87RF-03611-AR-021	0	Fault tree Analysis for EPS	2006 Aug. 08
87RF-03611-AR-022	0	Fault tree Analysis for Instrument Air System	2006 Oct. 03
87RF-03611-AR-023	1	Fault tree Analysis for Boiler Pressure Control System	2006 Sept. 14
87RF-03611-AR-024	0	Fault tree Analysis for Fuel Handling System	2006 Oct. 12
87RF-03611-AR-025	0	ASQ Report for Internal Events Level 1	2007 May 28
87RF-03611-AR-026	1	ASQ Report for Internal Events Level 2	2008 May 06
87RF-03611-AR-027	0	Summary report	2008 Jun. 26
87RF-03611-AR-028	0	Fault tree Analysis for End Shield Cooling System	2006 Dec. 04
87RF-03611-AR-029	0	Fault tree Analysis for HTT	2007 Apr. 23
87RF-03611-AR-031	0	Off-Site Consequences Analysis Report	2008 Dec. 04
87RF-03611-AR-032	0	Fault Tree Analysis for Make-Up System to Calandria Vault	2008 Oct. 24
87RF-03611-ASD-002	0	Level II PSA plan	2002 Jan. 03
87RF-03611-ASD-003	0	Systematic Review for Intitiating Events	2001 Nov. 12
87RF-03611-ASD-004	0	Point Lepreau Risk Baseline -SCDF for internal events	2001 Oct. 15
87RF-03611-ASD-006	0	Point Lepreau Risk Baseline -LRF for internal events	2002 Mar. 27
87RF-03611-ASD-011	1	System Dependencies Matrices	2003 Jan. 01
87RF-03611-ASD-008	0	Identification of Deterministic analysis to support the PSA assumptions	2006 Aug. 23
87RF-03612-AB-001	0	PSA SMA Methodology	2002 Jan. 08
87RF-03612-AR-003	0	PSA SMA Level 1 Report	2008 Jan. 09
87RF-03612-AR-004	0	PSA SMA Level 2 Report	2008 May 01
87RF-03612-ASD-002	0	Point Lepreau Risk Baseline -SCDF for external events	2003 Dec. 01
87RF-03612-ASD-003	0	Point Lepreau Risk Baseline -LRF for external events	2004 Feb. 01
87RF-03612-ASD-004	1	Seismic Walkdown Report	2005 Nov. 18

13.0 Tables, Continued

Table 1: Probabilistic Safety Analysis (PSA) (continued)

The following is a current list PSA Reports submitted to the CNSC in support of the Point Lepreau Generating Station Operating Licence			
Document Number	***Rev.***	***Document Title***	***Date Registered***
87RF-03612-ASD-005	0	SMA-Identification of safety related structures/equipment	2004 Aug. 01
87RF-03612-ASD-015	0	SMA- Fragility Analysis for Safety Related Equipment	2007 Jun. 03
87RF-03612-ASD-016	0	SMA- Fragility Analysis for Safety Related Structures	2007 May 30
87RF-03612-ASD-018	0	SMA- Fragility Analysis for Remaining Equipment	2007 Dec. 10
87RF-03612-ASD-019	0	Assessment of Other External Events for PLGS	2008 May 13
87RF-03612-TD-001	1	Seismic Walkdown - Walkdown Plan	2005 Apr. 01
87RF-03613-AB-001	2	PSA Fire & Flood Methodology	2006 Aug. 23
87RF-03613-AR-002	0	T/B Fire PSA Level 1	2008Mar. 03
87RF-03613-AR-003	0	Fire PSA Level 2 All Buildings	2008 May 01
87RF-03613-AR-004	0	S/B Fire PSA Level 1	2008 Feb. 19
87RF-03613-AR-006	1	B/B Fire PSA Level 1	2007 Dec. 12
87RF-03613-AR-008	0	Flood PSA Level 1	2008 Jan. 18
87RF-03613-AR-009	0	Flood PSA Level 2	2008 Mar. 12
87RF-03613-ASD-002	1	Cable Routing Database	2007 May 18
87RF-03613-ASD-003	0	Fire Walkdown Report	2004 Oct. 01
87RF-03613-ASD-004	0	Fire Initiating Event Frequency	2006 Aug. 29
87RF-03613-ASD-005	0	Flood Walkdown Report	2004 Oct. 01
87RF-03613-TD-001	0	Plant Walkdown Plan for fire / flood PSA	2004 May 01
87RF-03611-WAP-001	1	Work Activity Plan for PSA Analysis	2003 Dec. 01
87RF-03611-WAP-003	0	Work Activity Plan for PSA Phase 2	2005 Dec. 12

13.0 Tables, Continued

Table 2: Supplementary Safety Analysis Documentation

Supplementary Safety Analyses Documentation submitted since the issue of Point Lepreau Nuclear Generating Station, Safety Report 2009 Edition, Rev 0			
Document Number	***Document Title***	***Author***	***Date***
IR-71400-17 Rev 0	Fire Hazard Assessment	Tim O'Donnell	2008 Oct. 09

13.0 Tables, Continued

Table 3: Inspection Reports

The following Inaugural Inspection Reports have been submitted.		
Document Number	***Rev.***	***Document Title***
CR-03550-PL1-1	0	PHTS Feeders Thickness Measurements
CR-03550-PL1-2	0	Inaugural and Confirmatory Inspection of Steam Generator Nozzles
CR-03550-PL1-3	0	Inaugural and Confirmatory Inspection of Pressurizer
CR-03550-PL1-4	0	Inaugural and Confirmatory Inspection of Degasser Condenser
CR-03550-PL1-5	0	Pressure Tubes
CR-03550-PL1-6	0	Pumps
CR-03550-PL1-7	0	Shut down Cooling Heat Exchanger
CR-03550-PL1-8	1	Inaugural Inspection of Shut down Cooling Piping System
CR-03550-PL1-9	0	Inaugural Inspection of Pressure and Inventory Control Piping System
CR-03550-PL1-10	1	Inaugural Inspection of Emergency Core Cooling Piping System
CR-03550-PL1-11	0	Primary Heat Transport Piping Systems
CR-03550-PL1-12	0	Valves
CR-03550-PL1-13	0	Equipment, Piping Supports and Hangers
CR-03550-PL1-14	0	Inaugural and Confirmatory Inspection of Erosion Corrosion Areas
CR-03550-PL1-15	0	Mechanical Couplings
CR-03550-PL1-16	0	Inaugural Inspection of PHTS Headers

The following confirmatory reports regarding Pressure Tubes have been submitted.			
Document Number	***Rev.***	***Document Title***	***Date Registered***
IR-03550-009	0	100% Fuel Channel Pressure Tube Inspection	1983 Feb. 25
---	---	Ultrasonic Inspection of Pressure Tubes F6 and N13	1982 Mar. 31

The following Periodic Inspection Reports have been submitted.			
Document Number	***Rev.***	***Document Title***	***Date Registered***
---	0	Periodic Inspection Report	1983 May
L6CF.0610 PLGS Vault	0	Periodic Inspection Report 1984 May	1984 July
L6CF.0614 PLGS Vault	0	Periodic Inspection Report 1985 May	1985 July
L6CF.0618	0	Periodic Inspection Report 1986 May	1986 July
IR-03550-12	0	Periodic Inspection Report, Fuel Channel Pressure Tubes	1987 Aug. 26
L6CF.0624	0	Periodic Inspection Report 1988 Apr.	1988 July

13.0 Tables, Continued

Table 3: Inspection Reports (continued)

The following Periodic Inspection Reports have been submitted.			
Document Number	***Rev.***	***Document Title***	***Date Registered***
IR-03550-14	0	Fuel Channel Pressure Tubes	1989 Apr. 26
L6CF.0626	0	Periodic Inspection Report 1989 Apr.	1989 July
IR-03550-18	0/1	Periodic Inspection Report	1992 Mar. 06
IR-03550-21	0	Periodic Inspection Report	1992 Aug. 25
IR-03550-24	0	Periodic Inspection Report	1993 July 15
IR-03642-01	0	Containment Component Periodic Inspection Program, March 1994 Inspection Results	1994 July 28
IR-03550-28	0	Periodic Inspection Report	1994 Dec. 21
IR-03642-02	0	Containment Component Periodic Inspection Program, 1995 Unit Outage Inspection Results	1996 Jan. 08
IR-03641-01	0	Periodic Inspection Report, 1995 Outage	1996 Mar. 18
IR-03641-02	0	Periodic Inspection Program (PIP) Report 1997/98 Outage	1998 May 06
IR-03641-03	0	1997/1998 Fuel Channel Periodic and In-Service Inspection Program	1998 May 15
IR-03641-04	0	Periodic Inspection Program (PIP) Report 1998 Outage	1998 Aug. 26
IR-03641-05	0	Periodic Inspection Program 1999 Outage	1999 Oct. 05
IR-03641-06	0	1999 Fuel Channel In-Service Inspection Program	1999 Aug. 09
IR-03641-07	0	Periodic Inspection Program 2000 Outage	2001 Jan. 18
IR-03641-08	0	Periodic Inspection Program 2002 Outage	2002 Oct. 15
IR-03641-09	0	Periodic Inspection Program 2003 Outage	2003 Jan. 23
IR-03641-10	0	Periodic Inspection Program 2004 Outage	2004 Aug. 24
IR-03641-11	0	Periodic Inspection Program 2005 Outage	2005 Aug 03
IR-03641-12	0	Periodic Inspection Program 2006 Outage	2006 July 12
IR-03641-14	0	Periodic Inspection Program 2007 Outage	2007 July 16

The following Fuel Channel Periodic Inspection Program related Reports have been submitted			
Document Number	***Rev.***	***Document Title***	***Date Registered***
AECL 87-31100-PIP-002	0	Fuel Channel Periodic Inspection: 2004, May – Preliminary Report	June 2004
AECL 87-31110-TR-001	0	Results from the Point Lepreau Scrape Samples from 2004 May	August 2004

13.0 Tables, Continued

Table 4: Design Manuals

Design Manuals	
0087-21601-7001-001-DM-A-02	AIRLOCKS AND SEALING DOOR
0087-32510-0001-001-DM-A-01	MODERATOR D2O COLLECTION SYSTEM
0087-34320-0001-001-DM-A-02	EMERGENCY CORE COOLING SYSTEM PROCESS DESIGN
0087-34700-0001-001-DM-A-02	LIQUID INJECTION SHUTDOWN SYSTEM
0087-36920-0001-001-DM-A-00	FLUS AS THE SECONDARY SIDE PIPING LEAK DETECTION SYSTEM
0087-41140-3004-001-DM-A-01	TURBINE TRIPPING SYSTEM
0087-41150-3012-001-DM-A-00	TURBINE GLAND STEAM SYSTEM
0087-41160-3001-001-DM-A-01	TURBINE SPEED CONTROL SYSTEM
0087-41180-3009-001-DM-A-00	TURBINE GENERATOR LOW PRESSURE EXHAUST COOLING SYSTEM
0087-41190-3007-001-DM-A-00	TURBINE STEAM MOISTURE SEPARATION AND REHEAT SYSTEMS
0087-41200-3013-001-DM-A-00	GENERATOR AND EXCITATION SYSTEM
0087-41230-3010-001-DM-A-00	GENERATOR HYDROGEN COOLING SYSTEM
0087-41240-3010-001-DM-A-01	GENERATOR STATOR COOLING SYSTEM
0087-41330-3012-001-DM-A-00	GOVERNOR FLUID SUPPLY SYSTEM FRF
0087-41340-3016-001-DM-A-00	GENERATOR SEAL OIL SYSTEM
0087-41350-3006-001-DM-A-00	TURBINE GENERATOR LUBE OIL; STORAGE AND PURIFICATION SYSTEMS
0087-51410-0001-001-DM-A-01	MAIN UNIT OUTPUT TRANSFORMER
0087-51420-0001-001-DM-A-01	UNIT SERVICE TRANSFORMER
0087-51430-0001-001-DM-A-02	SYSTEM SERVICE TRANSFORMER
0087-51430-0002-001-DM-A-01	SPARE SERVICE TRANSFORMER
0087-52200-7005-001-DM-A-01	STANDBY GENERATORS SG3-1 AND SG3-2 FUEL SUPPLY SYSTEM FUNCTIONAL DESCRIPTION (KEY # 2244)
0087-52900-0001-001-DM-A-04	EMERGENCY POWER SUPPLY SYSTEM
0087-54200-0001-001-DM-A-01	STATION SERVICE DISTRIBUTION SYSTEM 600V SYSTEM
0087-54300-0001-001-DM-A-01	LOW VOLTAGE MOTOR CONTROL CENTERS
0087-55000-3026-001-DM-A-00	UNINTERRUPTIBLE POWER SUPPLIES AND DISTRIBUTION
0087-60260-0001-001-DM-A-01	CLOSED CIRCUIT TELEVISION SYSTEM
0087-60273-3002-001-DM-A-00	EOP 10 PAGING COMMUNICATION SYSTEM (KEY # 2103)
0087-60300-0001-001-DM-A-02	ANNUNCIATION
0087-61400-3168-001-DM-A-00	CONFIDENTIAL
0087-61500-0001-001-DM-A-00	SEISMIC MONITORING SYSTEM
0087-63103-3000-001-DM-A-00	GROSS ACTIVITY MONITOR (GASEOUS FISSION PRODUCT MONITOR)

13.0 Tables, Continued

Table 4: Design Manuals (continued)

Design Manuals	
0087-63432-0001-001-DM-A-03	EMERGENCY CORE COOLING SYSTEM-INSTRUMENTATION AND CONTROL
0087-63526-0001-001-DM-A-01	D2O SUPPLY SYSTEM INSTRUMENTATION AND CONTROL
0087-63861-0001-001-DM-A-01	D2O/H2O LEAKAGE DETECTION (BEETLES)
0087-64100-3022-001-DM-A-00	TURBINE GENERATOR SUPERVISORY INSTRUMENTATION SYSTEM
0087-64510-0001-001-DM-A-02	CENTRAL SAMPLING SYSTEM
0087-66580-3000-001-DM-A-00	RAMTEK FS2000 GRAPHICAL DISPLAY SYSTEM SOFTWARE
0087-67314-0001-001-DM-A-03	CONTAINMENT ISOLATION SYSTEM
0087-67875-3015-001-DM-A-00	LEAK DETECTION MONITORING OF FEEDER CABINETS (KEY #34)
0087-67878-0001-002-DM-A R0	FIXED TRITIUM IN-AIR MONITORING SYSTEM Addendum #1
0087-67890-3015-001-DM-A-01	SEVERE ACCIDENT SAMPLING/MONITORING SYSTEM (SASMS) (KEY #2284)
0087-68200-0002-001-DM-A-01	SHUTDOWN SYSTEM NUMBER ONE PART 2 - SHUTOFF RODS DESC RIPTION AND CONTROL. SECTION B - ROD LOGIC AND INSTRUMENTATION (68211)
0087-68200-0004-001-DM-A-05	SHUTDOWN SYSTEM NUMBER ONE PART 4 - NEUTRON POWER AND RATE TRIPS (68232) SECTION A - HIGH NEUTRON POWER TRIPS (68231)
0087-68200-0005-001-DM-A-04	SHUTDOWN SYSTEM NUMBER ONE - PART 5 PROCESS TRIP PARAMETERS
0087-68200-0006-001-DM-A-03	SHUTDOWN SYSTEM NUMBER ONE PART 6 ION CHAMBER MOUNTING AND SHUTTER TEST FACILITY (68212)
0087-68300-0002-001-DM-A-01	SHUTDOWN SYSTEM NUMBER TWO PART 2 INJECTION SYSTEM AND CONTROL SECTION B INSTRUMENTATION 63470
0087-68300-0004-001-DM-A-05	SHUTDOWN SYSTEM NUMBER TWO - PART 4 NEUTRON POWER AND RATE TRIPS (68331, 689332)
0087-68300-0005-001-DM-A-02	SHUTDOWN SYSTEM NUMBER TWO - PART 5 PROCESS TRIPS INSTRUMENTATION
0087-68300-0006-001-DM-A-03	SHUTDOWN SYSTEM NUMBER TWO - PART 6 ION CHAMBER MOUNTING AND SHUTTER TEST FACILITY (68312)
0087-68500-0001-001-DM-A-02	EMERGENCY CORE COOLING SYSTEM PART 1 GENERAL REQUIREMENTS AND OVERVIEW

13.0 Tables, Continued

Table 4: Design Manuals (continued)

Design Manuals	
0087-68900-0001-001-DM-A-02	SAFETY RELATED SYSTEMS AND THE TWO GROUP SEPARATION PHILOSOPHY
0087-71300-0001-001-DM-A-00	SERVICE WATER SYSTEM
0087-71400-0001-001-DM-A-04	FIRE PROTECTION SYSTEMS
0087-71730-0001-001-DM-A-01	REACTOR BUILDING ACTIVE DRAINAGE SYSTEM
0087-73110-0001-001-DM-A-02	REACTOR BUILDING COOLING SYSTEM
0087-73420-3039-001-DM-A-00	DEDICATED VENTTILATION FOR D20 MANAGEMENT (KEY #410)
0087-75110-0001-001-DM-A-01	SERVICE AIR SYSTEM
0087-75120-0001-001-DM-A-04	INSTRUMENT AIR SYSTEM
0087-75130-0001-001-DM-A-01	BREATHING/MASK AIR SYSTEM

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories

Nuclear Substances and Prescribed Equipment

ITEM	NUCLEAR SUBSTANCE	UNSEALED SOURCE MAXIMUM QUANTITY	SEALED SOURCE MAXIMUM QUANTITY	EQUIPMENT MAKE AND MODEL	CERTIFICATION NUMBER
1	Activation Products	800 MBq	N/A	N/A	N/A
2	Fission Products	200 MBq	N/A	N/A	N/A
3	Depleted Uranium	6000 grams	N/A	N/A	N/A
4	Am-241	1 MBq	N/A	N/A	N/A
5	Am-241 / Be	N/A	50 GBq	N/A	N/A
6	Activation Products	N/A	5 GBq	N/A	N/A
7	Fission Products	N/A	5 GBq	N/A	N/A
8	Depleted Uranium	N/A	6000 grams	N/A	N/A
9	U-235	N/A	100 KBq	N/A	N/A
10	Cesium 137	N/A	370 MBq	BOT Engineering TR-1A Universal Gamma Checker	414-0011
11	Cesium 137	N/A	50 GBq	J.L. Shepherd 142-10 calibrator	179-0018
12	Strontium 90	N/A	37 GBq	J.L. Shepherd Model 492 Beta Calibrator	179-0001
13	Cesium 137	N/A	5.5 TBq	J.L. Shepherd 89 calibrator	170-0210
14	Strontium 90 / Yttrium 90	N/A	1480 MBq	R-Metrics Beta Meter Checker	276-0001
15	Enriched Uranium 235	N/A	370 kBq	BOT Engineering Model RM-VIFM CDM	414-0012
16	Strontium 90 / Yttrium 90	N/A	50 kBq	Eberline Model CS20 for AAGMs	N/A
17	Cesium 137	N/A	1.1 MBq	Eberline Model CSM-1 for GEM	N/A
18	Cesium 137	N/A	366 kBq	Amersham-Buchler Nds for LEPM	N/A
19	Cesium 137	N/A	4.44 MBq	MGPI Model 124086 for GEM	R-069-002-0-2023
20	Cesium 137	N/A	4.44 MBq	MGPI Model 124087 for GEM	R-069-002-0-2023
21	Colbalt 57	N/A	555 MBq	RMD Instruments, LLC LPA-1	0295-0010

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Chemistry Source Inventory

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
1	Th-230		1.3E2	Alpha Standard, Button	11382
2	Sr/Y-90		1.7E2	Beta Standard, Button	8586
3	Pb-210		1.4E2	Alpha Standard, Button	8047
10	Eu-152		5.1E4	Plastic Shelf	6
31	H-3	Packard	4.9E3	LSC Sealed Vial	60
	C-14	Packard	2.2E3	LSC Sealed Vial	60
32	Ni-63	N/A	5.5E8	ECD Detector	1972
33	H-3	Packard	1.46E3	LSC Sealed Vial	13
	C-14	Packard	7.21E2	LSC Sealed Vial	13
34	H-3	Packard	4.85E3	LSC Sealed Vial	150
	C-14	Packard	2.18E3	LSC Sealed Vial	150
35	H-3	Packard	4.78E3	LSC Sealed Vial	3
36	H-3	Perkin-Elmer	4.8E3	LSC Sealed Vial	36
	C-14	Perkin-Elmer	2.4E3	LSC Sealed Vial	36
37	H-3	Perkin-Elmer	4.8E3	LSC Sealed Vial	1
	C-14	Perkin-Elmer	2.4E3	LSC Sealed Vial	1
38	H-3	Perkin-Elmer	4.8E3	LSC Sealed Vial	20
205	C-137	Beckman	7.4E5	LSC Source (not in LSC)	N/A
206	H-3		4.19E10	1 Litre Bottle (calibration)	N/A
207	H-3		7.9E10	1 Litre Bottle (calibration)	N/A
208	Eu-155 / Na-22	Canberra	3.7E3 3.7E3	Button for ISOXSRC	09079798
	Ba-133	Canberra-Packard	6.9E5	2100TR LSC	N/A

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Health Physics Source Inventory Room S1-217

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
3	Eu-152		4.7E4	2 Plexiglas Sheets for BC Calibration	
4	Eu-152	Amersham	4.9E4	Plexiglas Sheet HPGe detector QC	
18	Pb-210	NMC	5.0E2	Button	7606
25	Eu-152	Amersham	2.2E5	Water	U20147
27	Tc-99		1.9E4	Electroplated Disc for GEM Calibration	S.1937
28	Ba-133		4.6E3	Electroplated Disc for GEM Calibration	S.2229
34	U-238	Teledyne Isotopes	2.9 kg (depleted)	2 slabs in wood case TLD Irradiator	
45	Kr-85	IPL	2.3E9	Gas - 2 Canisters for GEM Calibration	84010
77	Tc-99		1.9E2	Electroplated Disc	
80	C-14		2.2E3	Liquid	
128	C-14	Amersham	2.0E5	Vial Carbonate for C-14 LSC Calibration	X-45114
129	C-14	NEN	3.7E6	1 Vial Benzene for C-14 Stack Monitor Cal.	NEC.010H
141	C-14	Amersham	7.5E6	20-L Lecture Bottle for C-14 Stack Monitor Calibration	63198
157A	C-14		2.3E6	1 L in 0.4N NaOH for LSC Calibration	K6065
157B	C-14		2.3E4	Liquid (1:100 Dilution of # 157A)	K6065
160	Eu-Sb	NBS	3.0E5	5 mL Ampoule for HPGe Calibration	SRM 4276B-187
161	C-14	Gollob	7.5E6	Lecture Bottle -20 L for C-14 Stack Monitor Calibration	64682
181	Am-241	Amersham	5.55E2	Electroplated Disc	6600 RA
183	Am-241	Amersham	5.55E3	Electroplated Disc	7639 RA
184	Am-241 Cm-244 Pu-239	Amersham	5.55E3	Electroplated Disc	9964 RA
185	Am-241	Amersham	1.01E3	Electroplated Sheet in Plastic Box (BP 624) for HFM Cal.	BK-624)
186	Tc-99	Amersham	1.04E3	Electroplated Sheet in Plastic Box for HFM Cal.	BP-186
187	C-14	Amersham	1.22E3	Electroplated Sheet in Plastic Box for HFM Cal.	BP-187
191	Th-230	Thomson & Neilsen Electronics	2.0E2	Electroplated Disk for Radon WL Meter Calibration	4944
199	Eu-152	IPL	3.3E5	Plastic Disc	354-23

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Health Physics Source Inventory Room S1-217 (continued)

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
200	Ba-133	IPL	4.3E5	Plastic Disc	233-14-1
201	Co-60	IPL	4.4E5	Plastic Disc	340-32-5
202	Cs-137	IPL	4.0E5	Plastic Disc	349-93-6
222	Mixed	Amersham	3.7E4	Film Disc	1921QB
225	Am-241		2E3	Nal Detector	KF-462
228	Sr/Y-90	Amersham	2.2E5	5 mL Dolly Bottle for GEM Calibration	S7/36/140
234	Co-57	Amersham	1.67E5	Dolly Bottle for BC Calibration	S2/13/28
234A	Co-57	Amersham	5.14E4	LSC Vial for BC Calibration	S2/13/28
235A	Co-60	Amersham	3.97E4	LSC Vial for BC Calibration	S2/4/64
235B	Co-60	Amersham	1.5E4	LSC Vial for BC Calibration	S2/4/64
235C	Co-60	Amersham	5.0E4	4 L Marinelli (agar) for LEM Calibration	S2/4/64
236A	Cs-137		3.80E4	LSC Vial for BC Calibration	S0/1/148
246	Ba-133	Eberline	3.7E3	Plastic Disc for EOC Check Source	
247	Cs-137	Eberline	1.85E5	Plastic Disc for EOC Check Source	
248	Tc-99	Eberline	1.85E2	Plastic Disc for EOC Check Source	8843
252	Y-88	Amersham	3.27E6	Plastic Disc	DP978
253	Cd-109	Amersham	3.90E6	Plastic Disc	DP979
255	Am-241 CL-36	SURRC	8.33E2 8.33E2	Liquid in Sealed Vial for LSC Calibration	030
260	Ba-133	Packard	6.95E5	Stainless Steel Capsule in Packard 2505 LSC	IND1401
263	Co-60 Cs-137	Canberra	7.4E3 7.4E3	Plastic Disc for BC Calibration	W01847 #1-25
280	Ba-133		1.33E4	Liquid in LSC Vial for BC Calibration	
281	Ba-133		1.3E3	Liquid in LSC Vial BC Calibration	
286	Mixed γ	Analytics	2.0E5	5 ml Ampoule for BC Calibration	51505-12
287	Zn-65	Amersham	2E6	LSC Vial for LEM Calibration	S6/2/7
306	Uranium			Pellets	
312	Cs-137	Exploranium	3.7E4	Plastic Disc for GR-130 Minispec	9757
314	Co-57	Analytics	1.88E5	Dolly Bottle for LEM Cal.	GA9536
316	Cs-137	Analytics	1.88E5	LSC Vial for LEM Cal.	56904-12
316B	Cs-137	Analytics	1.6E3	Filter Paper for GEM Calibration	56908-12
317	Co-60	Analytics	2.03E5	Dolly Bottle for LEM Commissioning	56903-12
323	Cs-137	DKD	4.3E4	Plastic Disk for Waste Monitor	GM825

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Health Physics Source Inventory Room S1-217 (continued)

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
327	Mixed γ	Analytics	1.92E5	Vial for BC & HPGe Calibration	59443-12
329	H-3	Packard	2.73E6	Liquid in 10 Sealed Vials	11
330	H-3 C-14	Packard	2.88E5 1.33E5	Liquid in Sealed Vial for LSC Standard	62
331	H-3 C-14	Packard	8.65E4 4.25E4	Liquid in Sealed Vial for LSC Standard	25
335	Mixed γ		1.87E5	Solid Matrix for BC Calibration	62614-12
337	Mixed γ		3.34E5	Dolly Bottle for HPGe Calibration	63411-12
338	Ba-133		1.91E5	Dolly Bottle for GEM Calibration	63914A-12
338B	Ba-133		9.6E3	Charcoal filter for GEM Cal.	63914A-12
339	Cs-137		2.03E8	Metal Cave	A548
341	Mixed γ	Analytics	1.87E5	Solid Matrix for BC Cal.	68145-12
342	Mixed γ	Analytics	9.98E4	Dolly Bottle for HPGe Cal.	68080-12
343	Mixed γ	Analytics	1.55E5	5 ml Ampoule for HPGe Cal.	68080-12
344	Ba-133		2.22E4	Pellet for GEM Check	
345	H-3 C-14	Perkin-Elmer	4.59E3 2.13E3	3 Sealed Vials for LSC	130
349B	Mixed γ		3.67E4	LSC Vial	
351	Mixed γ	Analytics	1.85E5	LSC vial	73159A-12
352	C-14	Perkin-Elmer	2.45E4	Sealed vial	18
353A	Zn-65	Amersham	3.07E5	1L Marinelli	S6/16/13
354	Cs-137	Amersham	**3.66E5**	Sealed metal cylinder	S9131
355	H-3 C-14	Perkin-Elmer	4.61E3 2.18E3	Sealed vial	142
357	Eu-155 Na-22	Canberra	3.7E4 3.7E4	Acrylic disc for ISOCS	
358	Mixed γ	Eckert-Ziegler	1.85E5	5 mL vial	77306-12
358A	Mixed γ	Eckert-Ziegler	3.34E4	1L Marinelli (bubblepack)	
358B	Mixed γ	Eckert-Ziegler	2.55E4	Chem bottle	
358C	Mixed γ	Eckert-Ziegler	1.36E4	Filter paper	
358D	Mixed γ	Eckert-Ziegler	1.42E4	Urine bottle	
358E	Mixed γ	Eckert-Ziegler	1.39E4	LSC vial	
358F	Mixed γ	Eckert-Ziegler	1.47E4	Charcoal cartridge	
358G	Mixed γ	Eckert-Ziegler	3.54E4	1L Marinelli	
359	Mixed γ	Eckert-Ziegler	1.85E5	5 mL vial	77306-12
360	Co-60	Eckert-Ziegler	1.15E4	Plastic disc	
361	Ba-133	Eckert-Ziegler	3.65E5	Plastic disc	

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Health Physics Source Inventory Room S1-217 (continued)

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
362	Cl-36	Eckert-Ziegler	1.99E4	Plastic disc	
363	Mixed γ	Eckert-Ziegler	1.85E5	LSC vial	
364	Cs-137	QSA Global	3.7E6	Sealed capsule	
365	Cs-137	QSA Global	3.7E5	Sealed capsule GEM	
366	Cs-137	QSA Global	3.7E5	Sealed capsule GEM	
367	Cs-137	QSA Global	3.76E5	Sealed capsule GEM	
368	Cs-137	QSA Global	3.57E6	Sealed capsule PSM	
369	Ba-133	QSA Global	6.95E5	Sealed capsule LSC	
370C	H-3	Isotrak	2.3E6	100 mL bottle GEM	R8/12/27
370D	H-3	Isotrak	2.5E6	5 mL sealed vial	R8/12/29
371	Mixed γ	Analytics	1.85E5	LSC vial	Catalogue # 80155-12
372	H-3	Perkin-Elmer	5E4	10 sealed vial	16
373	C-14	Perkin-Elmer	2.5E4	10 sealed vial	9
374	H-3	Perkin-Elmer	5E4	10 sealed vial	21
375A	H-3	Eckert-Ziegler	2.0E6	5 mL vial	
375B	H-3	Eckert-Ziegler	2.0E6	5 mL vial	
375C	H-3	Eckert-Ziegler	2.1E6	5 mL vial	
376	H-3	Perkin-Elmer	5E4	10 sealed vial	21

Radiation Control Source Inventory, Room S1-107

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
1	Co-60		1.1E3	False Hand	
2	Cs-137		1.5E3	Plastic Plate	
4	Cs-137	The Nucleus	1.7E5	Plastic Button	
5	Natural U		8.1E6	Plate	
6	Tl-204		1.7E5	Plastic Button	
7	Tl-204		1.7E5	Plastic Button	
8	Sr/Y-90		3.0E3	Plastic Plate	JS32
9	Sr-90	The Nucleus	3.7E3	Plastic Button	
10	Sr-90	The Nucleus	3.7E3	Plastic Button	
11	Tl-204	The Nucleus	1.85E4	Plastic Button	
12	Tl-204	The Nucleus	1.85E4	Plastic Button	

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Radiation Control Source Inventory, Rm S1-107 (continued)

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
15	Sr-90		9.3E8	Portable Instrument Check Source	
21	Po-210	The Nucleus	3.7E3	Button	
22	Co-60	The Nucleus	3.7E4	Button	
23	Sr-90	The Nucleus	3.7E3	Button	
24	Sr-90	The Nucleus	3.7E3	Button	
25	Po-210	The Nucleus	3.7E3	Button	
26	Co-60	The Nucleus	3.7E4	Button	
42	Tc-99		1.8E2	Stainless Steel Plate (Button)	CSN/A13 /
43	Cs-137	Beckman	1.5E6	Liquid Scintillation Source	
44	Cs-137	Beckman	1.5E6	Liquid Scintillation Source	
45	Cs-137	Eberline	3.33E5	Yellow Capsule	K.23 / 1477
48	Ba-133	IPL	4.1E4	Button	/ 514-2-3
49	Ba-133	IPL	4.6E3	Button	/ 9592-1
50	Ba-133	NEN	4.1E4	Button	
51	Ba-133	NEN	4.1E4	Button	
52	Ba-133	IPL	4.6E3	Button	/ 514-1-1
53	Ba-133	NEN	4.1E4	Button	
54	Ba-133	IPL	4.1E4	Button	/ 514-2-1
55	Ba-133	IPL	4.7E3	Button	/ 9592-2
56	Sr-Y-90	Eberline	1.4E3	AAGM Seed Source	CS-20 / C-4751
57	Sr-Y-90	Eberline	2.1E3	AAGM Seed Source	CS-20 / C-4756
61	Sr-90	Eberline	2E3	AAGM Seed Source	CS-20 / C-6366
65	Cs-137	Amersham	3.66E3	LEPM	CDR-82902 / 1197-101
66	Sr-90		6.38E8	DRD Checker #1	

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Source Inventory High Range Instrument Calibration Area– Room S1-242

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
1	Cs-137	Shepherd	9.6E12	Shepherd Calibrator	89 / 8120
2	Cs-137	Shepherd	3.7E9	Shepherd Calibrator	89 / 8120
3	Tc-99		4E1	Button in Holder	/ 7854
4	Tc-99		4.2E3	Button in Holder	/ 7856
5	Tc-99		3.7E2	Button in Holder	/ 7855
6	Am-241	Eberline	2.2E1	Button in Holder	S-002A / 7850
7	Ba-133	NEN	9.5E6	Capsule	358 / 3580282A-18
8	Am-241	Eberline	2.1E3	Button in Holder	S-002C / 7852
9	Am-241	Eberline	2.6E4	Button in Holder	S-002D / 7853
11	Am-241/Be	NEN	3.7E8	Sealed Capsule on a Wire	/ A389
12	Th-230	Eberline	5.6E2	Button	S-1163
13	Am-241/Be	Amersham	3.7E10	Neutron Source	S(U) / 3206/149
14	Sr/Y-90	Eberline	2E2	Button	S-1164
15	Sr/Y-90	Amersham	8.5E2	Plate	SIR104 / AA19
16	Tc-99	Amersham	1.27E3	Plate	B0903
17	C-14	Amersham	1.09E3	Plate	B0904
18	Am-241	Amersham	1.02E3	Plate	B0905
20	Sr-90	Shepherd	1.85E9	Beta Calibrator	492-R-50 / 15010
29	Th-230	Eberline	8.34E3	Button	S-2446
31R	Cs-137	N/A	4.0E5	Button (containment activity monitor)	
32	Co-60	The Nucleus	3.7E4	Button	
33	Ba-133	IPL	5E5	Button	
35	Ba-133	IPL	4.63E3	Button	/ 364-6-3
36	Ba-133	IPL	4.55E3	Button	/ 364-6-1
37	Ba-133	IPL	4.59E3	Button	/ 364-6-2
38	Ba-133	IPL	4.29E4	Button	/ 205-57-9
39	Ba-133		4.11E4	Button	/ 205-57-15
40	Tc-99	Amersham	2.9E3	Plate	DZ550

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Source Inventory High Range Instrument Calibration Area– Room S1-242 (continued)

Number	Isotope	Company	Activity (Bq)	Description	Model	Serial Number
41	Ba-133	IPL	4.59E3	Button	/ 9592.3	
44	Ba-133	IPL	4.73E3	Button	/ 514-1-2	
45	Ba-133	IPL	4.72E3	Button	/ 514-1-3	
46	Ba-133		4.62E3	Button		
47	Ba-133		3.7E4	Screw		
54	Sr-85	Analytics	9.05E5	Cylinder	S0314-11 / 1	
55	Sr-85	Analytics	8.97E5	Cylinder	S0314-11 / 2	
87	Eu-152	Analytics	4.6E5	Case		
200	Ba-133		3.41E4	Button	CP303	
399	Am-241	Eberline	2.5E2	Button in holder	S-002B / 7851	
400	Cs-137	Eberline	3.33E5	Lead Pig	K-23 / 14	
403	Ba-133	IPL	4.6E3	Button	1036-13-1	
404	Ba-133	IPL	5.0E3	Button	1036-13-2 P2	
405	Ba-133	IPL	5.0E3	Button	1036-13-3	
406	Ba-133	IPL	4.4E1	Button	1036-13-4	
407	Ba-133	IPL	4.4E1	Button	1036-13-5	
408	Ba-133	IPL	4.4E1	Button	1036-13-6	
410	SrY-90	Eberline	4.32E4	AAGM Seed Source	CS-20 / 5163-03	
411	SrY-90	Eberline	4.25E4	AAGM Seed Source	CS-20 / 5162-03	
412	SrY-90	Eberline	3.74E4	AAGM Seed Source	CS-20 / 5161-03	
413	SrY-90	Eberline	3.194	AAGM Seed Source	CS-20 / 5160-03	
416	Tc-99	AEA Technology	3.12E3	CAM Calibration Source	Ts-30 / MC758	
417	Ba-133	IPL	4.0E4	Button	514-2-2	
418	Cs-137	Eberline	1.1E6	Check source Mechanism	CSM1	
419	Cs-137	Eberline	1.1E6	Check source Mechanism	CSM1 / 1154	
420	Tc-99/ Am-241	MGP	3.99E3	CAM source	06-0739	
421	SrY-90	Eberline	3.7E4	AAGM Seed Source	CS-20	
422	SrY-90	Eberline	3.7E4	AAGM Seed Source	CS-20	
423	SrY-90	Eberline	3.7E4	AAGM Seed Source	CS-20	
424	SrY-90	Eberline	3.7E4	AAGM Seed Source	CS-20	
425	SrY-90	Eberline	3.7E4	AAGM Seed Source	CS-20 / 1030-91	

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Location: Waste Handling Facility

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
HP-322	Cs-137	DKD	4.25E4	Plastic disc to check Waste Bag Monitor	GM826
HP-325	Cs-137	Exploranium	3.7E4	Magnet disc to check Vehicle Monitor	

Location: Security

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
61446-DE-1	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213088
61446-DE-2	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213089
61446-DE-3	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213086
61446-DE-4	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213097
61446-DE-5	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213100
61446-DE-6	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213099
61446-DE-7	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213098
61446-DE-8	Ni-63	Barringer	7.0E8	Personnel Explosive Detector	Sentinel II MD / 213101
	Ni-63	IonTrack	3.7E8	Portable Explosive Detector	Itemiser 3 / 08024904101
	Ni-63	IonTrack	3.0E8	Portable Explosive Detector	Vapour Tracer 2 / 10024934597
	Ni-63	Smith's Detection	5.55E8	Portable Explosive Detector	400B / 25342

Location: Active Stores (S1-008)

Number	Isotope	Company	Activity (Bq)	Description	Model / Serial #
RC-18	Cs-137	Amersham	1.8E8	Sealed capsule	X7 / 1920HD
RC-19	Co-60	Amersham	2.0E8	Sealed capsule	9237GR
RC-69	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278434
RC-70	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278435
RC-71	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278436
RC-72	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278437
RC-73	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278438
RC-74	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278439
RC-75	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278440
RC-76	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278441
RC-77	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278442
RC-78	U-235 Enriched	LND Inc.	6 kBq	Fission Counter	30773 / 278443

13.0 Tables, Continued

Table 5: Equipment, Source and Room Inventories (continued)

Location: Various Locations

Location	Isotope	Company	Activity (Bq)	Description	Model / Serial #
Equipment Airlock	Sr/Y-90	R-Metrics	8E8	Instrument Checker	
Outside SF Bay	Sr/Y-90	R-Metrics	8E8	Instrument Checker	
MM Shop Corridor	Sr/Y-90	R-Metrics	8E8	Instrument Checker	
E Maintenance Lock	Enriched U	BOT Engineering	3.7E5	Bundle Counter	RM-VIFM CDM
W Maintenance Lock	Enriched U	BOT Engineering	3.7E5	Bundle Counter	RM-VIFM CDM
Outside SF Bay	Cs-137	BOT Engineering	3.7E8	Universal γ Checker	TR-1A / E403
LEM Room S1-026	Cs-137		2.3E3	Plastic Disc for LEM QC	050
GEM Room D1-334	Ba-133		2.22E4	Pellet for GEM Check	
GEM Room D1-334	Cs-137	Eberline	1E6	GEM source check	CSM-1
35 locations (AAGMs)	Sr/Y-90	Eberline	4 - 5E4	AAGM seed source	CS20

13.0 Tables, Continued

Table 6: Training Documentation

Document Number	Rev.	Document Title	Date Registered
PRR-00660-SU-3	2	Provide Training	2011 Jan. 20
SI-01365-TR 19	2	Determining Training Needs	2009 Apr. 08
SI-01365-TR 20	1	Designing the Training Solution	2009 Feb. 03
SI-01365-TR 21	1	Developing Training	2009 Feb. 03
SI-01365-TR 22	1	Scheduling Training	2006 Jan. 25
SI-01365-TR 23	3	Delivering Training	2009 Feb. 03
SI-01365-TR 24	2	Evaluating Training Effectiveness	2005 July. 21
SI-01365-A11	10	Radiation Protection Qualification	2002 May 11
SI-01365-A38	1/1	New Employee Plant Orientation	1997 Dec. 16
SDP-01368-TR10	0	Station System Knowledge Objectives User's Guide	2007 Aug. 21
SDP-08410-TR-20.13	1	Conducting Job and Task Analysis	2008 Mar. 04
SDP-01368-TR-11	1	Instructor Training Program	2009 Dec. 14
SDP-08410-TR-30.11	1	Power Plant Operator/Senior Power Plant Operator/Operations Filed Supervisor Training Program	2004 Jun. 01
IR-97179-01	1	Certified Staff Continuing Training Program Description	2010 Jul. 09
SDP-08410-TR-30.22	1	Health Physics Laboratories Training Program	2003 Sept. 03
SDP-08410-TR-30.24	0	Technical Training Program Fredericton	2002 Jun. 26
IR-97177-02	0	Shift Supervisor Incremental Training Program	2011 Feb. 22
IR-97170-01	1	Control Room Operator Candidate Training Program	2011 May 20
SDP-01368-TR14	0	Certified Health Physicist Program Description	2009 Oct. 15
SDP-08410-TR-30.32	0	Technical Assistants Training Program, Health Physics Lab	2002 Mar. 26
SDP-08410-TR-30.33	0	Training Program, Health Physics Lab Supervisor	2002 Sept. 12

13.0 Tables, Continued

Table 6: Training Documentation (continued)

Document Number	Rev.	Document Title	Date Registered
SDP-08410-TR-30.34	0	Training Program, Health Physics Lab ASR	2003 Jan. 09
SDP-08410-TR-30.35	0	Training Program Dose Records, Health Physics	2002 Jun. 13
SDP-08410-TR-30.36	0	Training Program Health Physicist	2002 Aug. 29
SDP-08410-TR-30.37	0	Emergency Planning Group Training Program	2003 Jun. 03
SDP-08410-TR-40.11	1	Performing on the Job Training and Evaluations	2011 Feb. 21
SDP-01368-TR-08	0	Knowledge Based Certification Examinations	2007 Aug. 01
SDP-01368-TR-07	0	Simulator Comprehensive Examinations	2007 Jul. 18
SDP-01368-TR-04	1	Examination Confidentiality	2009 Dec. 14
SDP-08410-TR-50.15	0	Developing and Using Qualification Guides	2004 Oct. 01
SDP-08410-TR-50.16	0	Developing Simulator Delivery Packages	2004 Dec. 22
TP30.15 R2	2	Mechanical Maintenance Training Program	2000 Jan. 10
TP50-03	2	Comprehensive Performance Evaluations	1999 Aug. 30
QTP-08410-QT02	1	Technical Support Personnel Qualification and Training Program	2005 Jun. 29
QTP-08410-QT01	1	Management and Leadership Training and Qualification Program	2007 Aug. 08
IR-08400-01	2	Training Material Development for Refurbishment Outage Modifications.	2010 Apr. 21
IR-08410-01	5	Refurbishment Project Operations Training Program Description.	2010 Oct. 22
IR-08410-03	1	Refurbishment Project Comprehensive Training Program Description	2007 May 03
IR-08410-04	2	Refurbishment Project Maintenance – Chemistry – Fuel Handling Training.	2009 Jun. 24

13.0 Tables, Continued

Table 7: Feeder Documentation

Document Number	Revision	Document Name	Date Registered
PRR-00660-ME-1	2	Establish Maintenance Programs	2011 Jan. 19
SI-01365-T89	1	Establish the Maintenance Program	2004 Sept. 23
RD-01364-L3	17	Operating Policies and Procedures	2009 Nov 30
ASME Section III		ASME B & PV Code, Nuclear Power Plant Components, Division 1	
CSA N285.4 09		Periodic Inspection of CANDU Nuclear Power Plant Components	
ASME Section XI		ASME B & PV Code, rules for In-service Inspection of Power Plant Components	
EPP-33126-FP01	1	Feeder Piping Management Plan	2007 Mar. 22

13.0 Tables, Continued

Table 8: Operating Manuals

Operating Manuals	
0087-01369-3000-001-OM-A-25	SDS1 SAFETY SYSTEM IMPAIRMENTS
0087-01369-3000-002-OM-A-01	SDS2 SAFETY SYSTEM IMPAIRMENTS
0087-01369-3000-003-OM-A-00	CONTAINMENT SAFETY SYSTEM IMPAIRMENTS
0087-01369-3000-004-OM-A-00	EMERGENCY CORE COOLING (ECC) SAFETY SYSTEM IMPAIRMENTS
0087-03101-3000-001-OM-A-07	OM-03101 CORE MONITORING AND PHYSICS CALIBRATIONS
0087-03102-3000-001-OM-A-08	OM-03102 POWER MANEUVERS AND OFF-NOMINAL REACTOR OPERATION
0087-03103-3000-001-OM-A-05	OM-03103 FUEL MANAGEMENT AND REACTIVITY CONTROL
0087-03104-3000-001-OM-A-04	OM-03104 REACTOR PHYSICS: REGIONAL OVERPOWER PROTECTION
0087-03300-3000-001-OM-A-12	OUTAGE HEAT SINK MANAGEMENT
0087-07320-3000-001-OM-A-01	OM-07320 INACTIVE SOLID WASTE HANDLING/DISPOSAL
0087-21601-3008-001-OM-A-13	PERSONNEL AND EQUIPMENT AIRLOCKS
0087-21602-3003-001-OM-A-05	CONTAINMENT DOOR/SHIELDING DOOR
0087-21602-3005-001-OM-A-04	OM-21602/52 FM SHIELDING AND TRANSFER DOORS
0087-22604-3000-001-OM-A-01	OM-22604 T/B PRESSURE RELIEF PANELS
0087-30100-3000-001-OM-A-07	IAEA INTEGRATED SAFEGUARDS SYSTEM
0087-31770-3000-001-OM-A-07	OM-31770/63732 CONTROL ABSORBER RODS
0087-31780-3000-001-OM-A-09	OM-31780/63731 ADJUSTER RODS
0087-32110-3005-001-OM-A-17	MAIN MODERATOR SYSTEM
0087-32210-3013-001-OM-A-15	MODERATOR PURIFICATION SYSTEM
0087-32220-3004-001-OM-A-07	MODERATOR AND FUELLING MACHINE DEUTERATION/DEDEUTERATION
0087-32310-3007-001-OM-A-16	OM-32310 MODERATOR COVER GAS SYSTEM
0087-32510-3002-001-OM-A-09	OM-32510 MODERATOR D2O COLLECTION SYSTEM
0087-32610-3000-001-OM-A-06	OM-32610 MODERATOR D2O SAMPLING
0087-32710-3012-001-OM-A-10	MODERATOR LIQUID POISON
0087-33100-3000-001-OM-A-14	PRIMARY HEAT TRANSPORT SYSTEM
0087-33320-3003-001-OM-A-19	HT PRESSURE AND INVENTORY CONTROL SYSTEM
0087-33330-0001-001-OM-A-07	OM-33330-01 HTS STORAGE AND TRANSFER (SEE OM 33330-2 HTS RECOVERY)
0087-33330-0002-001-OM-A-08	HTS RECOVERY
0087-33340-3002-001-OM-A-09	OM-33340 HT PUMP GLAND SEAL COOLING SYSTEM
0087-33350-3006-001-OM-A-13	OM-33350 HEAT TRANSPORT PURIFICATION
0087-33360-3001-001-OM-A-06	PRIMARY HEAT TRANSPORT DEUTERATION/DEDEUTERATION
0087-33370-3000-001-OM-A-01	OM-33370 AUTOCLAVE SYSTEM

13.0 Tables, Continued

Table 8: Operating Manuals (continued)

Operating Manuals	
0087-33410-3002-001-OM-A-10	OM-33410 SHUTDOWN COOLING SYSTEM
0087-33530-3001-001-OM-A-05	REACTOR BUILDING N2 ADDITION SYSTEM
0087-33540-3005-001-OM-A-04	OM-33540 PHT HYDROGEN ADDITION SYSTEM
0087-33710-3009-001-OM-A-06	HEAT TRANSPORT D2O SAMPLING
0087-33810-3001-001-OM-A-05	OM-33810 PHT D2O COLLECTION SYSTEM
0087-34110-3010-001-OM-A-10	OM-34110 SHIELD COOLING SYSTEM
0087-34310-3010-001-OM-A-13	OM-34310 DOUSING SYSTEM
0087-34320-3023-001-OM-A-15	EMERGENCY CORE COOLING
0087-34410-3000-001-OM-A-09	OM-34410 SPENT FUEL BAY COOLING & PURIFICATION SYSTEM
0087-34510-3002-001-OM-A-07	OM-34510 RESIN TRANSFER SYSTEM
0087-34610-3007-001-OM-A-06	OM-34610/63461 EMERGENCY WATER SUPPLY SYSTEM (EWS/BMW)
0087-34700-3004-001-OM-A-09	OM-34700 LIQUID INJECTION SHUTDOWN SYSTEM
0087-34810-3002-001-OM-A-16	LIQUID ZONE CONTROL SYSTEM
0087-34980-3006-001-OM-A-16	OM 34980 ANNULUS GAS SYSTEM
0087-35100-3000-001-OM-A-08	NEW FUEL STORAGE AND HANLDING
0087-35200-3001-001-OM-A-14	FUELLING MACHINE OPERATIONS
0087-35300-3004-001-OM-A-07	OM-35300 SPENT FUEL STORAGE AND HANDLING
0087-35370-3000-001-OM-A-04	OM-35370 SPENT FUEL DRY STORAGE
0087-36100-3005-001-OM-A-07	OM-36100 BOILER STEAM SYSTEM AND BOILER PRESSURE CONTROL
0087-36200-3000-001-OM-A-06	OM-36200 BOILER FEEDWATER AND LEVEL CONTROL
0087-36310-3034-001-OM-A-10	BOILER BLOWDOWN
0087-36320-3002-001-OM-A-02	OM-36320 BOILER WET LAY-UP/RECIRCULATION SYSTEM
0087-36910-3034-001-OM-A-02	OM-36910 H2O LEAKAGE COLLECTION SYSTEM
0087-36920-3002-001-OM-A-04	OM-36920 SECONDARY SIDE PIPING LEAK DETECTION
0087-38110-3005-001-OM-A-06	D2O SUPPLY SYSTEM
0087-38310-3011-001-OM-A-12	D2O VAPOUR RECOVERY
0087-38410-3007-001-OM-A-05	OM-38410 D2O CLEANUP SYSTEM
0087-38420-3009-001-OM-A-06	OM-38420 D2O UPGRADER
0087-38900-3000-001-OM-A-04	HEAVY WATER HANDLING AND SUPPORT SYSTEM
0087-38940-3000-001-OM-A-03	OM-38940 OIL D2O SEPARATOR (SAREX)
0087-41130-3010-001-OM-A-10	REHEATER AIR WARMING/REHEATER PREWARMING/REHEATER DRAINS
0087-41140-3002-001-OM-A-06	OM-41140 TURBINE TRIPPING SYSTEM
0087-41150-3001-001-OM-A-09	TURBINE GLAND STEAM SYSTEM
0087-41180-3006-001-OM-A-06	OM-41180 TURBINE LP EXHAUST COOLING SYSTEMS

13.0 Tables, Continued

Table 8: Operating Manuals (continued)

Operating Manuals	
0087-41200-3003-001-OM-A-04	GENERATOR AUXILIARY SYSTEMS
0087-41220-3004-001-OM-A-07	OM-41220 GENERATOR STATIC EXCITATION
0087-41230-3006-001-OM-A-12	OM-41230/75200 GENERATOR HYDROGEN COOLING SYSTEM
0087-41240-3005-001-OM-A-10	OM-41240 GENERATOR STATOR COOLING
0087-41310-3004-001-OM-A-06	OM-41310 TURBINE LUBE OIL STORAGE SYSTEM
0087-41330-3002-001-OM-A-12	OM 41330 GOVERNOR FLUID SUPPLY SYSTEM
0087-41340-3002-001-OM-A-06	GENERATOR SEAL OIL SYSTEM
0087-41350-3000-001-OM-A-14	OM-41350/41320/41500 TURBINE GENERATOR LUBRICATION OIL SYSTEMS
0087-42110-3001-001-OM-A-03	OM-42110 IMPURE CONDENSATE COLLECTION AND DISPOSAL
0087-42120-3001-001-OM-A-09	CONDENSER AIR EXTRACTION SYSTEM
0087-43110-3001-001-OM-A-02	OM-43110 EXTRACTION STEAM SYSTEM
0087-43130-3001-001-OM-A-05	OM-43130 FEEDWATER HEATER AND SEPARATOR DRAINS
0087-43140-3001-001-OM-A-04	OM-43140 FEEDWATER HEATER VENTS SYSTEM
0087-43210-3011-001-OM-A-15	OM-43210/43220 CONDENSATE, CONDENSATE MAKE-UP & REJECT SYSTEM
0087-43230-3027-001-OM-A-12	FEEDWATER
0087-43240-3011-001-OM-A-04	OM-43240 CONDENSATE POLISHING SYSTEM
0087-45100-0001-001-OM-A-08	OM-45100-01 CENTRAL SAMPLING SYSTEM
0087-45100-0002-001-OM-A-06	OM-45100-02 CONDENSER LEAK DETECTION
0087-45210-3003-001-OM-A-03	OM-45210 STEAM DRAINS
0087-45400-3003-001-OM-A-07	CHEMICAL ADDITION
0087-51170-3004-001-OM-A-09	ISOLATED PHASE BUS SYSTEM
0087-51210-3003-001-OM-A-04	345 KV DISCONNECT SWITCHES AND GROUND SWITCHES
0087-51220-3000-001-OM-A-05	SWITCHYARD 345 KV AIR BLAST CIRCUIT BREAKERS
0087-51310-3005-001-OM-A-05	345 KV SWITCHYARD COMPRESSED AIR SYSTEM
0087-51330-3006-001-OM-A-06	SWITCHYARD BUILDING HEATING AND VENTILATION
0087-51340-3005-001-OM-A-04	OM-51340 SWITCHYARD AC SUPPLY AND DISTRIBUTION
0087-51350-3000-001-OM-A-04	OM-51350 SWITCHYARD DC SUPPLY AND DISTRIBUTION
0087-51360-3005-001-OM-A-03	OM-51360 SWITCHYARD NORMAL AND EMERGENCY LIGHTING
0087-51410-3004-001-OM-A-09	OM-51410 MAIN UNIT TRANSFORMER UT1
0087-51420-3003-001-OM-A-05	OM-51420 UNIT SERVICE TRANSFORMER UST1

13.0 Tables, Continued

Table 8: Operating Manuals (continued)

Operating Manuals	
0087-51430-3005-001-OM-A-08	OM-51430 SYSTEM SERVICE TRANSFORMER SST1
0087-52000-3001-001-OM-A-23	STANDBY GENERATORS SG1 AND SG2
0087-52900-3007-001-OM-A-14	EMERGENCY POWER SUPPLY
0087-53010-3000-001-OM-A-08	OM-53010 13.8 KV PRIMARY DISTRIBUTION
0087-53223-3001-001-OM-A-08	OM-53223 4.16 KV PRIMARY DISTRIBUTION SYSTEM CLASS III
0087-53224-3000-001-OM-A-06	4.16 KV PRIMARY DISTRIBUTION SYSTEM CLASS IV
0087-54200-3000-001-OM-A-05	600 VAC SWITCHGEAR
0087-54300-3008-001-OM-A-03	OM-54300 MOTOR CONTROL CENTERS
0087-55211-3000-001-OM-A-09	OM-55211 UNINTERRUPTIBLE POWER SUPPLIES (UPS) CLASS 1 250 VDC
0087-55212-3000-001-OM-A-10	OM-55212 UNINTERRUPTIBLE POWER SUPPLIES (UPS) AND DISTRIBUTION PANELS CLASS I 48 VDC
0087-55221-3000-001-OM-A-07	OM-55221 UNINTERRUPTIBLE POWER SUPPLIES (UPS) CLASS II 600 VAC SUPPLY AND DISTRIBUTION
0087-55223-0001-001-OM-A-16	OM-55223 UNINTERRUPTIBLE POWER SUPPLIES (UPS) CLASS II 120 VAC SUPPLY AND DISTRIBUTION
0087-56000-0002-001-OM-A-05	LIGHTING SYSTEMS om-56000-02
0087-57420-3003-001-OM-A-04	OM-57420 HEAT TRACING
0087-58400-3012-001-OM-A-07	OM-58400 CATHODIC PROTECTION SYSTEM
0087-60200-3000-001-OM-A-05	OM-60200 COMMUNICATIONS
0087-60260-3002-001-OM-A-01	OM-60260 CLOSED CIRCUIT TELEVISION
0087-60300-3005-001-OM-A-05	ANNUNCIATION SYSTEM
0087-60439-3001-001-OM-A-01	OM-60439 10 VOLT DC RTD POWER SUPPLIES
0087-60473-3009-001-OM-A-07	OM-60473 PLANT AND SWITCHYARD FAULT RECORDERS
0087-60643-3000-001-OM-A-01	OM-60643 40 VOLT DC INSTRUMENTATION POWER SUPPLIES
0087-61200-3004-001-OM-A-07	OM 61200 METEOROLOGICAL MONITORING
0087-61500-3001-001-OM-A-02	OM-61500 SEISMIC MONITORING SYSTEM
0087-62030-3000-001-OM-A-09	ACCESS CONTROL
0087-63102-3001-001-OM-A-04	OM-63102 CHANNEL TEMPERATURE MONITORING
0087-63103-3003-001-OM-A-06	OM-63103 GROSS ACTIVITY MONITORING SYSTEM (GASEOUS FISSION PRODUCT MONITOR)
0087-63105-3004-001-OM-A-09	FAILED FUEL LOCATION SYSTEM
0087-63495-3000-001-OM-A-09	GAS ANALYSIS
0087-63710-3000-001-OM-A-14	OVERALL PLANT CONTROL
0087-63760-3000-001-OM-A-04	OM-63760 START-UP INSTRUMENTATION
0087-63861-3000-001-OM-A-06	H2O/D2O LEAKAGE DETECTION (BEETLES)
0087-63862-3002-001-OM-A-07	OM-63862 D2O IN H2O LEAK DETECTION SYSTEM
0087-63864-3000-001-OM-A-02	OM-63864 D2O IN AIR MONITORING

13.0 Tables, Continued

Table 8: Operating Manuals (continued)

Operating Manuals	
0087-64111-3004-001-OM-A-04	OM-64111 TURBINE GERERATOR SUPERVISORY
0087-64116-3003-001-OM-A-11	OM-64116 ELECTROHYDRAULIC GOVERNOR
0087-65110-3005-001-OM-A-12	GENERATOR VOLTAGE OUTPUT SYSTEM
0087-65130-3003-001-OM-A-04	SWITCHYARD ANNUNICATION SYSTEM
0087-65220-3009-001-OM-A-08	CLASS III LOAD SEQUENCER
0087-66400-3003-001-OM-A-09	OM-66400 STATION CONTROL COMPUTERS
0087-66460-3005-001-OM-A-02	PROCESS LOCAL AREA NETWORK
0087-66540-3002-001-OM-A-01	OM-66540 EMERGENCY CONDITIONS MONITOR
0087-67140-3000-001-OM-A-00	FIRE ALARM AND DETECTION SYSTEM
0087-67147-3000-001-OM-A-00	VERY EARLY SMOKE DETECTION AND ALARM (VESDA) SYSTEM
0087-67873-3012-001-OM-A-04	OM-67873 ALARMING AREA GAMMA MONITORS
0087-67874-3000-001-OM-A-04	OM-67874 PORTAL RADIATION MONITOR
0087-67875-3010-001-OM-A-08	FEEDER CABINET LEAK DETECTION SYSTEM (INCLUDING BACKUP FIXED TRITIUM-IN-AIR MONITOR, 67878-RT1 AND 67875-RT8 FOR FM MAINTENANCE LOCKS)
0087-67878-3007-001-OM-A-03	FIXED TRITIUM IN AIR MONITORING
0087-67883-3004-001-OM-A-18	OM-67883 GASEOUS EFFLUENT MONITOR
0087-68200-3000-001-OM-A-07	OM-68200 SHUTDOWN SYSTEM ONE
0087-68300-3000-001-OM-A-11	SHUTDOWN SYSTEM 2
0087-68900-3000-001-OM-A-06	OM-68900 SAFETY SYSTEM MONITORING SYSTEM
0087-71110-3002-001-OM-A-08	OM-71110 PUMPHOUSE COMMON SYSTEMS
0087-71190-3000-001-OM-A-07	OM-71190 OFF-SITE FRESH WATER SUPPLY
0087-71200-3000-001-OM-A-12	CONDENSER CIRCULATING WATER SYSTEM
0087-71310-3004-001-OM-A-14	RAW SERVICE WATER / RSW BEARING COOLING
0087-71340-0001-001-OM-A-12	RECIRCULATED COOLING WATER SYSTEM (RCW)
0087-71340-0002-001-OM-A-08	OM-71340-02 TURBINE AUXILIARIES LOOP RECIRCULATED COOLING WATER SYSTEM
0087-71340-0003-001-OM-A-04	OM-71340-03 INSTRUMENT AIR COMPRESSOR COOLING SYSTEM (IACC)
0087-71340-0004-001-OM-A-02	OM-71340-04 BAFFLED BATH COOLING LOOP RECIRCULATED COOLING WATER SYSTEM (BBRCW)
0087-71400-3011-001-OM-A-17	FIRE PROTECTION / DETECTION SYSTEM (OM-71400/67140)
0087-71401-0001-001-OM-A-02	FIRE PROTECTION IMPAIRMENTS AND LIMITATIONS
0087-71410-3000-001-OM-A-01	FIRE PUMPS/JOCKEY PUMPS AND UNDERGROUND FIRE WATER SUPPLY CIRCUIT
0087-71510-3005-001-OM-A-08	DOMESTIC WATER SYSTEM
0087-71600-3001-001-OM-A-05	OM-71600 WATER TREATMENT PLANT

13.0 Tables, Continued

Table 8: Operating Manuals (continued)

Operating Manuals	
0087-71720-3000-001-OM-A-04	OM-71720 SERVICE AND REACTOR BUILDINGS INACTIVE UNDERDRAINAGE
0087-71730-3000-001-OM-A-06	REACTOR BUILDING ACTIVE DRAINAGE
0087-71740-3004-001-OM-A-06	OM-71740 SERVICE BUILDING ACTIVE DRAINAGE
0087-71750-3005-001-OM-A-12	SEWAGE
0087-71760-3008-001-OM-A-02	ROOF DRAINAGE
0087-71780-3015-001-OM-A-25	TURBINE BUILDING INACTIVE DRAINAGE AND TREATMENT
0087-71790-3003-001-OM-A-03	OM-71790 MISC. BUILDINGS INACTIVE DRAINAGE
0087-71900-3004-001-OM-A-13	CHILLED WATER SYSTEM
0087-72130-3006-001-OM-A-06	AUXILIARY STEAM AND CONDENSATE SYSTEM
0087-73010-3003-001-OM-A-10	HEATING PLANT SYSTEM
0087-73110-3005-001-OM-A-08	REACTOR BUILDING COOLING SYSTEM
0087-73120-3013-001-OM-A-13	REACTOR BUILDING VENTILATION SYSTEM
0087-73140-3007-001-OM-A-14	OM-73140/67314 CONTAINMENT ISOLATION SYSTEM
0087-73210-3013-001-OM-A-06	OM-73210 TURBINE BUILDING HEATING SYSTEM
0087-73220-3022-001-OM-A-07	OM-73220 TURBINE BUILDING VENTILATION
0087-73310-3000-001-OM-A-03	OM-73310 CIRCULATING WATER PUMPHOUSE HEATING
0087-73320-3000-001-OM-A-04	OM-73320 CIRCULATING WATER PUMPHOUSE VENTILATION
0087-73410-3000-001-OM-A-02	OM-73410 SERVICE BUILDING HEATING SYSTEM
0087-73420-3038-001-OM-A-08	OM-73420 SERVICE BUILDING VENTILATION
0087-73510-3004-001-OM-A-09	OM-73510 AUXILIARY HEATING BOILER
0087-73810-3000-001-OM-A-05	OM-73810/73820 ADMINISTRATION BUILDING HVAC
0087-73900-0001-001-OM-A-02	OM-73900-01 EFFLUENT PUMPHOUSE HEATING AND VENTILATON
0087-73900-0002-001-OM-A-03	OM-73900-02 HANSON STREAM AND ON-SITE FRESH WATER PUMPHOUSE HEATING AND VENTILATION
0087-73900-0003-001-OM-A-05	OM-73900-03 SECONDARY CONTROL ROOM HEATING AND VENTILATION
0087-73900-0004-001-OM-A-02	OM-73900-04 ECC BUILDING HEATING AND VENTILATION
0087-73910-3000-001-OM-A-03	STOIC BUILDING HEATING AND VENTILATION
0087-75101-3000-001-OM-A-01	OM-75101 STOIC COMMON AIR

13.0 Tables, Continued

Table 8: Operating Manuals (continued)

Operating Manuals	
0087-75110-3010-001-OM-A-06	OM-75110 SERVICE AIR SYSTEM
0087-75120-3017-001-OM-A-12	INSTRUMENT AIR & BREATHING AIR SYSTEMS
0087-75140-3000-001-OM-A-04	OM-75140 SPENT FUEL DISCHARGE BAY AIR RETURN SYSTEM
0087-75300-3000-001-OM-A-07	BULK HYDROGEN SYSTEM
0087-75620-3001-001-OM-A-01	OM-75620 PROPANE SYSTEM
0087-75700-3000-001-OM-A-07	BULK NITROGEN SYSTEM
0087-78210-3002-001-OM-A-13	PLANT CHEMISTRY CONTROL
0087-79100-3000-001-OM-A-07	SOLID RADIOACTIVE WASTE MANAGEMENT FACILITY
0087-79140-3010-001-OM-A-07	SPENT RESIN HANDLING SYSTEM
0087-79150-3002-001-OM-A-04	OM-79150 SPENT FILTER FLASKS
0087-79190-3000-001-OM-A-04	OM-79190 RADIOACTIVE WASTE HANDLING EQUIPMENT
0087-79210-3000-001-OM-A-15	RADIOACTIVE LIQUID WASTE MANAGEMENT
0087-97186-3000-001-OM-A-08	FIRE TRAINING GROUNDS
87RF-34410-3001-001-OM-A-01	SPENT FUEL BAY TEMPORARY COOLING
87RF-73010-3000-001-OM-A-02	REFURBISHMENT AUXILIARY BOILER
87RF-73120-0002-001-OM-A-03	CALANDRIA DRY AND VENT SYSTEM (DASS)
87RF-73220-3026-001-OM-A-01	SECONDARY SIDE DEHUMIDIFICATION SYSTEM (REFURB)
87RF-79140-3010-001-OM-A-01	SPENT RESIN HANDLING SYSTEM

Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant	New Brunswick Power Nuclear Corporation
Subject	Request for Approval to Reload Fuel and Restart the Point Lepreau Nuclear Generating Station, and Application to Renew the Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station
Public Hearing Date	October 6, 2011 and December 1 and 2, 2011

Canada

RECORD OF PROCEEDINGS

Applicant:	New Brunswick Power Nuclear Corporation
Address/Location:	P.O. Box 600, Lepreau, N.B. E5J 2S6
Purpose:	Request for approval to reload fuel and restart the Point Lepreau nuclear generating station, and application to renew the Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station
Application received:	June 3, 2011
Dates of public hearing:	October 6, 2011 and December 1 and 2, 2011
Location:	Day 1: Canadian Nuclear Safety Commission (CNSC) Public Hearing Room, 280 Slater St., 14th. Floor, Ottawa, Ontario Day 2: Delta Brunswick, 39 King St., Saint John, New Brunswick
Members present:	M. Binder, Chair R. J. Barriault M. J. McDill

Assistant Secretary and Secretary:	K. McGee and M.A. Leblanc
Recording Secretary:	M. Young
Senior General Counsel:	J. Lavoie

<table>
<tr><th colspan="3">Applicant Represented By</th><th>Document Number</th></tr>
<tr><td colspan="3">• G. Thomas, President and CEO
• B. Kennedy, Vice-President Nuclear
• W. Parker, Station Director
• R. Eagles, Deputy Chief Nuclear Officer and Refurbishment Director
• C. Hickman, Transition Manager
• K. Duguay, Public Affairs Manager
• P. Thompson, Nuclear Safety & Regulatory Affairs Manager
• M. Hare, Production Manager</td><td>CMD 11-H12.1
CMD 11-H12.1A
CMD 11-H12.1B
CMD 11-H12.1C</td></tr>
<tr><th colspan="3">CNSC staff</th><th>Document Number</th></tr>
<tr><td>• R. Jammal
• G. Rzentkowski
• L. Love-Tedjoutomo
• A. Bouchard
• C. Cattrysse
• B. Valpy
• C. McDermott
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• R. Avadhanula
• S. Simic</td><td>• G. Cherkas
• B. Carroll
• A. Blahoianu
• R. Lane
• J. Mok
• M. Couture
• K. Kirkhope
• G. Frappier
• K. Mann</td><td>• M. Rinker
• R. Stenson
• K. Bundy
• L. Sigouin
• K. Lange
• J. Ramsay
• L. Colligan
• J. McManus
• C. Purvis</td><td>CMD 11-H12
CMD 11-H12.A
CMD 11-H12.B
CMD 11-H12.C</td></tr>
</table>

Intervenors	Document Number
See appendix A	
Others	
New Brunswick Department of Public Safety, represented by E. MacGillivray	CMD 11-H12.37
Natural Resources Canada on seismic events in Canada, represented by J. Adams	CMD 11-H12.38

Permission to Reload Fuel and Restart the Reactor: Granted
Licence: Renewed

Table of Contents

Introduction

1. New Brunswick Power Nuclear Corporation (NBPN) has applied to the Canadian Nuclear Safety Commission[1] (CNSC) for the renewal of the Power Reactor Operating Licence (PROL) for its Point Lepreau nuclear generating station (PLNGS). The current operating licence PROL 17.01/2012 expires on June 30, 2012. NBPN has applied for the renewal of this licence for a period of five years, until June 30, 2017.

2. The PLNGS site is located in New Brunswick (NB) on the Lepreau Peninsula, 40 kilometres southwest of Saint John, NB, on the northern shore of the Bay of Fundy. The PLNGS site consists of a single CANDU-6 pressurized heavy water reactor and a Solid Radioactive Waste Management Facility (SRWMF). The activities licensed by the current PROL include a maintenance outage to retube the reactor and refurbish the station with the intention to extend the operation of the PLNGS for 25 to 30 years. The retubing activities include the replacement of all pressure tubes, calandria tubes and feeder pipes. The refurbishment activities include additional repairs, replacements, inspections and upgrades.

3. The current PROL requires prior Commission approval before NBPN can begin reloading fuel into the reactor core and proceed with the reactor's restart. This licence also contains a requirement that NBPN provide a completion assurance report on the installation and commissioning of the refurbishment improvements and modifications listed in the licence.

4. In addition to the renewal of the PROL for the PLNGS, NBPN has requested permission to re-load fuel and restart the reactor, following the release of proposed regulatory hold points.

Issue

5. In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*[2] (NSCA):

    a) if NBPN is qualified to carry on the activity that the licence would authorize; and

    b) if, in carrying on that activity, NBPN would make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

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[1] The *Canadian Nuclear Safety Commission* is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.
[2] Statutes of Canada (S.C.) 1997, chapter (c.) 9.

Public Hearing

6. The Commission, in making its decision, considered information presented for a public hearing held on October 6, 2011 in Ottawa, Ontario and December 1 and 2, 2011 in Saint John, NB. The public hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*[3]. During the public hearing, the Commission considered written submissions and heard oral presentations from CNSC staff (CMD 11-H12, CMD 11-H12.A, CMD 11-H12.B, CMD 11-H12.C) and NBPN (CMD 11-H12.1, CMD 11-H12.1A, CMD 11-H12.1B, CMD 11-H12.1C). The Commission also considered oral and written submissions from 37 intervenors (see Appendix A for a detailed list of interventions).

Decision

7. Based on its consideration of the matter, as described in more detail in the following sections of this *Record of Proceedings*, the Commission concludes that NBPN is qualified to carry on the activity that the licence will authorize. The Commission is of the opinion that NBPN, in carrying on that activity, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Therefore,

> the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews New Brunswick Power Nuclear Corporation's Power Reactor Operating Licence for its Point Lepreau Nuclear Generating Station located on the Lepreau Peninsula in New Brunswick. The renewed licence, PROL 17.00/2017, is valid from February 17,2012 to June 30, 2017. The Commission concurrently revokes PROL 17.01/2012.
>
> In addition, the Commission grants New Brunswick Power Nuclear Corporation permission to proceed with fuel reload and restart of the reactor.

8. The Commission includes in the licence the conditions as recommended by CNSC staff and set out in the draft licence attached to CMD 11-H12.C and the draft Licence Conditions Handbook attached to CMD 11-H12.

9. The Commission delegates authority for approvals associated with fuel reload and post-fuel reload regulatory hold points to the CNSC Executive Vice President and Chief Regulatory Operations Officer, Regulatory Operations Branch.

[3] Statutory Orders and Regulations (SOR)/2000-211.

10. The Commission requires that NBPN perform a site-specific seismic hazard assessment. The Commission notes that NBPN has submitted an assessment plan as a part of its response to the CNSC staff action plan on the *CNSC Fukushima Task Force Report*[4] recommendations. The Commission further requires that NBPN share the results of this assessment as part of its public information program.

11. The Commission notes that CNSC staff presents its annual Integrated Safety Assessment of Canadian Nuclear Power Plants at a public proceeding of the Commission in approximately August of each year. The Commission further notes that the public will have an opportunity to provide written comments on this report.

Issues and Commission Findings

12. In making its licensing decision, the Commission considered a number of issues relating to NBPN's qualification to carry out the proposed activities and the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.

Post-Fukushima Regulatory Activities

13. CNSC staff provided information regarding the impact of the Fukushima nuclear accident on the licence renewal application. CNSC staff explained that on March 17, 2011, the CNSC Executive Vice-President and Chief Regulatory Operations Officer sent written requests to all Class 1 nuclear facilities, including the PLNGS, to review initial lessons learned from the events in Japan and re-examine the safety cases of nuclear power plants, and report on implementation plans for short-term and long-term measures to address any significant gaps. CNSC staff noted that there was a focus on the underlying defence-in depth concept, particularly on external hazards such as seismic, flooding, fire and extreme weather events; measures for the prevention and mitigation of severe accidents; and emergency preparedness.

14. CNSC staff further stated that the intention of short-term and long-term measures or actions was to confirm the availability and readiness of safety systems, and to give strong assurance that the risks related to the operation of nuclear power plants would continue to be low, and to identify opportunities to further enhance safety of nuclear power plants in light of lessons learned from the Fukushima event.

15. CNSC staff noted that NBPN provided an initial response on March 28, 2011 noting that extensive reviews and implementation of a number of design changes related to the management of severe accidents had already been completed as part of the refurbishment. On April 28, 2011, NBPN confirmed that, based on its preliminary re-examination of the safety cases, the risk related to PLNGS operation continued to be very low. NBPN committed to improvement actions that had already been initiated and, on July 28, 2011, submitted its long-term actions and implementation plans.

[4] CNSC Fukushima Task Force Report, September 30, 2011.

16. CNSC staff noted that, in addition to the physical improvements, the scope of the refurbishment work included design modifications and enhancements that extended the original plant design basis, which includes low-probability accidents that have potentially high consequences. CNSC staff stated that the PLNGS has been safeguarded against events such as a total loss of power followed by a loss of heat sinks that resulted in the catastrophic accident in Fukushima. CNSC staff further stated that Severe Accident Management Guidelines were implemented to mitigate potential consequences of these accidents should they occur.

17. CNSC staff noted that the design modifications and enhancements included the passive autocatalytic hydrogen recombiners, a dedicated emergency containment venting system, a main control room ventilation system, post-accident sampling and monitoring equipment, and a calandria vault make-up line for adding water from outside the reactor building. CNSC staff stated that, as a result of these enhancements, the PLNGS meets modern safety goals established for plants undergoing life extension.

18. CNSC staff reported that the *CNSC Fukushima Task Force Report* was issued on September 30, 2011. CNSC staff provided information regarding the report conclusions and recommendations applicable to the licence renewal and return to service of the PLNGS.

19. CNSC staff stated that the report concluded that Canadian nuclear power plants are safe and that the risk they pose to the health and safety of Canadians or to the environment is very small. CNSC staff stated that it verified that the threat of a major earthquake at a Canadian nuclear power plant is negligible. CNSC staff noted that the report included recommended improvements to further enhance the safety of nuclear power plants in Canada and reduce the associated risks. CNSC staff further noted that many of the recommended enhancements were either fully installed or near completion at the PLNGS.

20. CNSC staff stated that, based on the post-Fukushima review, the CNSC Task Force confirmed that the PLNGS has a robust design relying on multiple layers of defence that would ensure that there would be no impact on the public from credible external events, and provide protection against more severe external events that are much less likely to occur. CNSC staff noted that further enhancements may be implemented in line with the Canadian nuclear industry.

21. CNSC staff further stated that the current status of emergency preparedness and response measures in New Brunswick, specifically the onsite and offsite preparedness and response, is adequate. CNSC staff noted that the CNSC Task Force verified that there were no significant gaps in emergency planning at PLNGS or at the provincial level. CNSC staff noted that the effectiveness of emergency measures could be further improved through upgrading onsite emergency facilities and equipment, formalizing all arrangements and agreements for external support, and having better integration with the existing provincial emergency plans.

22. CNSC staff stated that there was an ongoing public process regarding the *CNSC Fukushima Task Force Report*, with opportunities for public comments.

Management and Operating Performance

Management System

23. The management system covers the framework that establishes the processes and programs required to ensure an organization achieves its safety objectives and continuously monitors its performance against these objectives thereby fostering a healthy safety culture. The management system includes safety management, quality management, organizational management and change management.

24. NBPN stated that its management system includes related management activities and is implemented to provide adequate confidence that safety-related equipment, systems and structures perform according to stated requirements during the course of their service lifetime. NBPN noted that it has a Nuclear Management Manual, which describes the Management System and the high-level policies, principles, and processes through which the station achieves its goals and performance objectives.

25. CNSC staff provided information concerning their review of NBPN's management system. Regarding safety management and quality management, CNSC staff stated that it has adopted the CSA standard *N286-05*[5] as being acceptable for a management system program and noted that NBPN was in full compliance with this standard. CNSC staff stated that NBPN staff has implemented the required management system processes to levels of effectiveness and rigour that meet CNSC requirements.

26. CNSC staff stated that organizational management and change management ensures that organizational changes are evaluated, managed and communicated, both internally and externally, to ensure that the changes do not adversely impact safety. CNSC staff reported that NBPN has a well documented and properly implemented process for change management. CNSC staff noted that NBPN has undergone numerous organizational changes since the beginning of refurbishment and that recent organizational changes implemented in August 2011 have not had a negative impact on NBPN's overall safety performance.

27. NBPN provided information regarding its corrective action program. NBPN noted that in order to minimize the potential for repeat performance problems, it is essential that events and event precursors are investigated and appropriate actions implemented in a timely manner. NBPN explained that a systematic process of event investigation to identify the causes of events significantly contributes to continual improvement initiatives in the areas of safety, quality and reliability. NBPN noted that it also uses benchmarking, the process of looking outside the organization to identify, evaluate and implement leading industry practices and lessons learned.

[5] N286-05: Management System Requirements for Nuclear Power Plants, Canadian Standards Association, 2005.

28. NBPN also described its self-assessment program, which assists in evaluating the effectiveness of programs, processes, or performance areas to improve in a proactive manner. NBPN explained that self-assessments are structured in an objective process to assess the effectiveness of programs against predetermined standards and expectations.

29. CNSC staff noted that one of the basic requirements of an effective management system is that the licensee assesses its management system regularly to ensure that it provides continued compliance with regulatory and internal requirements. CNSC staff reported that NBPN has a well-structured, and well-defined and documented self-assessment program, although during refurbishment the self-assessment program deteriorated in certain areas related to corrective actions. CNSC staff stated that the deterioration in the self-assessment program is minor and CNSC staff is satisfied with the corrective measures provided by NBPN ensure that this program remains acceptable.

30. CNSC staff stated that the management system program is adequate and its implementation meets regulatory requirements.

Human Performance Management

31. Human performance management encompasses activities that enable effective human performance through the development and implementation of processes that ensure a licensee's staff are sufficient in number in all relevant job areas, and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties. Human performance management includes personnel training, personnel examination and certification, work organization and job design, human performance programs and fitness-for-duty. CNSC staff noted that the proposed licence contains a licence condition requiring a human performance program with the expectations outlined in the proposed Licence Conditions Handbook.

32. NBPN provided information about its human factors program and its human performance program. NBPN discussed its staffing and training processes. NBPN noted that it would ensure that staffing levels remain adequate into the future through recruitment of new staff and the retention of existing licensed staff. Regarding training, NBPN explained that it uses a Systematic Approach to Training and reviews training effectiveness on a regular basis. NBPN described its training programs for areas such as maintenance, management, engineering, fuel handling and security, as well as its training facilities. NBPN noted that it uses training performance indicators and has planned several improvement initiatives, including improving its evaluation of training effectiveness. NBPN also described its fitness-for-duty program, which provides wellness programming, monitoring and support for employees, including training.

33. NBPN also provided information regarding staff certification. NBPN noted that its training program was designed based on the requirements specified in CNSC regulatory document RD-204[6].

34. Regarding training, CNSC staff stated that from a design perspective, the PLNGS training system complies with the fundamental requirements of a Systematic Approach to Training model. CNSC staff also noted some deficiencies. CNSC staff explained that while NBPN was generally creating the required products and documentation associated with the analysis, design and development phases of its training system, it was not evaluating its courses and training programs, nor was it systematically following up with managers to ensure that the courses were addressing the requirements of the users. CNSC staff stated that NBPN has developed and is progressing with an internal training improvement plan to correct these deficiencies and improve its training system. CNSC staff noted that it would monitor NBPN's progress in addressing these training issues.

35. Regarding personnel examination and certification, CNSC staff stated that personnel certification programs ensure that workers assigned to positions that have a direct impact on the safe operation of the facility are fully qualified to perform their duties. CNSC staff reported that, to date, the certification examinations supporting personnel certification have met CNSC regulatory requirements. For currently certified staff, CNSC staff stated that the requalification testing program for renewal of certification of personnel at PLNGS is satisfactory. CNSC staff noted that the full implementation of the initial certification examination program for control room operators at the PLNGS would take place once PLNGS has returned to service. CNSC staff further noted that the requirements for refresher training and update training on changes as a result of refurbishment and operation with new fuel would be detailed in the Licence Conditions Handbook.

36. CNSC staff also discussed work organization and job design. CNSC staff stated that NBPN has addressed the issue of having an aging workforce by formalizing the staff succession planning process and implementing a policy that enables knowledge transfer in key positions.

37. CNSC staff noted that some deficiencies were identified during an inspection of NBPN's process for monitoring and complying with minimum shift complement requirements. As such, CNSC staff stated that it would carry out follow-up activities during the next licensing period to confirm that the changes implemented by NBPN to address this issue are in effect. CNSC staff noted NBPN's process to manage work hours to minimize the impact of fatigue upon performance and also noted that NBPN has an acceptable fitness-for-duty program in place.

38. CNSC staff stated that NBPN's program for human performance is adequate and its implementation meets regulatory requirements.

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[6] CNSC Regulatory Document RD-204, "Certification of Persons Working at Nuclear Power Plant", 2008.

39. The Commission enquired about the staffing levels at the site and the expectations for future needs following the completion of refurbishment. A representative from NBPN responded that NBPN has a full complement of licensed staff who have continued their training throughout the refurbishment outage. The NBPN representative further stated that NBPN is managing the training requirements of its employees and that it has the staff required to resume operation. CNSC staff concurred and stated that it is satisfied with NBPN's human performance management.

40. The Commission noted that there were several changes in the management structure for NBPN and asked whether this posed any challenges. A representative from NBPN responded that it did not pose any challenges and noted that many of the changes involved employees changing roles from operation to the refurbishment outage.

41. The Commission asked for more information concerning the fitness-for-duty program at the PLNGS. A NBPN representative responded that the program has a documented process with guidance for supervisors to look for wellness issues, such as fatigue, and monitor behaviour. The NBPN representative stated that NBPN encourages self-reporting for workers, so if they feel that they cannot perform their duties, they can be assigned to other work or sent to the health unit. The NBPN representative further stated that NBPN has a substance abuse program as part of its overall program to ensure that it gets the necessary support to individuals who require assistance.

42. Several intervenors, including the International Brotherhood of Electrical Workers, Local 37 and an NBPN employee, expressed support for the human performance management at the PLNGS, noting that there is a positive safety culture at the facility with well-trained and qualified people. The Commission inquired about the relationship between management and the workers. The intervenors expressed that there is a good relationship between the union and management. A representative from NBPN noted that NBPN works with the International Brotherhood of Electrical Workers, Local 37 to develop policies, such as the hours of work policy.

Operating Performance

43. NBPN provided information about its operating performance. NBPN described its operating processes and procedures, which outline the safe operation of the facility. CNSC staff stated that its review of NBPN's operating performance included an overall review of the conduct of the licensed activities and the activities that enable effective performance at the PLNGS site. CNSC staff noted that its compliance activities during the licence period included surveillance, monitoring and walk-down inspections. CNSC staff stated that, during the licensing period, NBPN operated the PLNGS and waste storage facilities safely and in compliance with the NSCA, regulations and the conditions of the licence. CNSC staff stated that documentation relating to operating the plant is considered adequate for the next licensing period to ensure continued safe, uniform, and efficient operating practices.

44. NBPN also provided information regarding operating experience (OPEX). NBPN explained that the objective of the OPEX program is to prevent the recurrence of station and industry events through the effective sharing and use of industry operating experience. CNSC staff noted that OPEX requires the licensee to identify safety significant events, to analyze them and develop corrective actions to prevent recurrence. CNSC staff stated that OPEX program implemented at PLNGS is well-established through the corrective action program.

Conclusion on Management and Operating Performance

45. Based on the above information, the Commission concludes that NBPN has in place the necessary programs in the areas of quality management, human performance and training to ensure continued adequate human performance at the facility. Furthermore, the Commission concludes that NBPN has appropriate organization and management structures in place and that the operating performance at the facility provides a positive indication of NBPN's ability to adequately carry out the activities under the proposed licence.

Facility and Equipment

46. The Commission examined issues related to the program areas of Safety Analysis, Physical Design and Fitness for Service in order to assess the adequacy of the safety margins provided by the design of the facility.

Safety Analysis

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

48. NBPN stated that the safety analyses performed to support the operating licence were divided into two distinct categories, one deterministic and the other probabilistic, and are summarized in the Safety Report for the PLNGS. NBPN explained that relevant new analyses are incorporated into the Safety Report on a three-year cycle, with the most recent edition of the Safety Report (2009) including all of the analysis performed to support the refurbishment of the PLNGS.

Deterministic Analysis

49. NBPN described the deterministic analyses. NBPN explained that analyses of the outcome of pre-selected events, called design basis events, are performed to show that the safety systems are capable of mitigating the consequences of these events, and to determine any constraints or limits on the operation and maintenance of the station. NBPN noted that additional analyses are also performed to assess less probable events. NBPN stated that there is an on-going management of safety analysis issues at the PLNGS to ensure that changes to the plant design and operation, along with new information coming from operating experience or research and development initiatives, do not have a detrimental effect. NBPN noted that any changes that could impact the safety case would be analyzed, documented and included in the next revision of the Safety Report.

50. CNSC staff stated that NBPN's program for safety analysis is adequate and its implementation is meeting regulatory requirements. CNSC staff acknowledged the number of safety analyses that were completed to support the design changes of refurbishment. CNSC staff noted that the analyses also incorporated severe accident management, including the implementation of the emergency plan.

Probabilistic Analysis

51. The Probabilistic Safety Assessment for a nuclear power plant is a comprehensive and integrated assessment of the safety of the plant that considers the probability, progression and consequences of equipment failures or other adverse conditions to derive numerical estimates that provide a measure of the safety of the plant. CNSC Regulatory Standard *S-294*[7] requires that licensees complete relevant Probabilistic Safety Assessments to assess, respectively, the probability of core damage and the probability of off-site releases for internal and external events, during normal operation and shutdown conditions.

52. NBPN stated that it developed a Probabilistic Safety Assessment compliant with *S-294*. NBPN explained that the probabilistic safety assessment estimates the frequencies for various states of damage to the facility and the external radiological releases following various postulated design basis initiating events. NBPN noted that the cause and effect sequences for determining these frequencies encompass plant design, operations and maintenance practices, human reliability, and the potential for common cause failures that could reduce inherent redundancies in system design. NBPN further noted that the assessment also incorporates the success and failure of mitigating actions by plant operators or plant safety systems.

[7] CNSC Regulatory Standard S-294, "Probabilistic Safety Assessment for Nuclear Power Plants", 2005.

53. CNSC staff stated that it reviewed NBPN's Probabilistic Safety Assessment and reported that NBPN meets the safety limits and complies with the requirements of *S-294*. CNSC staff confirmed that the Probabilistic Safety Assessment must be updated every three years and that the next update to the assessment would be completed in June 2012. CNSC staff stated that the updated assessment would reflect work done during the refurbishment outage. CNSC staff further stated that the results to date show that there is a sufficient safety margin for the facility.

54. CNSC staff further discussed the Probabilistic Safety Assessment. CNSC staff stated that the external events considered in the assessment included internal fires and floods, and seismic events. CNSC staff stated that the Point Lepreau site has been assessed for a wide range of external events and has a proven ability to withstand severe seismic activity and flooding with no significant damage.

55. The Commission enquired about the safe operating envelope for the PLNGS. A representative from NBPN responded that NBPN is in the process of updating its safe operating envelope analysis to be in line with the new standard. The NBPN representative noted that NBPN has always operated within the safe operating envelope. CNSC staff noted that the safe operating envelope is important because it clearly defines parameters for operation.

56. The Sustainable Energy Group, Carleton Chapter, in its intervention, expressed concerns regarding the impact of solar flares on the power grid and highlighted the need for backup power. The Sustainable Energy Group explained that solar storms with unprecedented levels of magnetic energy may occur in 2012 to 2013 that could potentially damage power systems. The Commission enquired about the impact of a major electrical power interruption lasting months. CNSC staff responded that in the case of prolonged loss of power, the reactor would shut down safely and be maintained in a safe state. CNSC staff noted that during the northeast blackout in 2003, the reactors were shut down safely and maintained in a safe state for the period required. A NBPN representative stated that NBPN has sufficient fuel onsite to operate its backup emergency power generators for at least five days, and noted that additional fuel could be brought to the site, as necessary. The NBPN representative explained that the Province of New Brunswick has a critical infrastructure program which works to address critical situations that could potentially arise.

Seismic Margin Assessment

57. NBPN discussed the seismic margin assessment for the Probabilistic Safety Assessment. NBPN noted that the integration of the results in the Probabilistic Safety Assessment was reported in July 2008 and showed that the PLNGS meets the safety goals that are internationally accepted for existing nuclear power plants.

58. NBPN stated that the design basis of the PLNGS is a 0.2g[8] earthquake. NBPN further stated the seismic margin assessment determined that there was a high confidence that core damage would be prevented in the event of an earthquake with horizontal ground acceleration as high as 0.3g, which would be expected to occur about once every 10,000 years. NBPN further stated that there is a high confidence that a large release of fission products from containment, estimated to occur less frequently than once every 100,000 years, would be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g. NBPN noted that its assessment approximately corresponds to an earthquake with a magnitude of about 7 to 7.5 on the Richter scale located 30 to 35 km from the PLNGS site, which is not credible for the tectonic plate of New Brunswick. CNSC staff stated that it reviewed and accepted NBPN's seismic margin assessment.

59. A representative from Natural Resources Canada's (NRCan) Geological Survey of Canada presented information regarding earthquakes and the geotechnical stability of the PLNGS site and surrounding region. The NRCan representative concurred with NBPN's assessment and stated that the PLNGS is situated in a stable tectonic environment. NRCan's representative noted that the Passamaquoddy Bay on the Bay of Fundy has low to moderate seismicity.

60. The Commission asked for more information concerning the seismicity of the Passamaquoddy Bay area. A representative from NRCan responded that there was a 5.7 magnitude earthquake in 1904, a 5.5 magnitude earthquake in 1869, and several smaller earthquakes over the past 100 years. The NRCan representative stated that the expectation for a strong earthquake in New Brunswick would be a magnitude of 6 every 200 to 1,000 years. The NRCan representative noted that the seismic hazard modelling for the *National Building Code* is aimed at an earthquake that would occur every 2,500 years, as large as a magnitude 7 or 7.5.

61. Several intervenors, including the Council of Canadians, Saint John Chapter, CCNB Action, Saint John Fundy Chapter (CCNB Action), the Canadian Coalition for Nuclear Responsibility, and individuals, expressed concerns regarding seismicity. Intervenors questioned whether NBPN's seismic margin assessment was accurate in determining the likelihood of a large earthquake occurring and whether the PLNGS would be able to withstand a larger earthquake than previously predicted.

62. The Commission asked for more information concerning the seismic margin assessment and the capability of the reactor to withstand earthquakes. A representative from NBPN responded that, following the event in Fukushima, NBPN conducted a probabilistic safety assessment-based seismic margin assessment in accordance with international standards and practices, using the latest information from NRCan, which was also used to develop the 2010 National Building Code. CNSC staff stated that the probabilistic safety assessment-based seismic margin assessment used by NBPN met requirements. CNSC staff explained that under this methodology, NBPN was required to demonstrate that components important to safety have sufficient safety margins

[8] Units of 'g' refer to acceleration due to gravity.

beyond a review-level earthquake of 0.3g, which coincides with a probability of one in 10,000 years. CNSC staff stated that it is satisfied with NBPN's conclusion that a large release of fission products from containment would be prevented for an earthquake of 0.4g. CNSC staff noted that there was no requirement to qualify the facility against an earthquake of one in 100,000 years.

63. CCNB Action suggested that NBPN should perform a site-specific seismic hazard study in order to better understand the seismology of the PLNGS site, as the previous one was done in 1984. CCNB Action expressed the view that a new study could use new technology, such as three-dimensional mapping, that was previously not used at the site. The Commission sought more information on whether a site-specific seismic hazard study was needed. Representatives from NBPN expressed the view that a study was not needed because the existing seismic margin assessment was sufficiently conservative. A representative from NRCan expressed the view that although the information used for the seismic margin assessment was adequate and conservative, a site-specific seismic hazard study could provide additional details.

64. The Council of Canadians, Saint John Chapter suggested that the geotechnical stability of the PLNGS site could be compromised by hydrofracking[9] in New Brunswick. The Commission sought further information in this regard. The representative from NRCan responded that there would be a low risk of hydrofracking affecting the PLNGS. NRCan's representative explained that the potential for earthquakes induced by hydrofracking is low and the proposed hydrofracking in New Brunswick is far enough from the PLNGS site that there would not be any risk. CNSC staff concurred with the representative from NRCan and noted that it would continue to monitor hydrofracking in New Brunswick to ensure that it continues to not pose a risk. NBPN's representatives stated that NBPN would also monitor hydrofracking.

65. Based on the above information, the Commission is satisfied that the PLNGS meets the required safety goals. The Commission is satisfied that the seismic margin assessment has demonstrated with high confidence that core damage would be prevented in the event of an earthquake with horizontal ground acceleration as high as 0.3g, and that a large release of fission products from containment would be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g. The Commission is satisfied that the safety systems currently in place would safely shut down the reactor in the event of the worst possible earthquake in the region.

66. Furthermore, the Commission concurs with the recommendation by CCNB Action that NBPN should perform a site-specific seismic hazard assessment. The Commission is of the view that it would be beneficial for NBPN to better understand the seismology of the PLNGS site. The Commission requires that NBPN perform a site-specific seismic hazard assessment. The Commission notes that NBPN has submitted an assessment plan as a part of its response to the CNSC staff action plan on the *CNSC Fukushima*

[9] Hydrofracking refers to the hydraulic fracturing method of extracting natural gas from rock layers below the surface.

Task Force Report recommendations[10]. The Commission further requires that NBPN share the results of this assessment as part of its public information program.

Flooding and Severe Weather

67. CNSC staff provided information concerning the impact of flooding and severe weather on the PLNGS. CNSC staff stated that a major tsunami adversely affecting the PLNGS site is not considered credible due to the natural protection offered by the site elevation, which is approximately 15 metres, and the configuration of the ocean bottom at the Bay of Fundy. CNSC staff further stated that storm surges generated by maximum probable hurricanes are not high enough to reach the elevation of the facility.

68. Several intervenors, including CCNB Action and individuals, expressed concerns regarding the impact of a flood, hurricane, or other severe weather events on the facility. The Commission asked for more information on these subjects. Representatives from NBPN provided information regarding the incorporation of severe weather in the design and analysis for the PLNGS. A representative from NBPN noted that, under the codes to which the facility was built, the facility structures must be able to withstand 108 km/hour winds. The NBPN representative noted that the structures are more robust than this, with built-in safety margins. The NBPN representative further noted that if there is a high probability of significant winds, the reactor would be shut down accordingly, and inspected for external damage prior to restart.

69. The Commission also asked for more information concerning the protection against flooding at the PLNGS site, taking into consideration the tides on the Bay of Fundy and the possibility of storm surges. A NBPN representative responded that there is a sufficient margin to protect the site from flooding in the worst-case scenario of a storm surge from a hurricane during the maximum high tide. CNSC staff concurred, noting that the modelling that has been conducted, taking into consideration high tide, storm surge and wave-run up, has shown that there is a sufficient buffer for the grade of the station to withstand these events.

70. Intervenors, including CCNB Action and the Sustainable Energy Group, also expressed the view that climate change had not been appropriately considered and could pose a danger to the facility in the future. The Commission asked for more information in this regard. CNSC staff responded that it considered climate change in its assessment of risk to the environment from the facility, and, in accordance with the lessons learned from the events in Japan, CNSC staff would continue to apply factors related to climate change in its analyses. CNSC staff noted that, to date, the impacts of climate change are within the margin of safety associated with the original flood assessment. CNSC staff further noted that, although the nature of the future effects of climate change is

[10] Soon after the hearing, NBPN informed the Commission Secretariat that NBPN had, on its own initiative, commissioned a site-specific seismic hazard assessment as part of its response to the CNSC Fukushima Task Force.

uncertain, it has been working with international authorities, such as the International Atomic Energy Agency (IAEA), to consider the latest studies on climate change and how external events may affect the facility. A representative from NBPN noted that the 2003 environmental assessment for the SRWMF included consideration of the effects of climate charge.

71. Based on the above information, the Commission is satisfied that severe weather, flooding and climate change have been appropriately considered, and that such events would not pose a risk to the health and safety of persons or the environment.

Severe Accident Management

72. Many intervenors, including Sierra Club, Atlantic Chapter (Sierra Club), CCNB Action, the Canadian Coalition for Nuclear Responsibility and individuals, expressed concerns regarding the probability and consequences of a severe accident. The Commission asked for more information concerning a worst-case scenario "total station blackout" accident, where the facility would be without power for an extended period of time following the accident. Representatives for NBPN provided a detailed response on this matter, explaining the levels of defence in depth and redundant safety systems, including the reactor core containment structures, that would mitigate the effects of the accident and contain releases of radiation. Representatives from NBPN explained that the safety systems would shut the reactor down and noted that there are several, redundant systems to cool the reactor core, including an emergency water supply, the use of the moderator as a heat sink, and provisions for adding water from an external source. NBPN representatives noted that the steam would be filtered and vented in a controlled manner to maintain the pressure of the containment structures. NBPN representatives further explained that, in the event that there is a complete loss of cooling, it would be about 56 hours before the water evaporated from the reactor core. NBPN representatives noted that NBPN added new design features to address this scenario during the refurbishment, such as the ability to pump external water into the reactor.

73. The Commission asked for more information regarding the shutdown systems. CNSC staff described the two shutdown systems used to stop the reaction in the reactor core. CNSC staff explained that the first shutdown system drops cadmium rods into the core using gravity and the second system injects a poison[11] into the reactor core. CNSC staff noted that both systems are independent, fast-acting, and do not require power to operate.

74. CNSC staff noted that the reactor has a passive autocatalytic recombiner system to prevent a scenario where hydrogen could build up and eventually reach an explosive concentration. CNSC staff further noted that the passive recombiner system does not require any source of power to operate. The Commission enquired about the testing

[11] Poisons are chemical solutions that absorb neutrons when injected into the reactor core, stopping the nuclear reaction.

and maintenance of the new passive recombiner safety system. A representative from NBPN responded that the system was designed and tested in a laboratory setting before being installed and noted that NBPN can remove, replace and test the components on a rotating basis.

75. The Commission asked for more information regarding the spent fuel bay in accident conditions. CNSC staff responded that the spent fuel bay is located outside of the reactor building and would be isolated from the reactor in an accident. CNSC staff noted that CANDU fuel bays have a relatively low heat load because a small fraction of the spent fuel is deposited into the fuel bay at a time. CNSC staff further noted that because CANDU fuel is natural uranium, it cannot undergo a reaction in the spent fuel bay, unlike fuel made with enriched uranium. A NBPN representative noted that NBPN has provisions for providing additional cooling water to the fuel bay in the event of an accident, including the fire-water system.

76. The Commission sought confirmation that the health and safety of persons and the environment would be protected in the event of a worst-case scenario, regardless of the probability of occurrence. CNSC staff stated that this would be the case. CNSC staff explained that under the worst-case scenario, unfiltered releases would occur four to five days after the accident if there were no intervening mitigation, and this would provide sufficient time to relocate the population from the vicinity of the reactor.

77. Based on the above information, the Commission is satisfied that sufficient safety systems and mitigation measures are in place to protect the health and safety of persons and the environment in the event of a worst-case accident, regardless of the probability of occurrence. The Commission notes that its priority is the protection of the health and safety of the population around the facility, and not the future operability of the reactor following a severe accident.

Physical Design

78. Physical design relates to activities that impact on the ability of structures, systems and components to meet and maintain their design basis given new information arising over time, planned modifications to the facility, and taking changes in the external environment into account. The specific areas that comprise physical design at the PLNGS site are component design, environmental qualification of equipment, system design and classification, configuration management, human factors in design and engineering change control.

79. NBPN provided information regarding its design documentation and processes. NBPN stated that many design improvements were implemented as part of the refurbishment of the PLNGS. NBPN explained that the refurbishment included the replacement of all 380 fuel channel assemblies, calandria tubes, and the entire length of connecting inlet and outlet feeder piping from the end fittings to the headers. NBPN noted that a number of repairs, replacements, inspections and upgrades were also performed during

the refurbishment, along with safety improvements, including the addition of a filtering system to the main control room to protect its air supply in the event of an accidental release of radioactive material following a severe accident, as well as improvements to the two independent shutdown systems for events involving the moderator, such as leaking, loss of circulation and loss of cooling.

80. CNSC staff provided a review of the component design of the PLNGS. CNSC staff stated that the program for physical design is adequate and its implementation is meeting regulatory requirements.

81. Regarding the environmental qualification of equipment, CNSC staff stated that a 2010 inspection found minor deficiencies involving maintenance, inspection, identification, and training issues. CNSC staff noted that NBPN has made satisfactory progress to address these issues and that CNSC staff would continue to monitor them for compliance. Regarding system design and classification, CNSC staff stated that NBPN meets requirements. CNSC staff noted that its review included various system requirements for the start-up of the PLNGS, such as the emergency power supply, the emergency water system and the make-up steam generators.

82. CNSC staff stated that configuration management is the process of identifying and documenting the characteristics of a facility's structures, systems and components and of ensuring that changes to these characteristics are properly managed, recorded and incorporated into the facility documentation. CNSC staff stated that NBPN is adequately documenting and managing the configuration of structures systems and components at the PLNGS. CNSC staff further stated that it is satisfied with NBPN's program for incorporating human factors in design activities.

83. CNSC staff stated that an adequate engineering change control process is required to ensure that permanent and temporary modifications to structures systems and components and to software important to safety are adequately designed, reviewed, controlled and implemented. CNSC staff stated that the PLNGS change control process was implemented as documented in conformity to requirements of CSA standards *N286.2*[12] and *N286.5-95*[13] and that CNSC staff is satisfied with the engineering change control process at the PLNGS.

84. Sierra Club expressed concerns that human error could lead to accidents, and felt that this issue may not have been appropriately considered in the regulatory oversight of the facility. The Commission asked what measures are in place to address human error. Representatives from NBPN responded that there are a number of tools in place to address human error. A NBPN representative explained that it has human-performance, error-prevention tools, including procedures, peer checks for specific critical tasks, safety checks, and additional layers of checks. The NBPN representative noted that NBPN's training emphasizes the importance of preventing human error, including the use of training simulators for high-stress situations. The NBPN representative further

[12] CSA N286.2-00, Design Quality Assurance for Nuclear Power Plants, Canadian Standards Association, 2000.
[13] CSA N286.5-95, Operations Quality Assurance for Nuclear Power Plants, Canadian Standards Association, 1995.

stated that it has an observation and coaching program for supervisors to ensure that procedures are being followed. CNSC staff noted that human errors are modelled as a part of the probabilistic safety assessment, which is a regulatory requirement.

85. The Commission noted that the intervention by Atlantic Nuclear Services Inc. highlighted severe accident management, and asked for more information concerning the training of personnel to address human error. A representative from NBPN responded that the intervenor has been instrumental in working with NBPN's simulator training staff to address the worker behaviours required in an accident scenario or accident response situation and ensure that the workers properly follow the guidance documents. The NBPN representative noted that the response to severe accidents is modelled explicitly as part of the probabilistic safety assessment.

86. Some intervenors, including individuals and the Canadian Coalition for Nuclear Responsibility, expressed concerns with the design of the PLNGS. Intervenors highlighted safety issues with CANDU reactors, including a positive void coefficient of reactivity, which intervenors noted was a factor in the Chernobyl nuclear accident in 1986. The Commission asked for more information on these safety issues and how they have been addressed. Regarding the positive void coefficient, CNSC staff responded that this is a well-understood aspect of the CANDU design. CNSC staff explained that it was a part of the CANDU design in order to use natural uranium fuel and there are independent, engineered safety systems in place to prevent and mitigate the consequences of an accident. CNSC staff stated that there are sufficient safety margins in CANDU reactors to assure safe operation.

87. Regarding other CANDU safety issues, CNSC staff responded that these issues are well-known and noted that an IAEA report on CANDU reactors contains approximately 70 safety issues. CNSC staff stated that these issues are viewed as areas for safety improvements. CNSC staff noted that there are many differences between a CANDU reactor design and the design of the Chernobyl reactor, and that CANDU reactors are significantly safer due to the design and safety systems.

88. On the basis of the information presented, the Commission concludes that the design of the PLNGS is adequate for the operation period included in the proposed licence, and that appropriate measures are in place to address human errors and to manage the particularities of the CANDU design.

Fitness for Service

89. Fitness for service covers activities that are performed to ensure the physical condition of structures, systems and components remain effective over time, including programs that ensure equipment is available to perform its intended design function when called upon to do so. The specific areas that comprise fitness for service at the PLNGS site include maintenance, reliability, periodic inspections, life cycle management, and pressure boundary integrity.

90. Regarding maintenance, CNSC staff stated that NBPN has established a complete maintenance program which includes initiation, work planning and scheduling, work execution, and monitoring. Regarding reliability, CNSC staff explained that the requirements of a reliability program are to ensure that systems important to safety can and will meet defined design performance specifications at an acceptable level of reliability and noted that NBPN complies with CNSC regulatory standard *S-98*[14].

91. CNSC staff stated that NBPN is required to implement periodic inspection programs to monitor the continued fitness for service of nuclear pressure boundary components, containment components and containment structures. CNSC staff noted that NBPN must comply with CSA standards *N285.4*[15], *N285.5*[16], and *N287.7*[17]. CNSC staff stated that NBPN's performance in this area has been acceptable.

92. CNSC staff stated that life cycle management plans for structures, systems and components ensure reliable operation throughout their operating lifetimes. CNSC staff noted that the requirements for life cycle management are described in CNSC Regulatory Document *RD-334, Aging Management for Nuclear Power Plants*. In addition, CNSC staff stated that NBPN is required to develop an aging management process to manage the deterioration of structures, systems and components in accordance with CNSC Regulatory Document *S-210, Maintenance Programs for Nuclear Power Plants*. CNSC staff expressed satisfaction with the following NBPN management plan documents: fuel channel management plan, fuel channel feeder pipe management plan, steam generator management plan and reactor building management plan.

93. NBPN described the improvements it has made regarding pressure boundary integrity, including the successful completion of certification for the pressure boundary quality assurance program. CNSC staff stated that it is satisfied with NBPN's performance in this regard.

94. The Commission asked for more information regarding NBPN's plan to move from an annual outage cycle to a 24-month outage cycle. A representative from NBPN explained that moving to the longer outage cycle would be consistent with other nuclear generating stations and would allow for improved maintenance planning and efficiency. The NBPN representative noted that, due to the time required for shutdown and restart, there would be more time to perform maintenance during less frequent but longer outages. The NBPN representative further noted that the 24-month outage was incorporated in the updated probabilistic risk assessment for the PLNGS. CNSC staff stated it would provide regulatory oversight of the conduct of outage activities and that it has no concerns regarding the proposal. CNSC staff further noted that any safety issues during the outage would have to be addressed before the reactor can be restarted.

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[14] CNSC Regulatory Standard S-98, "Reliability Programs for Nuclear Power Plants", 2005.
[15] N285.4: Periodic Inspection of CANDU Nuclear Power Plant Components, Canadian Standards Association.
[16] N285.5: Periodic Inspection of CANDU Nuclear Power Plant Containment Components, Canadian Standards Association.
[17] N287.7: In-service Examination and Testing Requirements for Concrete Containment Structures for CANDU Nuclear Power Plants, Canadian Standards Association.

95. CCNB Action, in its intervention, expressed concerns regarding equipment reliability and maintenance. CCNB Action highlighted issues such as the use of old equipment, including control panels, and noted that some cable trays were full, which would require de-rating to prevent fire. The Commission sought further information in this regard. A representative from NBPN responded that NBPN reviews its equipment on a regular basis to ensure that all equipment remains in good operating order and to determine if any equipment needs repairs or upgrades. The NBPN representative noted that, as part of the refurbishment, NBPN conducted a thorough review of equipment to determine what needed to be refurbished and that the control panels were found to be in good order. The NBPN representative further noted that unnecessary changes could pose an operational risk due to the increased opportunity for human error with less familiar equipment. The NBPN representative concurred with CCNB Action's observation regarding cable trays and noted that it does follow the applicable codes and standards.

96. Based on the above information, the Commission is satisfied that NBPN has acceptable programs in place to ensure the physical condition of structures, systems and components over the lifetime of the reactor. The Commission is satisfied with NBPN's programs for the inspection and life-cycle management of key safety systems.

Conclusion on Facility and Equipment

97. Based on the above information, the Commission concludes that the equipment installed at the PLNGS is fit for service. The Commission is of the opinion that, given the mitigation measures and safety programs that are in place or will be in place to control hazards, NBPN will provide adequate protection to the health and safety of persons, the environment and national security.

Radiation Protection

98. As part of its evaluation of the adequacy of the provisions for protecting the health and safety of persons, the Commission considered the past performance of NBPN in the area of radiation protection, in accordance with the *Radiation Protection Regulations*[18].

Protection of Workers from Radiation

99. NBPN described the radiation protection program at the PLNGS and provided a summary of the doses to workers over the licence period of 2006 to 2010. NBPN stated that over the licence period there were no radiation exposures that resulted in an individual dose that exceeded the regulatory effective dose limits for nuclear energy workers of 50 mSv/y and 100 mSv in a five-year period. NBPN stated that the maximum individual annual dose prior to refurbishment was 12.1 mSv in 2006 and that

[18] SOR/2000-203.

the maximum individual annual dose over the licence period was 23.1 mSv in 2008. NBPN noted that radiation protection and ALARA (As Low As Reasonably Achievable) requirements are incorporated in detailed work plans.

100. CNSC staff stated that both NBPN's radiation protection program and its implementation were satisfactory over the licence period. CNSC staff noted that following an inspection performed in March 2006, it was noted that the implementation of the Radiation Protection Program implementation was adequate in several assessment areas, but improvements in the ALARA Program were required to ensure that doses would be effectively controlled and minimized at the PLNGS. CNSC staff stated that NBPN addressed this issue and, based on follow-up inspections and a review of NBPN documentation, CNSC staff determined that NBPN had implemented an appropriate ALARA program.

101. NBPN noted that there were four action level[19] exceedances with respect to individual exposures during the licence period. NBPN stated that two of them involved the detection of loose contamination greater than specified limits in certain areas. NBPN explained that in these instances, the contamination was removed and corrective actions were taken to improve controls on materials. NBPN further stated that the other events concerned the exceeding of an administrative dose limit; one due to an unmonitored neutron dose to two visitors and the other due to a discrepancy between a worker's personal alpha dosimeter and thermo-luminescent dosimeter readings. NBPN noted that corrective actions were taken as a result.

102. CNSC staff stated that the action level exceedances were not indicative of a loss of control of the radiation protection program. CNSC staff noted that these were slight exceedances and not the result of inadequate dose controls. CNSC staff confirmed that the investigation and the actions taken by NBPN to address the minor deficiencies in the assignment of administration levels were acceptable.

103. The Commission asked for more information concerning the action level exceedance due to an unmonitored dose to two visitors. A representative from NBPN responded that the visitors were nuclear energy workers who did not wear dosimeters during the visit. The representative from NBPN noted that the action level was exceeded because they went into an area where they received an unplanned dose in excess of NBPN's administrative dose limits for visitors. The NBPN representative noted that there were no health and safety implications of this event and that the doses have been included in the dose records for the workers. CNSC staff concurred that the dose was low and that there were no health effects associated with the event.

[19] An Action Level is defined in the *Radiation Protection Regulations* as a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's Radiation Protection program and triggers a requirement for specific action to be taken.

104. Some intervenors, including the International Brotherhood of Electrical Workers, Local 37, expressed support for the radiation protection program at the PLNGS and noted that workers are not exposed to unsafe levels of radiation at the facility. The Commission asked for more information in this regard. A representative from NBPN provided additional information regarding training and certification of radiation protection specialists and noted that there are different classifications for workers.

105. The Commission asked for more information concerning the national dose registry for workers. NBPN responded that the national dose registry is managed by Health Canada to track the doses of all nuclear energy workers in Canada. A representative from NBPN noted that this information is used for radiation protection purposes and to monitor dose trends.

Protection of the Public from Radiation

106. Using environmental monitoring results, the public dose rate is determined for a hypothetical member of the public (critical receptor) living near the facility who would receive the maximum exposure to radiation. NBPN stated that, over the licence period, the estimated dose to the critical receptor averaged 0.0003 mSv from airborne emissions and 0.0004 mSv from liquid emissions. CNSC staff noted that the highest estimated radiation dose to the public from the Point Lepreau site was 0.00178 mSv in 2008, which is well below the public dose limit of 1 mSv/y.

107. Many intervenors, including individuals, the Environmental Coalition of Prince Edward Island, Sierra Club, the International Institute of Concern for Public Health, CCNB Action, and the Canadian Coalition for Nuclear Responsibility expressed concerns about radiation risks. Intervenors were concerned about the potential health effects associated with exposure to radiation and suggested that there is no safe dose of radiation.

108. The Commission asked for more information regarding the regulatory limits for radiation releases and associated health effects. CNSC staff responded that the radiation protection requirements in Canada are based on international requirements and are well within the safe limits of any exposure to radiation. CNSC staff stated that it uses the linear, no-threshold model as the basis for the dose limits and the ALARA requirements in its *Radiation Protection Regulations*, and noted that doses to workers and members of the public from the operation of the PLNGS are well below the regulatory limits. CNSC staff further stated that the regulatory limits are far below levels where health effects have been observed in studies and are protective of all members of the public, including infants. CNSC staff explained that there is a good understanding of the health effects of radiation due to the combination of epidemiological studies of human populations exposed to radiation and laboratory studies on cells and molecules. CNSC staff stated that these studies have shown that health risks in people exposed to radiation doses of 100 mSv/y or less are low, and that

cancer rates in people exposed to these radiation doses have not been observed to be higher than cancer rates from non-radiological causes in the general population. CNSC staff noted that a recent epidemiological study of 42,000 Canadian nuclear power plant workers found that there is no increased risk to workers, who are more exposed than members of the public, from their radiation exposures.

109. CNSC staff discussed its relationship with Health Canada. CNSC staff explained that it has a memorandum of understanding with Health Canada and noted that they both have representatives on the United Nations Scientific Committee on the Effects of Atomic Radiation.

110. Energy Probe Research Foundation, in its intervention, expressed the view that under the radiation hormesis model low levels of radiation are beneficial to humans. Energy Probe Research Foundation requested that CNSC and NBPN investigate the potential health, social and financial benefits of applying the hormesis model of risk assessment to radiation protection measures. The Commission asked for CNSC staff's views on this matter. CNSC staff responded that it has looked at hormesis studies in the past and continues to do so. CNSC staff noted that there are a number of laboratory studies underway, both in Canada and internationally, that are looking at the effects of low levels of radiation and whether there are any positive effects. CNSC staff noted that the results to date are mixed, although preliminary results from some studies have shown that there is a mechanism for an enhanced immune system due to low level radiation exposures. CNSC staff stated that there has not been sufficient evidence to support changing the regulatory requirements for radiation protection.

Conclusion on Radiation Protection

111. The Commission is of the opinion that, given the mitigation measures and safety programs that are in place or will be in place to control hazards, NBPN will provide adequate protection to the health and safety of persons, the environment and national security.

Conventional Health and Safety

112. Conventional health and safety covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment. The conventional health and safety program is mandated by provincial statutes for all employers and employees to minimize risk to the health and safety of workers posed by conventional (non-radiological) hazards in the workplace.

113. NBPN emphasized that safety is its number one priority and provided information regarding its management of conventional health and safety. NBPN stated that its overall safety performance is based on good planning, work practices, field supervision and communication and explained that conventional health and safety requirements are

incorporated into all aspects of work planning. NBPN stated that there were nine lost-time accidents over the licence period. NBPN also provided information about its Joint Health and Safety Committee, which supports initiatives to improve safety and to ensure an avenue for discussion of safety related issues.

114. CNSC staff stated that WorkSafeNB is a Crown corporation that oversees the implementation and application of the *New Brunswick Occupational Health and Safety Act*[20], the *Workers' Compensation Act of New Brunswick*[21], and the *Workplace Health, Safety and Compensation Commission Act of New Brunswick*[22]. CNSC staff noted that WorkSafeNB would continue to conduct inspections at the PLNGS over the proposed licensing period. CNSC staff stated that its inspectors participated in the majority of the WorkSafeNB inspections, and routinely attended the weekly contractor safety meeting led by NBPN.

115. CNSC staff highlighted that there was an increased focus on housekeeping and management of hazards during the refurbishment due to the increased amount of materials being stored and disposed of at the site. CNSC staff explained that NBPN was challenged to meet expectations related to housekeeping and the management of hazards early in the refurbishment and noted that isolated instances of housekeeping deficiencies surfaced during the refurbishment. CNSC staff stated that subsequent inspections found that the problems had been resolved and preventive measures had been put in place. CNSC staff further noted that workers continue to wear personal protective equipment as required.

116. CNSC staff stated that it is satisfied that conventional health and safety work practices and conditions have resulted in a satisfactory degree of personnel safety at the PLNGS.

117. The Commission asked for more information regarding the support for conventional health and safety at the PLNGS. A representative from NBPN responded that there is a health unit with medical staff onsite and that a doctor is on-call and available.

118. CCNB Action, in its intervention, suggested that the lost-time injury statistic could be misleading. CCNB cited a newspaper article stating that 1,125 incidents required onsite first aid and that there were 2,963 "near misses," and suggested that NBPN compare its injury rates to the World Association of Nuclear Operators Industrial Safety Accident Rate. The Commission asked for more information in this regard. A representative from NBPN responded that the high number of near misses demonstrated a good reporting culture at the facility, and noted that it addresses the near misses as part of its corrective action program. The NBPN representative further stated that the accident rate at the PLNGS over the past three years was comparable to the averages for the World Association of Nuclear Operators and CANDU operators.

[20] CHAPTER O-0.2
[21] CHAPTER W-13
[22] CHAPTER W-14

119. The Commission asked the International Brotherhood of Electrical Workers, Local 37 if there were any concerns regarding occupational health and safety. A representative for the International Brotherhood of Electrical Workers, Local 37 stated that there were no concerns and noted that it has a joint health and safety committee and labour management committees to work with management on these issues.

120. The Commission is satisfied that the health and safety of workers and the public was adequately protected during the operation of the facility for the current licence period, and that the health and safety of persons will also be adequately protected during the continued operation of the facility.

Environmental Protection

121. NBPN provided information regarding its environmental protection performance over the licence period. NBPN stated that the PLNGS has implemented an Environmental Management System and has been certified as compliant with ISO 14001. NBPN noted that the station undergoes an ISO re-registration audit every three years, with the most recent being in the fall of 2010. NBPN explained that the Environmental Management System considers all conventional and radiological activities that may create an impact on the environment.

122. NBPN noted that as part of maintaining its accreditation, the station is audited annually by its ISO Registrar. NBPN explained that the auditors randomly check how Significant Environmental Aspects are being maintained at the PLNGS and the findings of the auditors are reviewed with station management. NBPN noted that major findings, if identified, must be resolved in a specific time frame.

123. CNSC staff reported that NBPN's Environmental Management System program meets requirements.

124. CNSC staff further stated that an environmental assessment for the expansion of the SRWMF conducted in 2003 and a 2007 environmental risk assessment concluded that environmental risks from releases of radioactive and hazardous substances as the result of licensed activities at the facility are acceptable.

Effluent Monitoring

Air Emissions

125. CNSC staff stated that the Derived Release Limit (DRL) is the theoretical quantity of a nuclear substance released in a year that would result in a committed effective radiation dose of 1 mSv to the most exposed group of the public (also known as the critical receptor) for that nuclear substance. CNSC staff noted that the DRL, along with Action

Levels and Internal Investigation Levels, is a tool for judging ongoing compliance with the annual public dose limit, as well as the requirements to control releases and keep exposures ALARA. CNSC staff noted that NBPN uses Derived Emission Limits (DEL), while other licensees use the term DRL; the two terms are interchangeable. NBPN noted that the DEL for the station are based on the 1987 version of CSA Standard *N288.1*[23] and that a revision to meet the 2008 version of *N288.1* is planned for December 2012.

126. NBPN described the process for filtering ventilation air from the reactor building and spent fuel bay prior to discharge to the exhaust stack. NBPN noted that exhaust from other areas, which have potentially contaminated ventilation air, is also routed to the stack after filtration. NBPN further noted that some areas of the reactor building utilize a vapour recovery system to reduce the tritium content in the air, which results in lower emissions. NBPN also described the containment isolation system, which prevents the release of reactor building air if abnormal gamma activity is detected in the airflow. NBPN stated that emissions are monitored continuously to alert operators to unanticipated changes, and that samples from the stack monitor are analyzed to verify that emissions do not exceed the operational targets, which are more restrictive than regulatory limits.

127. NBPN discussed its releases to air. NBPN stated that the emissions from the station remained low throughout the licence period, with airborne releases averaging 0.03% of the DEL from 2006 to 2011. NBPN noted that lower activity was measured during the refurbishment as short-lived nuclides have decayed and heavy water systems are not operating.

128. CNSC staff stated that, over the licence period, releases of tritium oxide and carbon-14 to air from the PLNGS remained below their respective licence limits. CNSC staff noted that the emissions from the facility to air were well below 0.1% of the DEL.

Water Emissions

129. NBPN stated that radioactive liquid wastes from various systems are routed to storage tanks in the Service Building, then sampled and analyzed for radioactivity prior to release into the station cooling water discharge. NBPN noted that provisions exist to reduce activity levels in the wastewater, if required. NBPN further stated that discharge from the tanks is monitored and controlled to ensure that the release levels do not exceed operational targets, which are significantly below the DEL.

130. NBPN discussed its liquid effluent releases. NBPN stated that the emissions from the station remained low throughout the licence period with liquid emissions averaging 0.038% of the DEL, with a peak of 0.14 % in 2008 due to the flushing of the reactor's moderator system.

[23] N288.1, Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities, Canadian Standards Association

131. CNSC staff stated that water discharges from the facility for the licence period for tritium oxide and carbon 14 remained below their respective licence limits. CNSC staff noted that the water emissions from the facility were well below 0.1% of the DEL.

132. The Commission sought further information about the increased liquid effluent releases in 2008. A NBPN representative responded that there was an increase in tritium releases when the moderator was drained in 2008. The NBPN representative noted that NBPN planned this work to reduce the amount of tritium in the system to keep doses to workers ALARA during the refurbishment. CNSC staff stated that it was aware of the increase and noted that the releases were still well below regulatory limits, and did not pose a risk to humans or to biota.

133. Some intervenors, including the Environmental Coalition of Prince Edward Island, the International Institute of Concern for Public Health and CCNB Action, expressed concerns related to tritium releases. The Commission sought further information on this matter. CNSC staff responded that tritium releases are well-controlled and monitored around the PLNGS and that tritium concentrations around the facility are in the range of 10 to 20 Bq/L, which is well below the Health Canada drinking water guideline of 7,000 Bq/L. CNSC staff stated that the dose to the public from tritium from the PLNGS is on the order of 0.001 mSv/y, which is 1,000 times less than the regulatory limit of 1 mSv/y. CNSC staff noted that at this level, the risks to the public and the environment are negligible.

Environmental Monitoring

134. NBPN stated that its environmental radiation monitoring program assesses the radiological impact of the Point Lepreau site on the environment and the public. NBPN stated that it collects water samples semi-annually from 11 groundwater monitoring wells as part of its monitoring program and noted that the water from these wells is used solely for monitoring groundwater on site. NBPN further noted that it submits monitoring results in its annual compliance report to the CNSC.

135. CNSC staff reported that the groundwater well monitoring indicates that the highest tritium content in well water was less than two percent of the 7,000 Bq/L drinking water limit and the concentration of Carbon-14 in well water was often below the detection limit.

136. The Commission asked for more information concerning the groundwater monitoring system. A NBPN representative stated that NBPN installed new boreholes around the waste management facility as part of the follow-up program for the environmental assessment for its expansion. The NBPN representative further stated that NBPN monitors water from different elevations in the wells.

Fish Impingement and Entrainment

137. CNSC staff stated that NBPN is required to implement and maintain an Environmental Protection program in accordance with CNSC regulatory standard *S-296*[24] that includes management of adverse effects on the fish population, including fish impingement and entrainment, and thermal effects from the cooling system.

138. The Commission asked for more information regarding fish impingement and entrainment, including shellfish. A representative from NBPN described the submerged cooling intake for the PLNGS and noted that due to the design of the system, there are no issues with fish impingement and entrainment. The NBPN representative noted that, in the case of mussels, there is an allowance for some growth around the intake line and there is no impact on operations.

139. Several intervenors, including individuals, the Fundy Baykeeper and CCNB Action, expressed concerns regarding the impact of the operation of the PLNGS on fish in the Bay of Fundy. The Fundy Baykeeper cited a 2010 Fisheries and Oceans Canada (DFO) report that suggested that the Bay of Fundy marine ecosystem is under extreme stress, and requested that NBPN sample the intake water for fish eggs, larvae, zooplankton and phytoplankton.

140. The Commission enquired about the impact of operations and whether further monitoring was required. CNSC staff supported the request by the Fundy Baykeeper and noted that it was recommending that monitoring be done at the facility. CNSC staff added that DFO has committed to work with the CNSC on the review of designs for monitoring for impingement and entrainment, including zooplankton and phytoplankton. CNSC staff noted that it works with DFO to conduct similar monitoring at other nuclear facilities. CNSC staff further stated that a new standard for environmental monitoring was issued in 2010, and it expects NBPN to be in compliance with this standard by 2013.

141. CNSC staff provided further information regarding the proposed monitoring. CNSC staff stated that there had been monitoring at the PLNGS in the past, but it was discontinued because the performance of the cooling system was effective. CNSC staff explained that the monitoring would reconfirm the effectiveness of the system and provide information about the changes in the fish population in the Bay of Fundy over time. A representative from NBPN concurred with CNSC staff and noted that the monitoring was discontinued in the late-1980s because the fish population densities around the PLNGS were low and the cooling system was deemed to have had an insignificant impact on the fish population of the Bay of Fundy. The NBPN representative further noted that this was later reviewed in the 2003 environmental assessment for the expansion of the SRWMF.

[24] CNSC Regulatory Standard S-296, "Environmental Protection, Policies, Programs And Procedures At Class I Nuclear Facilities and Uranium Mines And Mills", 2006.

142. Some intervenors, including the Fundy Baykeeper, also expressed concerns that aquatic life in the Bay of Fundy may be contaminated with radionuclides, including tritium, due to the presence of the PLNGS. The Commission sought further information in this regard. A NBPN representative responded that NBPN samples fish on an annual basis as part of its environmental radiation monitoring program and stated that there have been no issues. CNSC staff confirmed that it does not have any concerns in this regard.

143. The Commission agrees with CNSC staff's recommendation concerning the proposed monitoring and looks forward to updates on this matter as part of future Integrated Safety Assessment of Canadian Nuclear Power Plants reports.

Conclusion on Environmental Protection

144. Based on the above information, the Commission is satisfied that, given the mitigation measures and safety programs that are in place to control hazards, NBPN will provide adequate protection to the health and safety of persons and the environment.

Emergency Management and Fire Protection

145. Emergency management and fire protection covers the provisions for preparedness and response capability to mitigate the effects of accidental releases of nuclear and hazardous substances to the environment from emergency and non routine conditions. This also includes implementation of a comprehensive fire protection program to minimize the risk fire poses to the environment and the health and safety of persons through appropriate fire protection system design, fire safety analysis, fire safety operation and fire prevention.

Emergency Management

146. CNSC staff stated that licensees must establish a consolidated emergency plan with an associated emergency preparedness program and must verify the performance of their response capability by conducting evaluated exercises of simulated emergencies. The objective of the emergency plan is to ensure the provision of adequate preparedness and response capabilities that would mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security.

147. NBPN provided information regarding its emergency preparedness program. NBPN stated that its program addresses radiological and conventional emergencies, including severe accidents.

148. The New Brunswick Department of Public Safety (NBDPS) discussed the province's emergency response plan, which covers the emergency response off the PLNGS site. NBDPS described the program design and governance of its nuclear emergency program, and described the infrastructure in place to respond to an emergency. NBDPS stated that it has a federal coordination centre, several provincial emergency operations centres, upgraded telecommunications systems and information management systems. NBDPS further stated that it conducts training and exercises and noted that as it is developing fixed and mobile decontamination capabilities, it would be conducting an evacuation exercise with decontamination drills and reception centre processing in the summer 2012. NBDPS stated that following the Fukushima nuclear accident, it would work with federal partners, including the CNSC, to address any new requirements.

149. NBDPS stressed its focus on public awareness and education, and provided information concerning its public alerting systems. NBDPS explained that it provides information and alerting through its Web site, and has a variety of mass notification systems for Lepreau area communities, including home phone, mobile phone, office phone, fax, e-mail or text message. NBDPS further stated that it has a volunteer warden service to assist in notification and evacuation.

150. The Commission sought further information from the NBDPS regarding the public alerting system for the 10-km zone. A representative from the NBDPS stated that it has a robust, high-capacity service. The NBDPS representative noted that the NBDPS tests the system regularly, has a back-up system, and can use the national public alerting system. The NBDPS representative added that the NBDPS is working to improve notification through television and radio. The NBDPS representative further stated that the NBDPS communicates with residents of the 20-km planning zone to ensure that it has the appropriate, preferential contact information and that the local population understands the systems in place.

151. The Commission, noting a recent event in New Brunswick where telephone land lines were not available, asked if there were any concerns for such an event. The NBDPS representative responded that the NBDPS has a redundant system in place to address issues such as this. CNSC staff responded that it is satisfied that the systems that are in place have various levels of redundancy that are appropriate for the density of the population in the planning zone.

152. The Commission enquired about the use of sirens to notify people in the outdoors in the event of an emergency. The NBDPS representative responded that the NBDPS does not use sirens or alarms because it prefers to deliver messages with information and advice on the nature of the emergency. The NBDPS representative noted that people who are unfamiliar with the emergency program would not understand the situation if a siren were to go off.

153. The Commission sought further information about the responsibilities regarding the distribution of potassium iodide tablets within the community in the event of an emergency. The NBDPS representative responded that the potassium iodide is pre-distributed in the region and replenished every five years. The NBDPS representative noted that each household is educated on how to use it, and that the Chief Medical Officer of Health is part of the incident management system to provide direction to the community. CNSC staff noted that the decision to pre-distribute the potassium iodide rests with the provincial authorities and, for example, is also done in Quebec around the Gentilly-2 nuclear generating station.

154. CNSC staff described its review of NBPN's emergency preparedness. CNSC staff stated that there are no significant gaps in emergency planning at the PLNGS and that NBPN maintains and operates comprehensive and well-documented emergency plans that are regularly tested through drills and exercises. CNSC staff further stated that there are no significant gaps in nuclear emergency planning at the provincial level.

155. CNSC staff noted, however, that the effectiveness of NBPN's emergency planning could be further improved through upgrading onsite emergency facilities and equipment. CNSC staff recommended that NBPN formalize all arrangements and agreements for external support, and better integrate its plans with the existing provincial emergency plans. CNSC staff stated that these enhancements would be implemented as rapidly as practicable.

156. Several intervenors, including members of the public, supported NBPN and the NBDPS's emergency response plan. Intervenors explained that there is a good system in place to inform the public of an emergency and the public has a good understanding of the emergency plan.

157. The Musquash Fire Rescue Department, in its intervention, also supported the PLNGS emergency response program and noted that it conducts drills and training exercises with the PLNGS emergency response team. The Commission asked for more information regarding this training. The Musquash Fire Rescue Department representative responded that the department conducts drills on a regular, semi-annual basis with the PLNGS emergency response team. The Musquash Fire Rescue Department representative noted that the department has participated in drills both on and off-site, and that the Saint John Fire Department often participates in the drills as well. The Musquash Fire Rescue Department representative added that many of the department's firefighters are trained to the highest level, including hazardous materials training. A NBPN representative noted that NBPN provides technical supervision regarding radiation protection.

158. Several intervenors expressed concerns regarding emergency response, citing the Fukushima event as an example where evacuation was necessary. The Commission enquired about what the evacuation plans would be in the event of a severe accident. The NBDPS representative responded that, in the event of an urgent evacuation scenario, the intent of the evacuation plan would be to prevent the public from receiving a harmful dose of radiation. The NBDPS representative stated that the NBDPS would evacuate the population in the 20-km zone around the facility to Saint John and to St. Stephen, New Brunswick. The NBDPS representative stated that the NBDPS would set up reception centres to process people, provide them with information and make arrangements for temporary accommodations. The NBDPS representative further stated that the NBDPS would also have the ability to decontaminate people if necessary. The NBDPS representative added that the NBDPS would be conducting evacuation training exercises in the spring of 2012 and extended an invitation to interested parties to participate.

159. Sierra Club, in its intervention, questioned why emergency drills are not practised by the public or at night. The Commission asked for more information on this matter. The NBDPS representative responded that the NBDPS does not conduct drills at night because it does not want to put people at risk during a training exercise. The NBDPS representative noted that the NBDPS does involve the public in controlled exercises.

160. Based on the above information, the Commission concludes that the emergency management program at the facility, as well as the emergency response plan for the PLNGS site, is adequate to protect the health and safety of persons and the environment.

Fire Protection

161. CNSC staff stated that all licensees require a comprehensive fire protection program to ensure that the licensed activities do not result in the unreasonable risk to the health and safety of persons and to the environment due to fire. CNSC staff noted that all power reactor licensees are required to comply with the provisions of CSA standard *N293-2007*[25], the *National Building Code of Canada*[26] and the *National Fire Code of Canada*[27]. CNSC staff noted that as these requirements were imposed without a transition period, licensees have been completing upgrades to demonstrate compliance over a number of years.

162. NBPN provided information concerning fire protection at the PLNGS. NBPN noted that the station design takes into account the potential for fire as it relates to nuclear safety, personnel safety and asset protection.

[25] N293-2007, Fire Protection for CANDU Nuclear Power Plants, Canadian Standards Association, 2007.
[26] National Building Code of Canada 2010.
[27] National Fire Code of Canada 2010.

163. NBPN explained that the design is supported by analysis such as fire hazard assessments and the Fire Probabilistic Safety Assessment, which, along with fire protection codes and standards, identify constraints on station maintenance and operation. NBPN stated that it has an improvement project intended to bring the plant up to current fire protection codes and standards. NBPN stated that the improvements would be completed prior to the end of the upcoming licence period, in accordance with the dates identified in the proposed Licence Conditions Handbook. NBPN noted that until the improvements are implemented, compensatory measures would be in place to ensure that the risk from fire remains acceptably low.

164. NBPN described the fire protection measures in place at the PLNGS, including clearly marked egress routes, fire barriers, emergency lighting, signage, alarms, automatic detection and suppression. NBPN noted that its fire system and equipment performance is demonstrated through testing and monitoring.

165. NBPN also highlighted fire prevention measures, such as housekeeping, control of combustibles and work procedures, as well as fire response. NBPN explained that its emergency response team provides response on a full-time basis with support from local and regional fire departments and emergency preparedness plans.

166. CNSC staff stated that NBPN's fire protection program is currently below expectations and requires improvement, including the development and implementation of additional program elements, in order to meet the requirements of the fire protection codes and standards.

167. CNSC staff stated that while it is satisfied with NBPN's compensatory measures to meet the intent of the new codes and standards, the implementation of the fire protection program must be further developed and physical upgrades are required for full compliance. CNSC staff stated that it is satisfied with NBPN's Fire Protection Improvement Plan, which was developed to implement the requirements of *N293-2007*. CNSC staff further stated that under the proposed licence, all of the compensatory measures must be in place prior to the restart of the reactor, and NBPN would be required to comply with the latest fire protection codes and standards by December 31, 2014. CNSC staff noted that this is a hold point in the proposed licence.

168. The Commission noted that 17 small fires occurred during the licence period and questioned whether fire protection measures were adequate. CNSC staff responded that there were adequate provisions in place, including compensatory measures and emergency response, to address these types of fires. The Commission asked if the implementation of the new code would have prevented the small fires. CNSC staff responded that the small fires were not related to the fire code. A NBPN representative explained that the fires were minor and each was investigated for corrective actions.

169. The Commission asked CNSC to explain why NBPN's fire protection was below expectations. CNSC staff responded that it evaluated a number of drills over the licence period and noted that the response times and some of the techniques used did not meet the requirements of the new standard. CNSC staff explained that response time is important to prevent a fire from worsening and, as such, NBPN must implement a series of corrections to address this. CNSC staff stated that, in the short term and in accordance with the new standard, a series of compensatory measures would be required. CNSC staff noted that it has seen an improvement in NBPN's response time since the compensatory measures were put in place. Representatives from NBPN stressed NBPN's commitment to get the response time back to the acceptable level.

170. The Commission asked whether NBPN would be able to comply with the requirements before the end of 2014. CNSC staff responded that a series of modifications, analysis and physical installations would be required before NBPN can be fully compliant, and it is not anticipated that these would be completed until the end of December 2014. A NBPN representative described the work and fire protection measures it had installed to date, and stated that it would continue to do so to be compliant with the new standard by the end of 2014. CNSC staff stated that it is satisfied with NBPN's plans and compensatory measures. The Commission sought confirmation that all of the compensatory measures would be in place prior to the restart of the reactor. CNSC staff confirmed that this is the case.

171. The Commission noted that a new *N293* standard is planned to be in place by the end of 2012 and asked whether NBPN would be able to meet the future standard more quickly than it has the 2007 standard. CNSC staff explained that it has been involved with the development of the new standard and noted that the 2012 version is anticipated to provide improvements in the text and have only small changes in technical requirements. CNSC staff further stated that it would not anticipate it being a lengthy process for NBPN to become compliant with the 2012 version whenever it becomes a part of a future operating licence. A NBPN representative responded that NBPN would not be able to estimate its compliance with the new standard until it is issued but noted that it would comply with the requirements of its operating licence.

172. Some intervenors, including the Musquash Fire Rescue Department, expressed support for NBPN's fire protection program and noted the positive relationship between the fire department and NBPN. The Commission asked for more information in this regard. The Musquash Fire Rescue Department representative responded that NBPN's response team onsite is supported by the Musquash Fire Rescue Department and Saint John Fire Department. The Musquash Fire Rescue Department representative noted that the department also trains with NBPN. A representative from NBPN confirmed that NBPN has a significant amount of interaction and planning with the Musquash Fire Rescue Department.

173. Based on the above information and considerations, the Commission concludes that the fire protection measures in place, and that will be in place, at the facility are adequate to protect the health and safety of persons and the environment.

Conclusion on Emergency Preparedness and Fire Protection

174. The Commission concludes that the fire protection measures and emergency management program at the facility are adequate. The Commission notes that NBPN must comply with the latest fire protection codes and standards by December 31, 2014 and that full compliance with CSA standard *N293-2007* prior to December 31, 2014 is a hold point in the proposed licence. The Commission is satisfied that compensatory measures will be in place prior to the restart of the reactor to meet the intent of this standard.

Waste Management

175. Waste management covers the licensee's site-wide waste management program, including the waste storage facility, and the planning for decommissioning. CNSC staff evaluated NBPN's performance with regards to waste minimization, segregation and characterization; waste storage and processing; preliminary decommissioning plans; and the SRWMF. CNSC staff noted that NBPN owns and operates the SRWMF, a Class 1B facility in the exclusion zone of the PLNGS site under the licence for the PLNGS. CNSC staff explained that NBPN's former Waste Facility Operating Licence for the SRWMF was amalgamated into the operating licence for the PLNGS in August 2008[28].

176. NBPN described the SRWMF. NBPN stated that it has three phases: radioactive waste is stored in Phase I of the facility, irradiated fuel is stored in Phase II, and waste from retubing and other operations completed during refurbishment, including reactor components, calandria tubes, pressure tubes and feeders, is stored in Phase III.

177. NBPN also provided information about its management of solid radioactive waste. NBPN stated that all solid radioactive waste generated by the facility is packaged appropriately at the site and screened to determine the appropriate disposal location. NBPN further stated that, based on the results of the screening, radioactive waste is processed for medium term storage and sent to the Phase I section of the SRWMF and that non-radioactive waste is sent to a provincially licensed Regional Sanitary Landfill or to an appropriate external agency for disposal. Regarding spent fuel, NBPN stated that spent fuel bundles removed from the reactor are placed into the spent fuel bay for cooling and shielding for a minimum of seven years before being transferred to the Dry Storage Facility, in the Phase II section of the SRWMF.

[28] Refer to the *Record of Proceedings, including Reasons for Decision on Application to Amend the Point Lepreau Nuclear Generating Station Power Reactor Operating Licence to be Consolidated with the Point Lepreau Solid Radioactive Waste Management Facility Operating Licence*, hearing date August 29, 2008.

178. CNSC staff stated that it is satisfied that NBPN has taken the necessary steps to minimize, segregate and characterize the radioactive wastes generated as a result of operating the PLNGS. CNSC staff noted that waste storage includes short-lived storage within the power plant before waste is transferred to the SRWMF for long-term storage. CNSC staff stated that NBPN has demonstrated consistent and compliant management and control of waste storage throughout its operations. CNSC staff further noted that it inspects the SRWMF annually and has no outstanding compliance issues.

179. The Commission asked for further information regarding a tritium plume at Phase I of the SRWMF. A representative from NBPN responded that it has a system to collect and sample surface water and measure the volume of rainwater that has fallen, and that it had detected increased tritium levels. The representative from NBPN noted that these levels were below any action levels or regulatory limits and that the discharge of this system is not near a drinking water source. The NBPN representative further stated that NBPN investigated the issue and found that it was due to the waste filters used in the heat transport system and moderator system of the reactor having not been dried sufficiently to remove the tritium, and that the tritium was migrating through concrete structures and to the surface water. The NBPN representative noted that NBPN has corrected this issue by increasing the drying of the filters and other wastes before placing them in the waste facility. CNSC staff stated that it, along with Fisheries and Oceans Canada, has monitored the Bay of Fundy and the only measurable radionuclide detected has been tritium. CNSC staff further stated that the increase was not unexpected due to the refurbishment, and that the values are very low. CNSC staff noted that levels of tritium in groundwater and surface water are in the range of 10 to 25 Bq/L, well below the drinking water limit of 7,000 Bq/L.

180. Several intervenors, including the Council of Canadians, the Environmental Coalition of Prince Edward Island, the International Institute of Concern for Public Health, the Passamaquoddy Nation and the Canadian Coalition for Nuclear Responsibility, expressed concerns regarding the management and storage of waste, particularly fuel waste, at the PLNGS. Intervenors were also concerned regarding the long-term storage of fuel waste.

181. The Commission asked for further information regarding NBPN's management of low and intermediate level radioactive waste. A representative from NBPN responded that the SRWMF allows NBPN to manage waste on site as low-level waste. The NBPN representative stated that NBPN monitors and inspects the SRWMF on a regular basis. The NBPN representative noted that NBPN is looking into ways to reduce the volume of low-level waste, and that its long-term decommissioning plan and long-term waste management plan would involve sending the low-level waste off-site to a third-party facility in the future.

182. The Commission enquired about NBPN's management of fuel waste. A representative from NBPN stated that when fuel bundles come out of the reactor, they are discharged into the spent fuel bay where they are cooled for a period of seven years. The NBPN representative further stated that after seven years, the fuel bundles are transferred to the SRWMF for dry storage in concrete canisters, where air cooling is sufficient.

183. A representative from NBPN stated the Nuclear Waste Management Organization (NWMO) is responsible for the long-term solution for the management of used fuel waste and noted that the NWMO is currently undertaking formal consultations with First Nations and possible host communities in Canada. The NBPN representative stated that NBPN is actively involved and working with the NWMO in this undertaking.

184. The Commission asked about the CNSC's oversight of the storage of waste. CNSC staff responded that CNSC staff has a baseline compliance program for inspecting the waste management facilities and NBPN's monitoring programs. CNSC staff stated that it is confident that the waste is being safely managed at the PLNGS.

185. The Commission enquired about the safety of the fuel waste in the event of a large earthquake at the PLNGS. A NBPN representative responded that both the structure of the spent fuel bay and the dry storage canisters are seismically qualified to the necessary design basis earthquake levels.

186. Based on the above information and considerations, the Commission is satisfied that NBPN is safely managing waste at the PLNGS and SRWMF.

Packaging and Transport

187. Packaging and transport covers the safe packaging and transport of nuclear substances and radiation devices to and from the PLNGS site. NBPN must adhere to the *Packaging and Transport of Nuclear Substances Regulations*[29] and Transport Canada's *Transportation of Dangerous Goods Regulations*[30] for all shipments leaving the site. The *Packaging and Transport of Nuclear Substances Regulations* apply to the packaging and transport of nuclear substances, including the design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage and unloading of packages.

188. CNSC staff stated that NBPN is required to have appropriate training for personnel involved in the handling, offering for transport and transport of dangerous goods, and is required to issue a training certificate to those workers in accordance with the *Transportation of Dangerous Goods Regulations*. CNSC staff noted that NBPN has developed and implemented procedures for activities at the PLNGS site.

189. CNSC staff stated that NBPN has demonstrated compliance with the *Packaging and Transport of Nuclear Substances Regulations* and the *Transportation of Dangerous Goods Regulations* and is meeting regulatory requirements.

[29] SOR/2000-208.
[30] SOR/2001-286.

190. Several intervenors, including the Council of Canadians, the International Institute of Concern for Public Health, the Passamaquoddy Nation and the Canadian Coalition for Nuclear Responsibility, expressed concerns regarding the transport of waste. Intervenors were critical of a NBPN plan to transport low-level waste to Oak Ridge, Tennessee for incineration. The Commission asked for more information concerning the shipments. A representative from NBPN responded that the proposed shipment would be a part of NBPN's plan to reduce the volume of waste at the site. NBPN's representative explained that under the proposed plan, NBPN would ship the low-level waste, including items such as gloves, coveralls, and cleaning materials, to Oak Ridge for incineration and the resultant ash would be returned to NBPN for storage in the SRWMF. The NBPN representative explained that the process would eliminate the non-radioactive materials in the waste, and the radioactive materials would be returned for storage in certified packages. The NBPN representative noted that the return waste would be low-level waste. The NBPN representative further noted that the transport is licensed by the CNSC and that the processing plant in Oak Ridge is qualified to process the waste and would have a licence from the United States Nuclear Regulatory Commission to import and later export the waste.

191. The Commission asked for more information regarding the safety and regulatory oversight of the proposed shipment. CNSC staff stated that the process is safe and that the proposed transport and shipping containers meet requirements. CNSC staff noted that at all times the proposed shipment, incineration and processing would have to meet the regulatory requirements in Canada and in the United States, including the *International Atomic Energy Agency Regulations for the Safe Transport of Radioactive Material, TS-R-1*[31]. CNSC staff noted that it encourages volume reduction because it allows for safer waste management and increased storage capacity.

192. Based on the above information and considerations, the Commission is satisfied that NBPN is meeting regulatory requirements regarding packaging and transport.

Public Information Program

193. A public information program is a regulatory requirement for licence applicants and licensed operators of Class I nuclear facilities, such as nuclear generating stations. Public information programs are assessed against criteria set out in CNSC Regulatory Guide G-217[32].

194. NBPN provided information regarding its public information program. NBPN explained that it has a public affairs program to identify key issues and concerns and provide information to individuals and groups who have an interest in the PLNGS. NBPN described its public information activities, including public information

[31] Regulations for the safe transport of radioactive material : safety requirements — 2005 ed. — Vienna : International Atomic Energy Agency, 2005
[32] CNSC Regulatory Guide G-217, "Licensee Public Information Programs", 2004.

meetings, stakeholder meetings, the Community Relations Liaison Committee, site visits and workshops, a toll-free telephone line, the maintenance of its Web site and participation in community events. NBPN noted that a newsletter is distributed to communities within a 20 kilometre radius of the facility. NBPN stated that it evaluates its public information program using quantitative research such as surveys and that it tracks issues and comments.

195. CNSC staff stated that NBPN's public information program meets the criteria for an acceptable public information program set out in G-217 and meets the requirements of Paragraph 3(j) of the *Class I Nuclear Facilities Regulations*[33]. CNSC staff noted that the CNSC is currently developing a new Regulatory Document, "Requirements and Guidance for Public Information and Disclosure", which would replace G-217 once it is approved by the Commission.

196. Several intervenors, including individuals, expressed the view that there is community support for NBPN, and that NBPN is a good corporate citizen. Intervenors explained that NBPN's public information program provides information to the community and addresses the public's concerns.

197. Based on this information, the Commission is satisfied that NBPN's public information program meets regulatory requirements and is effective in keeping the public informed on the facility operations. The Commission is satisfied that NBPN has adequately consulted with the public, Aboriginal persons and other stakeholders, and encourages NBPN to continue to do more in this respect.

Security

198. With respect to site security issues, the Commission was provided with separate, protected CMDs, which were considered in a closed session.

199. The Commission concludes that NBPN has made adequate provisions for ensuring the physical security of the facility, and is of the opinion that NBPN will continue to make adequate provisions during the proposed licence period.

Non-Proliferation and Safeguards

200. The CNSC's regulatory mandate includes ensuring conformity with measures required to implement Canada's international obligations under the Treaty on the Non-Proliferation of Nuclear Weapons. Pursuant to the Treaty, Canada has entered into safeguards agreements with the IAEA. The objective of these agreements is for the IAEA to provide credible assurance on an annual basis to Canada and to the international community that all declared nuclear material is in peaceful uses and that there is no undeclared nuclear material or activities in this country.

[33] SOR/2000-204.

201. NBPN stated that it implements its safeguards program in accordance with Canadian obligations to the IAEA. NBPN explained that its safeguards program outlines the IAEA safeguard controls used at the PLNGS.

202. CNSC staff stated that the IAEA has conducted seven scheduled safeguards inspections at the PLNGS since the beginning of the refurbishment outage. CNSC staff noted that it accompanied the IAEA inspectors on four of these seven inspections to evaluate NBPN's safeguards program and its implementation. CNSC staff reported that during these inspections, NBPN provided accessibility and assistance required to IAEA inspectors to conduct their inspections activities and provided all safeguards records, reports and information in a timely manner.

203. CNSC staff noted that NBPN has agreed to install new IAEA safeguards equipment prior to any future spent fuel transfers to dry storage. CNSC staff stated that in general:
- NBPN has complied fully with both IAEA and CNSC requirements for safeguards during the past licensing period;
- the safeguards program and its implementation both continue to meet CNSC expectations; and
- NBPN continues to maintain satisfactory documentation for the safeguards program.

204. Based on the above information, the Commission is satisfied that NBPN has made and will continue to make adequate provisions in the areas of safeguards and non-proliferation at the PLNGS that are necessary for maintaining national security and measures necessary for implementing international agreements to which Canada has agreed.

Decommissioning Plans and Financial Guarantee

205. The Commission requires that the licensee have operational plans for decommissioning and long-term management of waste produced during the life-span of the facility. In order to ensure that adequate resources are available for a safe and secure future decommissioning of the Point Lepreau site, the Commission requires that an adequate financial guarantee for realization of the planned activities be in place and maintained in a form acceptable to the Commission throughout the licence period.

206. CNSC staff stated that licensees are required to maintain an acceptable preliminary decommissioning plan that sets out the manner by which the nuclear facility will be decommissioned in the future. The preliminary decommissioning plan must be kept current to reflect any changes in the site or facility, and meet the requirements of CSA standard *N294-09*[34] and the guidance of CNSC Regulatory Guide *G-219*[35]. Furthermore, the financial guarantee must meet the criteria of CNSC Regulatory Guide

[34] N294: Decommissioning of Facilities Containing Nuclear Substances, Canadian Standards Association, 2009.
[35] CNSC Regulatory Guide G-219, "Decommissioning Planning for Licensed Activities", 2000.

G-206[36]. CNSC staff noted that the preliminary decommissioning plan for the PLNGS must be reviewed and revised by NBPN every five years or when the Commission requires, in accordance with its operating licence. CNSC staff reported that, since the licence renewal in 2006, NBPN has maintained an acceptable preliminary decommissioning plan in accordance with its licence.

207. NBPN provided information about its revised preliminary decommissioning plan and financial guarantee. NBPN stated that they were updated in June 2010 and re-assessed in September 2010 due to the delay in the completion of the refurbishment. NBPN stated that it confirmed in January 2011 that, as of September 30, 2010, the amount of available funding of $507 million would be adequate to cover the financial guarantee requirements of $500 million.

208. CNSC staff stated that it reviewed NBPN's revised preliminary decommissioning plan and found it met the requirements of *N294-09* and the guidance of *G-219*. CNSC staff further stated that the proposed financial guarantee for the PLNGS, comprised of two segregated funds, the Point Lepreau Decommissioning Fund and the Point Lepreau Used Fuel Management Fund, currently valued at $507 million, meets the requirements of *N294-09* and the guidance provided in *G-206*.

209. The Commission asked NBPN if it had the funds in place for the increased financial guarantee. A representative from NBPN responded that was the case.

210. Some intervenors, including CCNB Action and the Canadian Coalition for Nuclear Responsibility, questioned whether the decommissioning fund would be sufficient to cover the costs of decommissioning. Intervenors also questioned how the decommissioning funds were affected by the refurbishment. The Commission asked for more information in this regard. The NBPN representative responded that NBPN updated the decommissioning cost estimates taking into consideration the impact of the refurbishment. The NBPN representative noted that NBPN updates its cost estimates on a regular basis, including the costs for used fuel management. The NBPN representative further stated that NBPN has sufficient space onsite to deal with the additional waste from the refurbishment. CNSC staff noted that it reviewed and accepted the revised decommissioning costs included in the licence renewal application.

211. Based on this information, the Commission considers that the preliminary decommissioning plans and related financial guarantee are acceptable for the purpose of the current application for licence renewal.

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[36] CNSC Regulatory Guide G-206, "Financial Guarantees for the Decommissioning of Licensed Activities", 2000.

Application of the *Canadian Environmental Assessment Act*

212. Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act*[37] (CEAA) have been fulfilled, including ensuring the conduct of an environmental assessment where its licensing decision would enable a project, as defined in the CEAA, to be carried out.

213. In addition, under the NSCA, the Commission's statutory mandate is to regulate in order to prevent unreasonable risk to the environment (paragraph 9(a)(i)). As such, and notwithstanding whether there is a CEAA requirement in any given licence application, the Commission always evaluates whether the applicant is qualified to conduct those activities subject to licensing and whether, in conducting the activities to be licensed, the applicant would adequately protect the environment. This evaluation involves analysis and assessment of the activities proposed and their potential impact on the environment, to determine what would be required to ensure the protection of the environment. The Commission may not renew a licence under subsection 24(4) of the NSCA unless it is satisfied with the adequacy of the applicant's proposal with respect to environmental protection.

214. CNSC staff indicated that although the issuance or amendment of a licence under subsection 24(2) of the NSCA is listed as a 'trigger' under the *Law List Regulations*[38] of the CEAA, the renewal of a licence under subsection 24(2) of the NSCA is not prescribed for the purposes of paragraph 5(1)(d) of the CEAA in the *Law List Regulations*. CNSC staff noted that as NBPN has requested a licence renewal, there is no 'trigger' for this proposal under the CEAA and there are no other CEAA 'triggers', pursuant to subsection 5(1) of the CEAA, that involve the CNSC. CNSC staff stated that since there are no other CEAA triggers for this project that involve the CNSC, an environmental assessment under CEAA is not required.

215. Several intervenors, including the International Institute of Concern for Public Health, Sierra Club, CCNB Action, and the Canadian Coalition for Nuclear Responsibility disagreed with CNSC staff and expressed the view that a full environmental assessment was required before the PLNGS could resume operation. Intervenors suggested that there should have been an environmental assessment for the refurbishment of the PLNGS and felt that an environmental assessment would provide a more thorough review of the facility with more opportunities for public participation.

216. The Commission asked CNSC staff to explain its review process for NBPN's application. CNSC staff responded that CEAA was not triggered by NBPN's application for licence renewal and request to reload fuel. CNSC staff noted that there was an environmental assessment for the original construction and operation of the facility under the *Environment Assessment Review Process Guidelines Order*, the prior

[37] S.C. 1992, c. 37
[38] SOR/94-636.

legislation to the CEAA, and another in 2003, when there was a new project for the SRWMF. CNSC staff noted that the 2003 environmental assessment included in its scope the continued operation of the PLNGS facility. CNSC explained that because the refurbishment activities were previously assessed, there was no need for an additional environmental assessment under CEAA.

217. CNSC staff further stated that, in addition to the previous environmental assessments, it has conducted environmental risk assessments under the NSCA. CNSC staff noted that one was done for the SRWMF in 2003 that also included continued operations of the PLNGS, and the most recent one was done in 2007.

218. Based upon its consideration of this matter, the Commission is satisfied that the requirements of the CEAA have been met. The Commission is satisfied that an environmental assessment under the CEAA is not required for NBPN's application for licence renewal. The Commission is satisfied that environmental risk assessments and environmental protection requirements under the NSCA have provided sufficient treatment of the potential adverse environmental impacts of the conduct of the proposed activities.

Participant Funding

219. Participant funding was available to intervenors to prepare for and participate in Day Two of the public hearing. The Commission received four requests for funding. The Funding Review Committee, independent of the Commission, reviewed the applications. Funding was provided to three applicants as per a decision issued on September 30, 2011.

220. The Passamaquoddy Nation, in its intervention, expressed that it had difficulties with the management of the Participant Funding Program and the timing associated with the availability of funds. The Commission asked for more information on the management of this program. CNSC staff responded that it offered assistance for filling out the application forms for participant funding and provided information concerning the program at its public information sessions. CNSC staff acknowledged that the program is new and that there may be modifications required to address issues related to the time frame associated with the CNSC's public hearings. CNSC staff stated that it has made some modifications to the program based on the feedback received to date and noted that it would continue to consider further changes as it reviews the program.

221. The Commission acknowledges that the Participant Funding Program may require additional modifications to address the issues identified by participants. Based on the above information, the Commission directs CNSC staff to continue to review the Participant Funding Program, taking into consideration the feedback received from participants, and make modifications if necessary.

Aboriginal Consultation

222. CNSC staff stated that as an agent of the Government of Canada and as Canada's nuclear regulator, the CNSC recognizes and understands the importance of consulting and building relationships with Canada's Aboriginal peoples. The CNSC ensures that all its licensing decisions under the NSCA and decisions pertaining to environmental assessments under the CEAA uphold the honour of the Crown and consider Aboriginal peoples' potential or established Aboriginal or treaty rights pursuant to section 35 of the *Constitution Act, 1982*. [39]

223. CNSC staff stated that, upon receipt of the licence application from NBPN, it conducted research to determine the Aboriginal groups that may have an interest in the licensing decision. CNSC staff further stated that it sent notification letters to the identified groups on June 13, 2011 with information on the following:
- details regarding the licence application and refurbishment activities;
- how the public and Aboriginal groups can participate in Day 2 public hearings;
- relevant or important dates related to the regulatory review process;
- general information regarding the CNSC's Participant Funding Program; and
- new CNSC contact details for inquiries and questions.

224. CNSC staff stated that the operation of the PLNGS was not expected to cause adverse impacts to any potential or established Aboriginal or treaty rights, and that it had encouraged Aboriginal groups to participate in the Day 2 public hearing to advise the Commission directly of any concerns they may have in relation to the applications by NBPN.

225. CNSC staff provided further information regarding the consultation it held with the Passamaquoddy Recognition Group Inc. (Passamaquoddy Nation), which is not formally recognized as an Indian Band in Canada, but asserts an aboriginal right to the territory in the vicinity of the PLNGS. CNSC staff stated that it met with them on August 3, 2011 in St. Andrew's, New Brunswick.

226. The Commission asked for more information concerning the meeting with the Passamaquoddy Nation. CNSC staff responded that the Passamaquoddy Nation raised some concerns about the operation of the PLNGS at the meeting but did not provide information about impacts on any asserted rights. CNSC staff further stated that it did not hold a second meeting with the Passamaquoddy Nation and it encouraged them to apply for the CNSC Participant Funding Program and to raise these concerns at the Day 2 hearing. A representative from NBPN added that NBPN representatives had met with them, provided information about the licence renewal and refurbishment, and offered to have a site visit in the future. The representative from NBPN further stated that NBPN had committed to have additional meetings with them.

[39] *The Constitution Act, 1982*, being Schedule B to the Canada Act 1982 (U.K.), 1982, c. 11.

227. The Passamaquoddy Nation, in its intervention, discussed Aboriginal rights and the duty to consult. The Passamaquoddy Nation asserted its rights and title to lands and expressed dissatisfaction with the consultation activities held with the CNSC and NBPN to date. The Passamaquoddy Nation stated that it wanted more meaningful consultation. The Passamaquoddy Nation further stated that its concerns regarding the proposed fuel reload and licence application included effects on the health, well-being and security of workers, the public and ecological systems.

228. The Wolastoqewiyik Traditional Council of Tobic, in its intervention, discussed land rights issues and expressed the view that it had not been properly consulted.

229. The Commission noted that while it does not have jurisdiction under the *Indian Act*[40], it does take the duty to consult seriously and that the hearings are part of the process. The Commission asked staff for more information about its Aboriginal consultation process. CNSC staff explained that it undertook consultation activities early in the review process, including sending letters about the licence renewal and the Participant Funding Program to a number of Band Chiefs and followed up with phone calls to confirm receipt of the information, ask about any issues or concerns about the licence renewal application and to encourage participation in the hearings. CNSC staff noted that the proposed activities under the licence application are on an existing site and are not expected to cause adverse impacts to any potential or established Aboriginal or treaty rights.

230. NBPN also provided information regarding its Aboriginal consultation activities. NBPN stated that its parent organization, New Brunswick Power, created a First Nations Affairs Department to liaise and work with the First Nations throughout the province. NBPN explained that it works closely with a number of Aboriginal groups with the intent of sharing information and having a meaningful dialogue. NBPN noted that its consultation activities between 2000 and 2003 were incorporated in the environmental assessment for the SRWMF, and that its application for licence renewal and fuel loading did not introduce any new impacts. NBPN further stated that it has a continued commitment to be engaged with Aboriginal peoples. NBPN stated that it would continue to make information available, to share information, and to provide opportunities for First Nations to come to the site.

231. The Commission enquired about possible ways to improve future consultation activities. A representative for the Passamaquoddy Nation responded that it would prefer for there to be a forum for larger groups of people to be consulted, rather than the consultation being done primarily with the chiefs. The Passamaquoddy Nation representatives stressed the need for greater understanding and dialogue.

[40] R.S.C., 1985, c. I-5.

232. The Commission asked for more information regarding public access to the PLNGS site. A NBPN representative responded that NBPN makes as many areas accessible as possible, including a bird observatory, and noted that it has accommodated members of the public, Aboriginal groups and other groups on site visits. The NBPN representative further stated that NBPN has had representatives of Aboriginal groups on the site in the past to do inspections for any items of traditional interest, such as herbs, before sites were developed. NBPN representatives extended a standing invitation for Aboriginal groups to participate in site visits.

233. As an agent of the Crown, it is incumbent on the Commission to ensure that its decision accords with the honour of the Crown. In assessing the applicability and adequacy of the duty to consult, the Commission must consider the particular facts of each application and determine whether the subject matter of consultation and accommodation falls within its mandate as defined under its enabling legislation.[41] The Courts have, on a number of occasions, reconfirmed that in instances where an administrative Tribunal such as the Commission has the authority under its governing legislation to decide questions of law, and the subject matter of consultation falls within the Tribunal's mandate and expertise, not only does the Tribunal have the ability to decide if the consultation is consistent with section 35 of the *Constitution Act, 1982*, the Crown can rely on regulatory processes to fulfill its duty to consult.

234. As the Commission has previously found[42], it is of the view that, for a proposed activity such as the one proposed by NBPN, the Commission is an appropriate body to determine the adequacy of the consultation.

235. The Commission is satisfied that the public consultation program, including the Aboriginal consultation component, provided sufficient notice and opportunities to Aboriginal peoples. The Commission's hearing process is considered part of the consultation process and the participant funding program supported the opportunity to the intervenors to make submissions and to participate in the regulatory review process. The Commission is satisfied that its proceedings provided the appropriate forum in which concerns could be expressed and dealt with. The Commission has considered all of the submissions in making its decision and is satisfied that, in this particular instance, the proposed activity will not cause adverse impacts to potential or established Aboriginal or treaty rights and that the duty to consult was adequately discharged.

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[41] *Brokenhead Ojibway Nation et al v. Attorney General of Canada (National Energy Board) et al.*, 2009 FC 484 The Court stated that, except to the extent that Aboriginal concerns cannot be dealt with, the appropriate place to deal with project-related matters in the circumstances of the Pipeline Projects was before the NEB existing and not in some collateral discussion with either the GIC or some arguably relevant ministry.

[42] Record of Proceedings, McClean Lake Operation Renewal issued June 30, 2009 at par. 130 where the Commission stated that: "for project-related matters which may cause concern to rights-holders about potential impacts, which are within the authority of the Commission to address and perhaps accommodate, the Commission has the jurisdiction to deal with consultation on behalf of the Crown, and its process is the appropriate forum in which to deal with such issues." A Judicial Review of the Commission's decision was filed and in its decision (ARG v. AGC 2010 FC 948) the Federal Court further endorsed the Commission's view that its proceedings provide the applicant with an opportunity to understand the nature of the Decision being made and to provide input regarding any Aboriginal and Treaty rights affected.

Approval to Reload Fuel and Restart the Reactor

236. In addition to the renewal of the PROL for the PLNGS, NBPN requested permission to reload fuel in the reactor, following the release of established regulatory hold points. NBPN provided information concerning the progress of its refurbishment activities in CMD 11-H11.1. CNSC staff's review of the refurbishment was presented in CMD 11-H11.

237. NBPN stated that it had completed the following major activities since the reactor was shut down for the refurbishment outage on March 28, 2008:
- the reactor was defueled;
- the heat transport system was drained and dried;
- the fuelling machine vaults were prepared and heavy lift platforms and tables were set up at each reactor face;
- all inlet and outlet feeder pipes were removed and transferred to the on-site radioactive waste facility;
- the moderator system was drained, rinsed and dried;
- the positioning assemblies, shield plugs, end fittings, calandria tubes and pressure tubes were removed and transferred to the on-site radioactive waste management facility;
- in-core inspections were completed;
- upper section of the new feeder pipes were installed and welded to the headers; and
- calandria tube sheet bore was polished and calandria tubes have been installed.

238. Regarding the retube work, NBPN stated that the installation of the 380 fuel channels, i.e., the pressure tubes, end fittings and position assemblies, was complete at the time of the Day 2 hearing in December 2011. NBPN noted that this activity would be followed by the refilling of the calandria with the moderator heavy water and, subsequently, the large work platform would be removed and the lower feeders installed. NBPN stated that the last major activity of the retubing work would be the loading of the new fuel and the installation of shield plugs and closure plugs. NBPN stated that the milestones for the completion of the work were:
- fuel channel installation (completed December 2011);
- lower feeder installation completion (May 2012); and
- return to service and generating electricity (Fall 2012).

239. NBPN also provided information regarding the other refurbishment activities included in its licence, including those for the main generator and auxiliaries, the turbine system, shutdown systems, and the moderator. NBPN stated that all commissioning activities were expected to be completed by the end of October 2011, except for those portions that are dependent on a future state of the plant when the necessary conditions would be present.

Radiation Protection During Refurbishment

240. NBPN stated that individual and collective doses are being maintained as low as reasonably achievable, despite the increase in the overall outage duration due to some refurbishment activities taking longer than originally planned. NBPN stated that individual doses were well below any administrative or legal limits and that the single highest annual dose received by an individual in 2010 was 11.9 mSv, while 90% of the workers received less than 1.5 mSv, which are well below the regulatory annual limit of 50 mSv/y for nuclear energy workers. NBPN noted that the anticipated collective dose for the outage increased due to the outage extension, tooling issues and refinement of the manpower estimates for the required work.

241. NBPN further stated that the potential for spread of contamination has been well-controlled and that radiological releases to the environment are consistent with that expected for the outage and remain well within regulatory limits. NBPN noted that conditions associated with the environmental assessment and follow up actions have been met.

242. NBPN stated that the collective dose for the retube and refurbishment portion of the outage was expected to be approximately 12.7 person-sieverts (p-Sv). The Commission asked for more information concerning the increased estimated dose for the refurbishment outage. A representative from NBPN responded that the estimate increased from 11.4 p-Sv to 12.7 p-Sv because the duration of the outage increased and the original estimates for the work did not take some maintenance activities into account. CNSC staff concurred with the reasons given by NBPN and noted that the decision to repeat the installation of the calandria tubes contributed to the increase.

243. The Commission, noting an incident that occurred during Bruce Power's refurbishment of the Bruce A NGS, where workers were exposed to an unexpected dose of alpha radiation, asked for NBPN to provide more information concerning its program to manage alpha radiation. A representative from NBPN responded that, during the outage, NBPN had measures in place, such as monitoring and alarms, protective equipment, and respiratory protection. The NBPN representative noted that NBPN has taken further measures to upgrade its capabilities to manage alpha radiation, including improved monitoring, and reviewing and upgrading its training and instrumentation programs. The NBPN representative stated that NBPN conducted bioassays to measure the doses for potentially-affected workers and found no significant issues. The NBPN representative stated that four workers received an uptake of alpha radiation but the dose was low.

244. The Commission asked CNSC staff to comment on this matter. CNSC staff stated that it was satisfied with the measures in place and actions taken by NBPN to address the issue. Regarding the four workers, CNSC staff stated that the dose was below the action level that would require reporting, but noted that NBPN did report it to CNSC staff, regardless. CNSC staff further noted that NBPN must use industry best practices to upgrade the radiation protection program and ensure that lessons learned from the Bruce Power event are addressed.

Environmental Protection During Refurbishment

245. CNSC staff stated that it reviewed the 2008, 2009 and 2010 quarterly operations reports for the PLNGS, as per CNSC regulatory standard S-99. CNSC staff stated that it found no significant issues related to the radiation dose to the public or environmental protection. CNSC staff noted that planned gaseous and aqueous releases of nuclear substances remained below action levels and there were no significant planned or unplanned releases of nuclear substances or hazardous substances. CNSC staff stated that, based on this performance, there are no impediments that affect fuel reload.

Management System During Refurbishment

246. CNSC staff stated that the management system includes quality management and organizational/change management. Regarding quality management, CNSC staff stated that its inspections and reviews during refurbishment were focused on NBPN's procurement, design, construction and commissioning activities. CNSC staff stated that, based on its reviews, the commissioning process was properly planned and executed, and that NBPN's Completion Assurance Documentation process was sound and well-implemented. CNSC staff further stated that the NBPN quality management system was properly implemented for refurbishment and that the overall performance of the system processes was satisfactory.

247. CNSC staff noted that it plans to undertake inspections and reviews regarding Configuration Management, NBPN's process for managing and verifying the station safe operational configuration, the Self-Assessment and Corrective Action Process, and Documents and Records Control, prior to reactor start-up. CNSC staff noted that the outcome of these inspections would inform the decisions to lift the regulatory hold points leading up to operation at full power.

248. Regarding organizational/change management, CNSC staff noted that, in accordance with the *General Nuclear Safety and Control Regulations*, NBPN must report any significant change in organizational structure to the CNSC. CNSC staff stated that all refurbishment activities were brought under the control of the Station Director. CNSC staff noted that there were several temporary changes in the NBPN organization as employees were redeployed to support various activities. CNSC staff stated that although much of the refurbishment work was carried out by contractors, the performance of NBPN management continued to meet CNSC requirements throughout the refurbishment outage.

Human Performance Management During Refurbishment

249. CNSC staff stated that human performance management includes personnel training and personnel certification. Regarding training during refurbishment, CNSC staff stated that it has reviewed NBPN refurbishment training materials, inspected the Continuing Training Program for certified operators, and received updates on training for non-certified staff. CNSC staff stated that the training has been effective and has met requirements. CNSC staff stated that, in preparation for reactor start-up, CNSC staff would confirm that certified staff and non-certified operators have received the required training.

250. Regarding personnel certification, CNSC staff stated that certified staff members participated in training that covered system and equipment changes related to the refurbishment and operation, in accordance with the operating licence for the facility. CNSC staff noted that the certified staffing complement has been maintained at the levels required by the licence, and that these staffing levels would continue to be maintained throughout the refurbishment outage and restart activities. CNSC staff noted that this would ensure that a sufficient number of certified staff would be assigned to shift operating positions to support refurbishment activities.

Operating Performance During Refurbishment

251. CNSC staff stated that although the PLNGS remained shut down for the duration of the refurbishment outage, all regulatory obligations under the licence remained applicable. CNSC staff stated that it carried out regulatory oversight with inspections and reviews targeted to refurbishment activities that have safety-related implications for the short-term (during refurbishment) and for the long-term operation of the station.

252. CNSC staff stated that it performed surveillance and monitoring activities, and conducted inspections to confirm regulatory obligations throughout the refurbishment outage. CNSC staff further stated that no significant safety issues were identified in these inspections. CNSC staff noted that where safety issues were identified, NBPN took appropriate measures to address them.

Safety Analysis Related to Refurbishment

253. CNSC staff stated that, based on technical assessments and inspections for the programs and processes applicable to safety analysis, there are no impediments that affect fuel reload.

254. CNSC staff stated that NBPN developed a deterministic safety analysis program in support of the refurbishment to address the physical and licensing requirements directly related to refurbishment upgrades and modifications. CNSC staff noted that the resulting deterministic safety analysis plan identified additional analyses to be performed in support of design changes and conditions expected after refurbishment, as well as those required from CNSC Regulatory Guide C-006 Revision 1[43]. CNSC staff stated that the analyses addressed the design improvements, modified reactor trip setpoints, initiating events and post-refurbishment conditions for the reactor core. CNSC staff stated that the safety upgrades and analyses performed as part of the refurbishment project have been incorporated into the 2009 edition of the PLNGS Safety Report submitted in December 2009. CNSC staff stated that the overall plant safety case has been strengthened as a result of the refurbishment.

255. CNSC staff stated that the next update of the Probabilistic Safety Assessment, expected in 2012, would reflect, to the extent possible, the work done during the refurbishment outage as described in the Integrated Implementation Plan. CNSC staff noted that current and planned upgrades would increase the safety margins for the plant and would address lessons learned from the Fukushima event. CNSC staff noted that the safety margins were acceptable prior to refurbishment and stated that the updated probabilistic safety assessment did not present an impediment to fuel reload or restart of the reactor.

256. CNSC staff stated that it reviewed and accepted NBPN's integrated implementation plan, which was submitted in accordance with CNSC regulatory document RD-360[44]. CNSC staff stated that the integrated implementation plan presents a comprehensive list of planned corrective actions or safety improvements and their corresponding completion schedules, including refurbishment activities, commitments made to the CNSC, action items related to design improvements, and follow-up activities from the integrated safety review. CNSC staff noted that the integrated implementation plan specifies the activities to be completed prior to the restart of the reactor and those that would continue to be tracked after the reactor restart.

257. CNSC staff stated that it is tracking the progress of the integrated implementation plan and that CNSC and NBPN have agreed to review it at least every six months. CNSC staff noted that the current revision of the integrated implementation plan is up to date and accurately documents the current pre- and post-refurbishment commitments. CNSC staff further noted that long-term commitments, following the return to service, included the resolution of fire protection issues and safety analysis follow-up.

[43] CNSC Regulatory Guide C-006 Revision 1, "Safety Analysis of CANDU Nuclear Power Plants", 1999.
[44] CNSC Regulatory Document RD 360, "Life Extension of Nuclear Power Plants", 2008.

Physical Design Related to Refurbishment

258. CNSC staff stated that physical design related to refurbishment includes reactor component replacement, programmable digital comparators replacement, electrical qualification, and human factors in design. Regarding reactor component replacement, CNSC staff stated that the major refurbishment activity was the replacement of all reactor fuel channel assemblies (i.e., pressure tubes and end fittings), calandria tubes and feeder pipes. CNSC staff noted that the replaced components incorporated design improvements and updated specifications intended to enhance performance.

259. NBPN submitted its general approach to comply with CSA standard *N285.0-06*[45] and the requirements of its operating licence related to reactor component repairs and replacements for the fuel channel, calandria tube and feeder systems, and other modifications during the refurbishment outage. CNSC staff stated that it concurred with NBPN's approach and has reviewed and accepted the design description, design requirements and design specifications documents for the retube components (fuel channels, feeders, calandria tubes).

260. CNSC staff further stated that the replacement components met requirements. CNSC staff noted that a concession request was submitted by NBPN for some components, including the calandria tubes, pressure tubes and end fittings, where the inspection calibration standards used did not fully comply with the required CSA material standards. CNSC staff noted that technical assessments found that the non-conformances were acceptable and would not compromise the integrity of the components. CNSC staff stated that the concession was granted because the integrity of the calandria tubes, pressure tubes and end fittings was not compromised.

261. The Commission asked for more information concerning the concession request. CNSC staff responded that the request was because the calibration blocks, reference materials used for calibrating the inspection probes, did not meet the CSA material standards. CNSC staff explained that the calibration blocks have reference flaws, or notches, designed to be detected by the inspection probes and, because there was a 0.01 mm deviation in the dimensions of the reference flaws in the calibration blocks compared to the standard, NBPN had to provide further assurance that the inspections would have captured any defects in the new components. CNSC staff stated that several reviews, including one from the New Brunswick Department of Public Safety, confirmed that the probes used to inspect the new components met the requirements of the CSA standard. A representative from NBPN stated that NBPN completed a root-cause analysis of the issue and ensured that all of the materials used during the refurbishment outage met requirements. CNSC staff stated that there were no safety issues as a result of this concession.

[45] N285.0-06: General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants, Canadian Standards Association, 2006.

262. CNSC staff stated that NBPN undertook a major upgrade to replace the programmable digital comparators for shutdown systems one and two to address the current software configuration and safety function of the programmable digital comparators and to protect against the obsolescence of the hardware system and rising maintenance cost. CNSC staff stated that it accepted the design approach, as well as the shutdown systems reliability test reports, and noted that commissioning of the replacement programmable digital comparators is expected to be completed by June 2012.

263. Regarding electrical qualification, CNSC staff stated that it had recommended improvements following inspections in 2008 and 2009. CNSC staff further stated that a July 2011 inspection found that NBPN had addressed the recommendations.

264. Regarding human factors in design, CNSC staff stated that although some aspects relating to the oversight of the human factors work carried out by contractors and the verification and validation of human factors designs has been identified as an area for improvement, overall CNSC staff is satisfied with the program for incorporating human factors in design activities. CNSC staff stated that it would continue to monitor the consideration of human factors in design activities through review of documents, additional meetings and site visits as required.

265. The Commission asked for further comments on reactor design changes during refurbishment. A representative from NBPN responded that there were several design changes that would improve the performance of the reactor, including improvements in the grade of steel used for the feeder pipes that has a greater resistance to cracking and corrosion. The NBPN representative noted that the design changes were evaluated to ensure that they were appropriate. CNSC staff stated that it evaluated all of the repairs and replacements of components and found them to be acceptable. CNSC staff noted that improvements were also made to safety system components to enhance the safety of the reactor.

266. Some intervenors, including individuals, CCNB Action, Sierra Club, and the International Institute of Concern for Public Health, expressed concerns regarding the refurbishment and questioned whether the reactor would meet the requirements of a new reactor. The Commission asked for more information in this regard. A representative from NBPN responded that the refurbished components would have improved reliability compared to the previous components and noted that it conducted a comprehensive plant condition assessment prior to refurbishment to ensure that the components that were not refurbished would continue to be in good working condition for the remainder of their operating life. The NBPN representative further noted that NBPN reviews equipment on a regular basis, has an extensive maintenance program and uses ageing management planning to ensure that the plant would continue to operate safely. CNSC staff concurred with NBPN and noted that while not all components were refurbished, the scope of refurbishment activities underwent a comprehensive assessment, taking over 100 standards into consideration, to bring the PLNGS up to modern standards.

Fitness for Service Related to Refurbishment

267. CNSC staff stated that fitness for service related to refurbishment included consideration of condition assessment, inspections and testing, and the reliability program. CNSC staff noted that, based on technical assessments and inspections for the above applicable programs and processes, there were no impediments that would affect fuel reload.

268. Regarding the reliability program, CNSC staff stated that, before the refurbishment outage, a reliability program had been established at PLNGS in compliance with CNSC regulatory standard S-98. CNSC staff noted that the reliability program would be re-established during the restart following refurbishment. CNSC staff further noted that the restart would include surveillance activities, maintenance plans, operating manual tests and operational routines, and that the reliability program would be updated with new equipment data. CNSC staff stated that it would continue to monitor NBPN's compliance with S-98 as the plant transitions from the defueled state to operation.

269. CNSC staff stated that NBPN had submitted an event report that outlined actions taken to verify seismic qualification of pipe supports at PLNGS. CNSC staff noted that these actions addressed lessons learned from the Fukushima event. CNSC staff stated that it concurred with NBPN's conclusion that the design of the pipe supports meets the site requirements for a design basis earthquake with ground acceleration of 0.2g.

Conventional Health and Safety During Refurbishment

270. NBPN stated that its overall safety performance during the refurbishment has been good as a result of planning, good work practices, field supervision and communication. NBPN explained that conventional safety requirements were incorporated into all aspects of work planning, with input from both contractor and NBPN safety personnel, and a sustained focus on safety was maintained. NBPN provided safety statistics and noted the low frequency of lost-time accidents at the site. NBPN noted that all NBPN employees had returned to work following their lost-time accident.

271. CNSC staff stated that WorkSafeNB routinely conducted inspections at the PLNGS during the refurbishment outage. CNSC staff noted that CNSC inspectors participated in the majority of these inspections and routinely attended the weekly contractor safety meeting lead by NBPN. CNSC staff stated that it is satisfied that occupational health and safety work practices and conditions have resulted in a satisfactory degree of personnel safety at PLNGS during refurbishment.

Emergency Management and Fire Protection Related to Refurbishment

272. CNSC staff stated that during the refurbishment outage, the PLNGS is limited to an "on-site emergency" classification due to the reduced risk level associated with the reactor being in a de-fuelled state. CNSC staff noted that NBPN submitted an acceptable Emergency Preparedness Plan to update the emergency procedures in preparation for the refurbishment outage. CNSC staff noted that it is planning inspections to verify that the emergency preparedness program would be in place and fully operational for normal operations.

273. Regarding fire protection, CNSC staff stated that the fire protection design upgrades reflecting modifications necessary for the refurbishment outage, prior to restart, and following restart were listed in the integrated implementation plan. CNSC staff noted that there are no impediments for fuel reload but there are specific prerequisites in this area for removing the guaranteed shutdown state.

274. CNSC staff stated that, based on its technical assessments and inspections for emergency preparedness and fire protection, there are no impediments that affect fuel reload.

Waste Management During Refurbishment

275. CNSC staff stated that the waste facility operating licence for the SRWMF, WFOL W4-318.01/2009, was amended in 2003 following Commission approval of the environmental assessment to allow NBPN to add waste storage structures to the SRWMF[46,47]. CNSC staff noted that the additional storage structures were necessary to receive waste generated by the extended operation of the reactor and the PLNGS refurbishment activities. CNSC staff further noted that the WFOL and PROL for the PLNGS were consolidated under PROL 17.7/2011, in August 2008.

276. CNSC staff stated that it inspected the SRWMF in November 2008 and no compliance issues were identified. Subsequently, a Designated Officer of the Commission granted NBPN authorization to start operation of the new Phase III Facilities in accordance with the licence after verifying that NBPN had completed all prerequisites for the operation phase.

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[46] Refer to the *Record of Proceedings, including Reasons for Decision on Environmental Assessment Screening Report – Proposed Modifications to the SRWMF*, hearing date June 27, 2003.

[47] Refer to the *Record of Proceedings, including Reasons for Decisions, Application for an Amendment to the Waste Facility Operating Licences for the Point Lepreau Solid Radioactive Waste Management Facility*, hearing dates September 25 and November 26, 2003.

277. CNSC staff stated that it completed an inspection specific to the refurbishment waste management area of Phase III in January 2009 to verify that NBPN was in compliance with its licence requirements. CNSC staff stated that it observed the following:

- the new structures of the SRWMF Phase III are secure and in good repair;
- the Phase III area had been constructed and was receiving waste resulting from the ongoing refurbishment of the power plant;
- the field dose rates were found to be well below the prescribed trigger (25 μSv/h) for restricted access and other radiation protection requirements;
- the access to the area was controlled and signage was in place at the entrance to the facility;
- additional signage had been posted at intervals along the perimeter fence;
- the contamination meter at the access point to Phase III had been calibrated within the twelve month period preceding the inspection as per the NBPN Radiation Protection Directives and was operating properly; and
- the whole-body monitor was operating as required.

278. CNSC staff stated that the storage of waste generated by the refurbishment project meet requirements and that CNSC staff is satisfied that there are no waste management issues associated with reloading the fuel or operating the SRWMF.

Security During Refurbishment

279. CNSC staff stated that NBPN maintained adequate protection against threats through an effective physical protection program. CNSC staff noted that it continues to actively oversee the physical protection program at PLNGS. Detailed information on security issues was provided to the Commission in separate, protected CMDs that were considered in a closed session.

Safeguards Related to Refurbishment

280. CNSC staff stated that, during the refurbishment period, the IAEA could conduct additional inspections to verify the operational status of the reactor and to witness the core reload process. CNSC staff noted that it met with NBPN in December 2008 to discuss the ongoing safeguards requirements during the refurbishment outage and that NBPN had committed to the re-installation of core discharge monitors prior to the first discharge of spent fuel.

281. CNSC staff stated that, to date, NBPN has complied fully with both IAEA and CNSC requirements for safeguards during the refurbishment period and that CNSC staff expects NBPN to continue to comply with regulatory requirements associated with safeguards.

Environmental Assessment for Refurbishment

282. CNSC staff reported that, in 2003, the Commission approved an environmental assessment to allow NBPN to add waste storage structures to the SRWMF. CNSC staff noted that the environmental assessment also addressed the effects of continued operation. CNSC staff further noted that, in 2005, CNSC staff reviewed previously performed environmental assessments for the PLNGS site to determine whether there were any gaps that would need to be addressed in a modified environmental assessment for refurbishment and continued operation. CNSC staff determined that an assessment for refurbishment and continued operation of the PLNGS, pursuant to the CEAA, was not required.

Regulatory Hold Points and Prerequisites for Fuel Reload

283. The established regulatory hold points that mark the completion of commissioning phases A to D, consistent with the requirements of CNSC regulatory document RD-360 are as follows:
- Phase A - Prior to Fuel Load;
- Phase B - Prior to Guaranteed Shutdown State removal;
- Phase C - Prior to exceeding 0.1% Full Power; and
- Phase D - Prior to exceeding 35% Full Power.

284. CNSC staff stated that it has aligned each commissioning phase with the appropriate CNSC approval that will be sought for each of the hold points. CNSC staff noted that these hold points would serve as regulatory verification to ensure operational readiness of the plant safety systems to support full power, and satisfy regulatory requirements for staged increases in reactor power. CNSC staff further noted that prerequisite commitments for all of the regulatory hold points were included in the proposed Licence Conditions Handbook.

285. CNSC staff stated that NBPN implemented a formal and comprehensive process for the restart of the PLNGS in compliance with the RD-360 requirements for commissioning and return to service. CNSC staff further stated that NBPN would have to produce a Completion Assurance Document (CAD) consistent with RD-360 requirements for each regulatory hold point. CNSC staff noted that the CAD would provide assurance that applicable activities (design, installation, maintenance, testing, commissioning) for a specified hold point have been successfully completed. CNSC staff further noted that NBPN must also submit a CAD following sustained operation at 100% for all activities that were completed between 35% and 100% Reactor Power. The CAD would be reviewed by CNSC staff for verification of completion.

286. Some intervenors, including CCNB Action and the International Institute of Concern for Public Health, expressed concerns regarding the proposed use of hold points. Intervenors suggested that hold points would allow NBPN to operate before some issues have been addressed or components have been installed. The Commission asked CNSC staff to explain the purpose of the hold points. CNSC staff responded that the

hold points would strengthen regulatory oversight by requiring focused inspections and verification be done to ensure that the work has been conducted in accordance with all applicable requirements before the hold points are removed.

Delegation of Consent for Release of Regulatory Hold Points

287. CNSC staff stated that licence conditions in the proposed licence require NBPN to obtain approval from the Commission, or a person authorized by the Commission, prior to reloading fuel and proceeding with the restart of the reactor, and prior to each increase of reactor power in a staged fashion.

288. CNSC staff proposed that the Commission delegate authority for the necessary approvals associated with fuel load (phase A – remaining pre-requisites) and post-fuel load regulatory hold points (phases B to D) to the Executive Vice President and Chief Regulatory Operations Officer of the Regulatory Operations Branch. CNSC staff noted that the Executive Vice President would approve the release of regulatory hold points based on CNSC staff's verification that all the pre-requisites are met. CNSC staff further noted that a similar process and delegation of authority was previously approved by the Commission and is currently in use for the fuel reload and restart of Bruce A nuclear generating station Units 1 and 2.

289. CNSC staff stated that approval to release a hold point, including fuel reload, is contingent on NBPN providing confirmation that all established prerequisites have been met. CNSC staff stated that it would verify compliance and provide a report to the Executive Vice President and Chief Regulatory Operations Officer, Regulatory Operations Branch. CNSC staff noted that based on review of the report, the Executive Vice President and Chief Regulatory Operations Officer, Regulatory Operations Branch would issue a record of decision.

290. Some intervenors, including CCNB Action and the International Institute of Concern for Public Health, expressed concerns regarding the delegation of authority, stating that they felt that this delegation of authority would usurp the authority of the Commission members. The Commission does not share this concern; however, the Commission considers the proposal to load fuel to be a significant safety issue. As such, the Commission is of the opinion that the authority to consider NBPN's application for consent to remove regulatory hold points must be diligently managed by CNSC staff.

Conclusion on Approval to Reload Fuel and Restart the Reactor

291. Based on the above information, the Commission grants NBPN permission to proceed with fuel reload and restart of the PLNGS. The Commission also delegates authority for the necessary approvals associated with fuel load (phase A – remaining pre-requisites) and post-fuel load regulatory hold points (phases B to D) to the Executive Vice President and Chief Regulatory Operations Officer of the Regulatory Operations Branch.

292. Furthermore, the Commission expects CNSC staff to provide updates regarding the status of the project as needed. The Commission directs CNSC staff to report any failure of NBPN to meet the pre-requisites for approvals associated with fuel reload and hold points.

Licence Length and Conditions

293. NBPN has applied to the CNSC for a five-year renewal of its operating licence for the PLNGS, until June 30, 2017. CNSC staff recommended that the Commission accept and grant the proposed five-year term. CNSC staff stated that NBPN is qualified to operate for the proposed licence period, and that there is adequate management and oversight in place for all processes. CNSC staff further stated that NBPN is in good standing for cost recovery and meets the Nuclear Liability Insurance requirements of the *Nuclear Liability Act*[48] (NLA).

294. Several intervenors, including the Council of Canadians, Saint John Chapter; the Environmental Coalition of Prince Edward Island; Sierra Club; the Sustainable Energy Group, Carleton Chapter; the Fundy Baykeeper; the International Institute of Concern for Public Health; the Passamaquoddy Nation; CCNB Action, Saint John Fundy Chapter; the Canadian Coalition for Nuclear Responsibility; the Wolastoqewiyik Traditional Council of Tobic; and individuals, opposed the licence renewal and restart of the PLNGS. Intervenors were of the view that there was too great a risk associated with the operation of nuclear power plants, including financial cost, the possibility of severe accidents and radiation risks. Some intervenors suggested that the power could be generated by other means.

295. Other intervenors, including individuals, politicians, Saint John Energy; the Saint John Board of Trade; the Centre for Nuclear Energy Research; Energy Probe Research Foundation; the Canadian Nuclear Workers Council; J.D. Irving Ltd; the International Brotherhood of Electrical Workers, Local 37; Atlantic Nuclear Services Inc.; Atlantica Centre for Energy; Candu Energy Inc.; the Canadian Nuclear Association; and the Musquash Fire Rescue Department expressed support for the proposed restart and licence renewal. Intervenors were of the view that NBPN has safely operated the PLNGS and would continue to do so over the life of the facility. Intervenors were also of the view that the PLNGS was an important part of the energy supply and economy of New Brunswick.

296. CNSC staff proposed a new licence format for the PLNGS operating licence. CNSC staff explained that the new licence format incorporates the use of a Licence Conditions Handbook and is meant to strengthen regulatory oversight, increase regulatory effectiveness and efficiency, and reduce administrative efforts.

[48] R.S.C., 1985, c. N-28

297. CNSC staff explained that the new licence incorporates a risk-informed approach, eliminates cascading references to changing working-level licensee documentation and establishes compliance verification criteria to be used by the licensee for self-compliance verification and by CNSC staff for a regulatory focus on risk-significant items. CNSC staff further explained that the proposed licence conditions refer to well-defined policies or programs, specific requirements in accepted standards and regulatory documents, and tables of numerical limits which define the limits of authorization issued by the Commission. CNSC staff noted that the new licence format has been implemented for the power reactor operating licences of other licensees.

298. In addition to the licence, CNSC staff provided information regarding the Licence Conditions Handbook. CNSC staff explained that the Licence Conditions Handbook consolidates compliance verification criteria, provides interpretations and clarifies how the licensee must be in compliance with the licence. CNSC staff further explained that the Licence Conditions Handbook is specific to each individual facility.

299. Some intervenors, including Sustainable Energy Group, expressed the view that the current liability amount of $75 million in the NLA would not be sufficient to cover the costs of a severe accident. CNSC staff stated that, as the PLNGS is a nuclear installation under the NLA, NBPN is required to have nuclear liability up to $75 million. The Commission is satisfied that NBPN has the coverage required under the NLA. The Commission acknowledges the intervenors' concerns about this issue and notes that it is not the responsibility of the CNSC to administer the NLA, or to make policies in respect of nuclear liability or the NLA.

300. The Commission asked if the hold points for the licence would be sufficient to ensure that all of the requirements for safe operation are met. CNSC staff responded that the Licence Conditions Handbook outlines the prerequisites for every hold point and that there would be sufficient oversight to ensure that these are met before the reactor can resume safe operation. CNSC staff noted that the planned date for fuel load is May 2012, but this would only proceed if CNSC staff is satisfied that the prerequisites have been met and the permission to proceed has been granted. A representative from NBPN stated that NBPN would meet the commitments outlined in the Licence Conditions Handbook.

301. In CMD 11-H12.C, CNSC staff recommended a revision to licence condition 1.1 and proposed two new conditions, 13.4 and 13.5. CNSC staff explained that these revisions would further strengthen the licensing basis for the PLNGS. Regarding licence condition 1.1, CNSC staff stated that the proposed revision would clarify that the licensee shall conduct its activities in accordance with all applicable laws, regulations and requirements set out in federal statutes and agreements and federal, provincial and municipal regulations, in addition to the licensing basis for the facility, and report any apparent non-compliance that pertains to the licensed activities to the Commission or a person authorized by the Commission.

302. CNSC staff further stated that licence conditions 13.4 and 13.5 would require the implementation of security measures in accordance with CNSC regulatory documents RD-321[49] and RD-361[50], respectively. CNSC staff stated that the introduction of RD-321 and RD-361 represented further enhancements and improvements to the regulatory framework for security. CNSC staff noted that NBPN has complied with these two new regulatory documents.

303. CCNB Action expressed a concern that licence condition 16.2, which requires that a leakage test for the reactor building be conducted prior to the removal of the guaranteed shutdown state, was not explicit regarding the test results. The Commission sought clarification on this issue. CNSC staff responded that NBPN is required to perform a leakage rate test, and that all the tests performed by the licensee must be reviewed and accepted by CNSC staff before the reactor can be restarted. CNSC staff noted that the test would have to meet requirements to be accepted.

304. Based on the provided information and above considerations, the Commission is satisfied that a five-year licence is appropriate. The Commission accepts the licence format, licence conditions and Licence Conditions Handbook as recommended by CNSC staff. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority. The Commission notes that CNSC staff can bring any matter to the Commission as applicable. The Commission directs CNSC staff to inform the Commission on an annual basis of any changes made to the Licence Conditions Handbook.

Conclusion

305. The Commission has considered the information and submissions of CNSC staff, the applicant and all participants as set out in the material available for reference on the record, as well as the oral and written submissions provided or made by the participants at the hearing.

306. The Commission concludes that an environmental assessment of the proposed continued operation of the facility, pursuant to the *Canadian Environmental Assessment Act*, is not required.

307. The Commission is satisfied that the applicant meets the requirements of subsection 24(4) of the *Nuclear Safety and Control Act*. That is, the Commission is of the opinion that the applicant is qualified to carry on the activity that the proposed licence will authorize and that the applicant will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

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[49] CNSC Regulatory Document RD-321, "Criteria for Physical Protection Systems and Devices at High-Security Sites", 2010.
[50] CNSC Regulatory Document RD-361, "Criteria for Explosive Substance Detection, X-ray Imaging and Metal Detection Devices at High-Security Sites", 2010.

308. Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews New Brunswick Power Nuclear Corporation's Power Reactor Operating Licence for its Point Lepreau Nuclear Generating Station located on the Lepreau Peninsula in New Brunswick. The renewed licence, PROL 17.00/2017, is valid from February 17, 2012 to June 30, 2017. The Commission concurrently revokes PROL 17.01/2012.

309. The Commission includes in the licence the conditions as recommended by CNSC staff and set out in the draft licence attached CMD 11-H12.C and the draft Licence Conditions Handbook attached to CMD 11-H12.

310. In addition, the Commission grants New Brunswick Power Nuclear Corporation permission to proceed with fuel reload and restart of the reactor. The Commission delegates authority for approvals associated with fuel reload and post-fuel reload regulatory hold points to the CNSC Executive Vice President and Chief Regulatory Operations Officer, Regulatory Operations Branch.

311. The Commission requires that NBPN perform a site-specific seismic hazard assessment. The Commission notes that NBPN has submitted an assessment plan as a part of its response to the CNSC staff action plan on the *CNSC Fukushima Task Force Report* recommendations. The Commission further requires that NBPN share the results of this assessment as part of its public information program.

312. The Commission notes that CNSC staff presents its annual Integrated Safety Assessment of Canadian Nuclear Power Plants at a public proceeding of the Commission in approximately August of each year. The Commission further notes that the public will have an opportunity to provide written comments on this report.

M. Binder

FEB 1 6 2012

Michael Binder
President,
Canadian Nuclear Safety Commission

Date

Appendix A – Intervenors

Intervenors	Document Number
Timothy L. Curry	CMD 11-H12.2
Saint John Energy	CMD 11-H12.3
Saint John Board of Trade	CMD 11-H12.**4**
Centre for Nuclear Energy Research	CMD 11-H12.5
Council of Canadians, Local Chapter of Saint John, represented by P. Tippett	CMD 11-H12.6 CMD 11-H12.6A
Energy Probe Research Foundation, represented by D. Spence	CMD 11-H12.7 CMD 11-H12.7A
Canadian Nuclear Workers' Council, represented by R. Bourque	CMD 11-H12.8
Environment Coalition of Prince Edward Island (ECOPEI)	CMD 11-H12.9
Sierra Club Canada, Atlantic Canada Chapter, represented by L. Lack	CMD 11-H12.10 CMD 11-H12.10A CMD 11-H12.10.B
J.D. Irving, Limited	CMD 11-H12.11
International Brotherhood of Electrical Workers (IBEW), Local 37, represented by R. Bourque	CMD 11-H12.12 CMD 11-H12.12A
Atlantic Nuclear Services Inc.	CMD 11-H12.13
Ron Mawhinney	CMD 11-H12.14 CMD 11-H12.14A
Atlantica Centre for Energy	CMD 11-H12.15
Sustainable Energy Group, Carletong Chapter, represented by S. Arnold	CMD 11-H12.16
Candu Energy Inc.	CMD 11-H12.17
Canadian Nuclear Association	CMD 11-H12.18
Marion Pack	CMD 11-H12.19
Fundy Baykeeper, M. Abbott	CMD 11-H12.20
Hon. Craig Leonard, Minister of Energy and Minister responsible for NB Energy Efficiency and Conservation Agency	CMD 11-H12.21
International Institute of Concern for Public Health	CMD 11-H12.22 CMD 11-H12.22A
Edna Hoddinott	CMD 11-H12.23
Elva Waycott	CMD 11-H12.24
Anne Harding	CMD 11-H12.25
Wilhelmina Nolan	CMD 11-H12.26 CMD 11-H12.26A
Musquash Fire Rescue Department	CMD 11-H12.27
Lyman R. Spear	CMD 11-H12.28
Gordon Dalzell	CMD 11-H12.29
Ruth Stewart-Verger	CMD 11-H12.30
Charlene Sheehan	CMD 11-H12.31
Passamaquoddy Nation	CMD 11-H12.32

CCNB Action, Saint John-Fundy Chapter, represented by S. Murphy and C. Rouse	CMD 11-H12.33 CMD 11-H12.33A CMD 11-H12.33B CMD 11-H12.33C
Michel Duguay	CMD 11-H12.34
Canadian Coalition for Nuclear Responsibility	CMD 11-H12.35
Wolastoquwiyik Traditional Council of Tobic (WTCT), represented by D. Ennis and H. Laporte	CMD 11-H12.36

Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Record of Decision

In the Matter of

Applicant	New Brunswick Power Corporation
Subject	Application to Renew the Nuclear Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station
Public Hearing Dates	January 26, 2017 May 9-11, 2017

Canada

RECORD OF DECISION

Applicant:	New Brunswick Power Corporation
Address/Location:	515 King Street, Fredericton NB, E3B 5G4
Purpose:	Application to Renew the Nuclear Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station
Application received:	June 30, 2016
Dates of public hearing:	January 26, 2017 (Part 1) May 9-11, 2017 (Part 2)
Location:	Part 1: Canadian Nuclear Safety Commission (CNSC) Public Hearing Room, 280 Slater St., 14th Floor, Ottawa, Ontario Part 2: Delta Hotel Saint John, 39 King St., Ballrooms A & B, Saint John, New Brunswick
Members present:	M. Binder, Chair D. D. Tolgyesi R. Velshi S. McEwan
Secretary:	M.A. Leblanc
Recording Secretary:	M. Hornof
Senior General Counsel:	L. Thiele

Applicant Represented By	**Document Number**
B. Plummer, Chief Nuclear Officer and Vice-President, Nuclear J. Nouwens, Director of Regulatory Affairs & Community Affairs and Performance Improvement C. Hickman, Director, Environment and Emergency Planning K. Duguay, Manager, Manager of Community Affairs and Nuclear Regulatory Protocol M. Hare, Station Director A. Allen, Director, First Nation Affairs and Ombudsman P. Thompson, Senior Technical Advisor – Point Lepreau Generating Station D. Mullin, Superintendent of Safety Analysis	CMD 17-H2.1 CMD 17-H2.1A CMD 17-H2.1B CMD 17-H2.1C
CNSC staff	**Document Number**
R. Jammal, P. Elder, G. Frappier, M. Rinker, B. Poulet, L. Casterton, C. Ducros, A. Levine, A. Du Sautoy, YC Liu, A. Bouchard, C. Cole, D. Ndomba, A. Rupert, L. Sigouin, N. Mesmous, K. Glenn, K. Noble, A. McAllister, Y. Akl, J. Jin, V. Tavasoli, R. Tennant, E. Lemoine, R. Kameswaran, K. Sauvé, E. Desgagné, J. Jin, I. Roy and Z. Bounagui	CMD 17-H2 CMD 17-H2.A CMD 17-H2.B CMD 17-H2.C

eDocs 5192243 (word)
eDocs 5333679 (pdf)

Intervenors	Document Number
See appendix A	
Others	
Fisheries and Oceans Canada: P. Hall	
Environment and Climate Change Canada: N. Ali and D. Kim	
Health Canada: D. Nsengiyumva	
New Brunswick Emergency Measures Office: G. MacCallum, R. Shepard and C. Goodfellow	
Natural Resources Canada: J. Adams and J. Hénault	

Licence: Renewed

Table of Contents

1.0 INTRODUCTION

1. New Brunswick Power Corporation (NB Power) has applied to the Canadian Nuclear Safety Commission[1] for the renewal of its Nuclear Power Reactor Operating Licence (PROL) for the Point Lepreau Nuclear Generating Station (PLNGS) located on the Lepreau Peninsula, approximately 40 kilometers southwest of Saint John, New Brunswick. The current operating licence, PROL 17.04/2017, expired on June 30, 2017. NB Power has applied for a renewal of its licence for a period of five years. On June 15, 2017, the Commission renewed the PROL for PLNGS.[2] This *Record of Decision* provides the detailed reasons for that decision.

2. The PLNGS site consists of a single 705-megawatt Canada Deuterium Uranium-6 (CANDU-6) pressurized heavy water reactor and the Solid Radioactive Waste Management Facility (SRWMF). The SRWMF is used for the storage of radioactive waste, including used fuel, which is produced at the PLNGS site.

3. NB Power holds a single licence for all activities at the PLNGS site, including the possession of nuclear substances and prescribed equipment. The reactor at the PLNGS returned to commercial operation in 2012 following completion of reactor refurbishment.

4. In September 2016, up to $75,000 in funding to participate in this licensing process was made available to Indigenous groups, not-for-profit organizations and members of the public through the CNSC's Participant Funding Program (PFP). A Funding Review Committee (FRC), independent of the CNSC, recommended that up to $108,462 in participant funding be provided to six applicants. These applicants were required, by virtue of being in receipt of the funding, to submit a written intervention and make an oral presentation at Part 2 of the public hearing commenting on NB Power's application. One PFP recipient withdrew its PFP request prior to Part 2 of the public hearing.

Issues

5. In considering the application, the Commission was required to decide:

    a) what environmental assessment review process to apply in relation to this application

    b) if NB Power is qualified to carry on the activity that the licence would authorize

[1] The *Canadian Nuclear Safety Commission* is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.
[2] CNSC Summary Record of Decision – New Brunswick Power Corporation, "Application to Renew the Nuclear Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station", June 15, 2017.

c) if, in carrying on that activity, NB Power will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

Public Hearing

6. The Commission, in making its decision, considered information presented for a two-part public hearing held on January 26, 2017 in Ottawa, Ontario and on May 9 to 11, 2017 in Saint John, New Brunswick. The public hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*.[3] During the public hearing, the Commission considered written submissions and heard oral presentations from NB Power (CMD 17-H2.1, CMD 17-H2.1A, CMD 17-H2.1B and CMD 17-H2.1C) and CNSC staff (CMD 17-H2, CMD 17-H2.A, CMD 17-H2.B and CMD 17-H2.C). The Commission also considered oral and written submissions from 94 intervenors (see Appendix A for a list of interventions). The hearing was webcast live via the CNSC website, and video archives are available for a three-month period following the hearing. A *Summary Record of Decision* was issued on June 15, 2017.

Mandate of the Commission

7. Many intervenors provided the Commission with information about the economic impact of the PLNGS. The Commission notes that, as the regulatory authority over nuclear matters in Canada, it has no economic mandate and will not base its decisions on the economic impact of a facility. It is the health, safety and security of the public, the protection of the environment, national security, and international obligations that guide its decisions.

2.0 DECISION

8. Based on its consideration of the matter, the Commission concludes that NB Power is qualified to carry on the activity that the licence will authorize. The Commission is of the opinion that NB Power, in carrying on that activity, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Therefore,

[3] Statutory Orders and Regulations (SOR)/2000-211.

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews the Nuclear Power Reactor Operating Licence issued to New Brunswick Power Corporation for the Point Lepreau Nuclear Generating Station located on the Lepreau Peninsula in New Brunswick. The renewed licence, PROL 17.00/2022, is valid from July 1, 2017 until June 30, 2022.

9. The Commission includes in the licence the conditions as recommended by CNSC staff in CMDs 17-H2 and 17-H2.B. The Commission also delegates authority for the purposes of licence conditions 3.2 and 15.2, as recommended by CNSC staff.

10. The Commission considers the environmental review that was conducted by CNSC staff to be acceptable and thorough.

11. The Commission notes that CNSC staff can bring any matter to the Commission as applicable. The Commission directs CNSC staff to inform the Commission on an annual basis of any changes made to the Licence Conditions Handbook (LCH).

12. With this decision, the Commission directs CNSC staff to report annually on the performance of NB Power and PLNGS, as part of the annual *Regulatory Oversight Report for Canadian Nuclear Power Plants* (NPP ROR). CNSC staff shall present this report at a public proceeding of the Commission, where members of the public will be able to participate.

13. The Commission directs CNSC staff to continue increased regulatory oversight in the Management System safety and control area, with annual reports to the Commission through the NPP ROR.

3.0 ISSUES AND COMMISSION FINDINGS

14. In making its licensing decision, the Commission considered a number of issues and submissions relating to NB Power's qualification to carry out the licensed activities. The Commission also considered the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.

15. The Commission examined CNSC staff's assessment of NB Power's performance in all 14 safety and control areas (SCAs) and in relation to several other matters of regulatory interest over the current licence period. Details and the Commission's consideration of information submitted by NB Power in support of its licence renewal application, of CNSC staff assessments and of interventions submitted in relation to this matter are provided in the following sections of the *Record of Decision.*

3.1 Application of the *Canadian Environmental Assessment Act, 2012*

16. In coming to its decision, the Commission was first required to determine whether an Environmental Assessment (EA) under the *Canadian Environmental Assessment Act, 2012*[4] (CEAA 2012), was required.

17. The application submitted by NB Power is for a PLNGS licence renewal. The Commission notes that a licence renewal is not a designated project under CEAA 2012.

18. The Commission notes that a previous EA was carried out in 2003 under the *Canadian Environmental Assessment Act*[5] in conjunction with the maintenance of, and the modifications made to, the SRWMF. CNSC staff informed the Commission that CNSC reviews of ongoing reporting from NB Power confirmed that activities and predictions at the PLNGS were consistent with the 2003 EA.

19. The Commission considered the completeness and adequacy of the EA that CNSC staff conducted under the NSCA for this licence renewal. CNSC staff findings included, but were not limited to:

- NB Power maintained adequate environmental protection programs that met CNSC requirements.
- NB Power conducted the most recent environmental risk assessment (ERA) using appropriate methodology and sufficiently conservative data, with the ERA showing that human health and the environment remained protected.
- The results of the CNSC's 2014 and 2015 Independent Environmental Monitoring Program (IEMP) confirmed that the public and the environment near the PLNGS remained protected from the releases from the facility.

20. Asked to comment on the adequacy of the EA that CNSC staff conducted under the NSCA for this licence renewal, the Environment and Climate Change Canada (ECCC) representative submitted that, after reviewing the EA components that were within ECCC's mandate, ECCC was satisfied that the EA was adequate for the purposes of the renewed PLNGS operations.

21. The Commission notes that the NSCA provides a strong regulatory framework for environmental protection. Whether an EA under CEAA 2012 is required or not, the CNSC regulatory framework ensures that adequate measures are in place to protect the environment and human health in accordance with the NSCA and its regulations.

[4] Statutes of Canada (S.C.) 2012, chapter (c.) 19, section (s.) 52.
[5] S.C 1992, c. 37

22. On this basis, and based on the information examined and provided on the record for this hearing, the Commission concludes that an EA conducted under the NSCA and its regulations was appropriate for the PLNGS licence renewal application. The Commission is satisfied that an EA under CEAA 2012 was not required in this matter. Further, the Commission is satisfied that NB Power has made, and will continue to make, adequate provision for the protection of the environment throughout the proposed licence period.

3.2 Management System

23. The Commission examined NB Power's Management System which covers the framework that establishes the processes and programs required to ensure that the PLNGS achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture. Throughout the current licence period, CNSC staff rated NB Power's performance in this SCA as "satisfactory."

24. The Commission assessed the information submitted by NB Power and CNSC staff regarding NB Power's compliance with Update no. 1 of CSA N286-05, *Management system requirements for nuclear power plants*, during the current licence period.[6] Furthermore, NB Power reported that CSA N286-12, *Management system requirements for nuclear facilities*,[7] would be fully implemented at the PLNGS by December 2017. CNSC staff confirmed the adequacy of this timeline to the Commission.

25. CNSC staff informed the Commission that CNSC compliance verification activities had identified some areas for improvement in specific areas of the PLNGS management system, including roles and responsibilities, contractor evaluation, document control, work control, storage control, procedural adherence and procedural adequacy. CNSC staff further explained that corrective actions plans (CAPs) for these areas of improvement were completed by NB Power and accepted by CNSC staff in 2015 and 2016.

26. CNSC staff submitted to the Commission that an inspection focussing on self-assessment and independent assessment at the PLNGS had identified areas for improvement in regard to documentation control, procedural adherence and procedural adequacy. CNSC staff noted that documentation control related areas for improvement had been addressed to CNSC staff's satisfaction and that the remaining areas for improvement were of low safety significance, with CNSC staff continuing to monitor the implementation of CAPs for these matters through ongoing compliance verification activities.

[6] CSA N286-05, Update no. 1: *Management system requirements for nuclear power plants*, CSA Group, 2007.
[7] CSA N286-12, *Management system requirements for nuclear facilities*, CSA Group, 2012.

27. The Commission noted the number of procedural adequacy and adherence related CAPs and enquired about whether this was representative of an overall systematic failure of the PLNGS management system. CNSC staff acknowledged that a facility's management system affected all 14 SCAs and that NB Power's decreased performance in procedural adequacy and adherence during the current licence period resulted in actions on NB Power, including root cause analyses, CAPs and additional CNSC oversight. The NB Power representative provided detailed information about the root cause analysis that was conducted with a third-party expert for this issue. The NB Power representative also informed the Commission about how NB Power continued to address the identified management system issues and about the performance metrics used to assess the PLNGS management system. CNSC staff confirmed to the Commission's satisfaction that, overall, the PLNGS management system satisfied regulatory requirements and that CAPs were being implemented satisfactorily.

28. In response to an intervention from A. Dykeman regarding the use of procedures at the PLNGS and how these contributed to its safe operation, the Commission asked the licensee about how information regarding regulatory issues, such as those identified for procedural adequacy and adherence, were disseminated to PLNGS employees. NB Power provided the Commission with information about the regular employee and contractor meetings, as well as on-the-job reinforcement, noting that NB Power was making significant progress in ensuring that all PLNGS employees and contractors were aware of, understood and used these established procedures.

3.2.1 Quality Management

29. The Commission assessed the adequacy of NB Power's PLNGS Quality Assurance Program. NB Power submitted that the Quality Assurance Program ensured that safety-related equipment, systems and structures were performing according to the stated requirements over the course of their service lifetime. NB Power also submitted that it used self-assessments, benchmarking, an independent Nuclear Oversight Group and two external oversight groups – the Nuclear Safety Review Board and the Corporate Nuclear Oversight Team – to ensure that the requirements and objectives of the PLNGS Management System were being achieved.

30. Asked to submit additional information regarding external oversight of NB Power's operations, the NB Power representative provided the Commission with information about the roles of the Corporate Nuclear Oversight Team, the Nuclear Safety Review Board, the internal NB Power Nuclear Oversight Group, as well as about the oversight provided through the World Association of Nuclear Operators, noting that these multiple layers of internal and external oversight ensured that the PLNGS remained a safe and robust station. The NB Power representative also informed the Commission that external reviews were generally consistent in the identification of best practices and areas that required improvement. The Commission is satisfied with the information provided on this point.

31. Based on the information provided on the record for this hearing, the Commission is satisfied that NB Power has an appropriate Quality Assurance Program in place at the PLNGS. The Commission expects CNSC staff to continue its monitoring of NB Power's implementation of CAPs in regard to procedural adequacy and adherence throughout the proposed licence period.

3.2.2 Organization

32. The Commission reviewed the information submitted by NB Power regarding its organizational structure at the PLNGS, noting the key activities that NB Power used to effectively implement PLNGS processes. NB Power submitted that the PLNGS organizational structure identified the high level responsibilities and authorities of the positions associated with its operations and that its Plan of Establishment included the total complement of positions needed to support the facility's safe operation. NB Power also submitted that, through extensive hiring and multi-year staffing plans, NB Power was ensuring the continuity of knowledge and skills throughout the life of the PLNGS.

33. NB Power submitted that, as part of its overall organizational improvement plan, PLNGS leadership development programs and learning and development activities were increased and improved throughout the current licence period. NB Power also noted that the PLNGS change management process was significantly improved, strengthened and streamlined during the current licence period.

34. NB Power provided the Commission with information on its management of contractors, noting the specific technical, quality and training requirements that contractors had to meet. NB Power explained that its contractor management programs ensured that the work of contracted personnel conformed to the standards and expectations as defined in the PLNGS Management System.

35. The Commission considered the information submitted by CNSC staff regarding NB Power's organization and areas of improvement that were identified through CNSC compliance activities. CNSC staff reported that it had assessed NB Power's CAPs to address all of the identified areas for improvement and determined them to be satisfactory. CNSC staff confirmed to the Commission's satisfaction that the areas of improvement did not present a safety risk and that the CAPs would continue to be monitored during the proposed licence period.

36. The Commission enquired about NB Power's strategies for knowledge transfer and succession planning. The NB Power representative provided information on its succession planning initiative, noting that NB Power was well prepared for the upcoming retirements through its graduate hiring program. In regard to knowledge transfer, the NB Power representative stated that benchmarking to improve knowledge transfer processes at the PLNGS was recently carried out. The Commission was satisfied with the information provided on this point.

37. Based on the information provided, the Commission is satisfied that NB Power has an appropriate organizational structure in place at the PLNGS to ensure continued safety of persons and the environment throughout the proposed licence period.

3.2.3 Facility Management

38. The Commission examined the information provided by NB Power in regard to facility management at the PLNGS. NB Power submitted that the SAP® software package, *Work Clearance Applications*, was used for PLNGS configuration management and provided detailed information about configuration control improvements that were made during the current licence period. NB Power also provided information regarding configuration control improvement initiatives planned for the proposed licence period.

39. The Commission assessed the adequacy of NB Power's business continuity programs at the PLNGS, developed to minimize disruptions in the event of natural, human or technical threats. NB Power provided information about its risk assessment and management processes, as well about the PLNGS Pandemic Response and Emergency Response Plans, noting that NB Power worked with the New Brunswick Emergency Measures Organization (NBEMO) and various levels of government to ensure the safety of the public through its business continuity programs. CNSC staff confirmed the information provided by NB Power, noting that NB Power was adequately prepared to maintain or restore critical business functions in the event of disabling circumstances.

40. The Commission requested additional details about NB Power's pandemic emergency and business continuity planning. The NB Power representative provided additional information about how the PLNGS business continuity plans would maintain or restore critical business functions during an emergency at the PLNGS, noting that the pandemic emergency plan was a corporate-wide plan and was being updated. The Commission was satisfied with the information provided.

41. Based on the information provided, the Commission is satisfied that NB Power has adequate programs in place for configuration management and business continuity management at the PLNGS.

3.2.4 Safety Culture

42. The Commission assessed the adequacy of NB Power's safety culture at the PLNGS. NB Power reported that nuclear safety was a primary focus at the PLNGS and that NB Power challenged itself to continuously improve in this area. NB Power also provided information about the processes NB Power used to evaluate its safety culture, including comprehensive assessments in 2014 and 2016 showing a healthy PLNGS nuclear safety culture and noting that the PLNGS safety culture was validated by an industry

award. NB Power further provided information on areas for improvement that were identified during these assessments and reported to the Commission that implementation plans had been developed for each of those areas of improvement. CNSC staff confirmed this information, providing the Commission with details about CNSC assessments of the PLNGS safety culture during the current licence period. CNSC staff further confirmed that NB Power had a variety of effective mechanisms to implement recommendations from its internal and CNSC safety culture assessments.

43. Asked to provide results of the latest PLNGS nuclear safety culture surveys, the NB Power representative submitted that the surveys, conducted every two years, showed confidence amongst PLNGS employees in the mechanisms that had been implemented to report safety concerns. However, the NB Power representative stated that a gap was identified in the mechanism that was used to transmit information from the management level to the workers in the plant. The NB Power representative provided the Commission with CAPs that NB Power took to correct this issue, metrics that were used to measure progress in this regard and stated to the Commission's satisfaction that there had been significant improvements in this regard.

44. In their interventions, several unions, nuclear-related organizations and NB Power employees submitted that NB Power was very receptive in addressing and ensuring the resolution of safety issues that arose at the PLNGS. In the Commission's consideration of these interventions, the Commission requested additional information on the topic of raising safety issues at the PLNGS. The NB Power representative informed the Commission that there was a low threshold for the reporting of issues at the PLNGS and that site staff regularly used the multiple mechanisms through which they could report these issues or concerns.

45. Further on this topic, the Commission called for comments regarding the concern in PEACE-NB's intervention that the PLNGS had a history of bullying in the workplace. The NB Power representative provided the Commission with information on this matter, stating that NB Power had a respectful workplace policy with zero-tolerance for bullying. The Commission is satisfied with the information provided on this point.

46. The Commission considered the interventions from members of local communities, unions, local businesses and PLNGS staff that commended NB Power on the high safety culture standards at the PLNGS, ensuring the continuous safety of its operations and staff. The Commission noted that several intervenors were companies with contractors at the PLNGS and that these intervenors submitted that they had very good working relationships with NB Power.

47. Based on the information examined for this hearing, the Commission is satisfied that NB Power has maintained and will continue to maintain a strong safety culture at the PLNGS.

48. The Commission wishes to note that, based on the information submitted for this hearing, the Commission is satisfied that NB Power provides PLNGS staff and contracted personnel with adequate opportunity and support to report safety issues and to refuse unsafe work without the fear of bullying or retribution.

3.2.5 Conclusion on Management System

49. On the basis of the information provided on the record for this hearing, the Commission concludes that NB Power has appropriate organization and management structures in place and that the operating performance at the PLNGS in the current licence period provides a positive indication of NB Power's ability to adequately carry out the activities under the proposed renewed licence.

50. The Commission notes its concerns with the management system-related deficiencies that were identified through CNSC compliance verification activities during the current licence period. The Commission expects NB Power to implement CAPs as described during this hearing throughout the proposed licence period and expects CNSC staff to continue increased regulatory oversight in this SCA, with annual reports to the Commission through the NPP ROR.

51. The Commission is, overall, satisfied that the PLNGS management system-related deficiencies noted during CNSC inspections do not amount to a risk to the health and safety of persons or the environment and that the implementation of the management system related-CAPs will continue to support safe operations at the PLNGS.

3.3 Human Performance Management

52. The Commission assessed NB Power's human performance management programs which encompass activities that enable effective human performance through the development and implementation of processes that ensure that PLNGS staff are sufficient in number in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties. During the current licence period, CNSC staff rated NB Power's performance in this SCA as "satisfactory."

53. The Commission examined the information submitted by NB Power regarding the PLNGS human performance program and the integration of P-119, *Policy on Human Factors*[8] into PLNGS processes. NB Power also provided information on its Human Performance Steering Committee and the CAPs related to human performance management that were implemented throughout the licence period. NB Power submitted that it used departmental clock resets[9] as learning and communication tools

[8] CNSC Regulatory Policy P-119, *Policy on Human Factors*, October 2000.
[9] "Departmental clock resets" are an event tracking tool. These indicate any event that resets the departmental event-free site clock, helping to track and to establish lessons learned for these events.

at the PLNGS and that, through increased oversight and reinforcement of specific human performance tools, department clock resets in 2015 were reduced by 50% in comparison with resets in 2014.

54. CNSC staff reported that a 2013 PLNGS human performance program inspection resulted in corrective actions that were adequately addressed by NB Power during the current licence period. CNSC staff also noted that NB Power performed a focussed human performance program self-assessment in 2014 that validated the program's consistency with industry standards. CNSC staff reported to the Commission's satisfaction that NB Power had committed to carrying out a human performance program self-assessment at least once per licence period, with program documentation updated accordingly.

3.3.1 Personnel Training

55. The Commission considered the information submitted by NB Power about its personnel training programs, noting that the programs at the PLNGS were compliant with REGDOC-2.2.2, *Personnel Training*[10] and that training oversight was provided by three committees. NB Power submitted details about training process improvement initiatives that were carried out throughout the current licence period, as well as industry strengths that were identified in the PLNGS training programs. NB Power also reported that it was recognized by industry for its dedication to fostering on-the-job learning of its employees.

56. CNSC staff confirmed the information provided by NB Power and reported that NB Power's Systematic Approach to Training- (SAT-) based system met the specifications of REGDOC-2.2.2. CNSC staff provided the Commission with information on personnel training compliance verification activities that were carried out at the PLNGS throughout the current licence period, reporting that overall, NB Power had implemented training programs in accordance with its SAT-based training system. CNSC staff noted that, although NB Power's CAPs for its Fuel Handling Operator Training program had been reviewed and accepted by CNSC staff in May 2016, a 2017 inspection identified additional areas of improvement for this program. CNSC staff confirmed to the Commission's satisfaction that NB Power would provide CNSC staff with quarterly updates on the improvements being implemented for the Fuel Handling Operator Training program and that annual updates would be provided to the Commission through the NPP ROR.

57. The Commission examined numerous interventions from individuals who presented information about the training provided to PLNGS employees and contractors. The Commission notes that all of these intervenors were of the opinion that PLNGS employees and contractors were provided with more than adequate training to carry out their duties safely.

[10] CNSC Regulatory Document REGDOC-2.2.2, *Personnel Training*, December 2016.

58. The Commission considered the information provided in several interventions, including those from first responder organizations, community businesses, municipalities, unions and individuals, respecting collaborative training initiatives that they carried out with PLNGS personnel. The Commission notes its satisfaction with this practice and encourages NB Power to continue its collaboration with various stakeholders in PLNGS training initiatives.

59. Having examined all of the information provided on the record for this hearing, the Commission is satisfied that NB Power has appropriate training programs in place at the PLNGS and meets the objectives of REGDOC-2.2.2. The Commission expects CNSC staff to continue its monitoring of NB Power's progress in addressing the identified corrective actions.

3.3.2 Certification and Examinations

60. NB Power informed the Commission about the SAT-based Certified Staff Training Program at PLNGS, noting that it met the specifications of CNSC RD-204, *Certification of Persons Working at Nuclear Power Plants*[11] and that PLNGS had a 10-year plan for the certification of three staffing streams. NB Power also reported that the Management Development Program at the PLNGS was developed in order to ensure the continued progress of PLNGS employees through the program. CNSC staff confirmed the information provided by NB Power and further informed the Commission that NB Power maintained a sufficient number of certified personnel for all certified positions at the PLNGS throughout the licence period.

61. In regard to certification examinations, NB Power provided the Commission with detailed information about how its programs met the specifications in RD-204 and reported that PLNGS had started reporting the results of Personnel Certification Examinations as specified in REGDOC-3.1.1, *Quarterly Report on Nuclear Power Plant Personnel*.[12] CNSC staff informed the Commission that an inspection focusing on simulator exams was conducted during the current licence period, with four areas for improvement identified and subsequent corrective actions completed by NB Power to the satisfaction of CNSC staff. CNSC staff confirmed that NB Power was compliant with all CNSC requirements in regard to certification examinations.

62. The Commission examined the intervention from an individual, L. Belding, and requested additional details about the scenarios considered during licensed control room operator simulator training. The intervenor provided the Commission with detailed information regarding the frequency of simulator training and the wide variety of conditions for which PLNGS staff trained, including severe accidents and extreme weather situations. The Commission was satisfied with the information provided on this point.

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[11] CNSC Regulatory Document RD-204, *Certification of Persons Working at Nuclear Power Plants*, February 2008.
[12] CNSC Regulatory Document REGDOC-3.1.1, *Quarterly Report on Nuclear Power Plant Personnel*, April 2016.

63. Based on the information presented during this hearing, the Commission is satisfied that NB Power has appropriate training and certification programs in place at PLNGS. The Commission is also satisfied that NB Power's programs meet the objectives of RD-204, with quarterly reporting to the CNSC in accordance with REGDOC-3.1.1.

3.3.3 Human Factors

64. The Commission assessed the information provided by NB Power regarding its adherence to minimum shift complement (MSC) requirements. NB Power reported that a PLNGS MSC validation analysis was carried out during the current licence period and that an analysis was also carried out against G-323, *Ensuring Presence of Sufficient Qualified Staff at Class I Nuclear Facilities: Minimum Staff Complement*.[13]

65. CNSC staff reported that, during the current licence period, NB Power added an Emergency Response Team (ERT) to its MSC, providing NB Power additional emergency response capacity. The Commission expressed satisfaction with the addition of the ERT to the MSC and enquired about whether the ERT had operational responsibilities at the PLNGS. NB Power confirmed that the primary responsibility of the ERT was the response to medical, fire, nuclear and hazardous materials events, not PLNGS operations.

66. The Commission assessed the Fitness for Duty Program at the PLNGS which included hours of work, workplace wellness, relationships in the workplace, prevention programs and several employee assistance programs. NB Power reported that its Fitness for Duty Program included a Continuous Behaviour Observation Program which provided guidance to employees, contractors and supervisors to detect negative behavioural changes. CNSC staff confirmed the information provided by NB Power.

67. Asked for additional information on the Continuous Behaviour Observation Program, the NB Power representative explained that the program trained NB Power employees to look for aberrant behaviour to ensure that this behaviour did not negatively impact the PLNGS, noting that a variety of resources is made available to employees should such aberrant behaviours be identified. The Commission further enquired as to the effectiveness of the program. The NB Power representative explained how program effectiveness was measured through the PLNGS corrective action system and trending, Several intervenors, who were also PLNGS employees, explained to the Commission the workings and effectiveness of the Continuous Behaviour Observation Program, noting that they were encouraged to report fitness for duty or safety issues.

68. CNSC staff reported that, during the current licence period, NB Power controlled the hours of work and shift schedules of its workers in accordance with approved procedures and that certified staff was in full compliance with PLNGS limits on hours

[13] CNSC Regulatory Guide G-323, *Ensuring Presence of Sufficient Qualified Staff at Class I Nuclear Facilities: Minimum Staff Complement*, August 2007.

of work. CNSC staff further reported that NB Power had measures in place to manage worker fatigue to comply with CNSC requirements. CNSC staff also informed the Commission that the recently-published REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*,[14] as well as REGDOC-2.2.4, *Fitness for Duty*[15] (under development), would apply to NB Power's programs for the PLNGS during the proposed licence period, with the associated implementation plan and timeline accepted by CNSC staff and detailed in the LCH.

69. The Commission further enquired about NB Power's management of fitness for duty concerns related to drug and alcohol impairment. The NB Power representative explained that, through the PLNGS fitness for duty monitoring programs, NB Power had adequate measures in place to manage these fitness for duty concerns, with additional guidance in this regard forthcoming through the next volume of REGDOC-2.2.4. CNSC staff confirmed that NB Power's programs in this regard met CNSC staff expectations. The Commission is satisfied with the information provided on this point.

70. In response to the concerns raised in an intervention from G. Dalzell about the appropriateness of 12-hour shifts at the PLNGS, the NB Power representative explained that the PLNGS had implemented 12-hour shifts in the 1990s and therefore had a lot of experience in this area. The NB Power representative also provided information about the PLNGS fatigue monitoring program and submitted that, although NB Power was of the opinion that 12-hour shifts were adequate and that they were an industry standard, NB Power was evaluating the adequacy and safety of 12-hours shifts as part of the implementation of REGDOC-2.2.4. CNSC staff confirmed the information provided by NB Power, explaining that CNSC staff considered 12-hour shifts to be safe.

71. Noting that many intervenors focussed on the technical safety improvements that were made at the PLNGS as part of the Fukushima Action Plan, the Commission called for comments on the role of human factors in ensuring that these technical improvements were effective in improving safety at the facility. CNSC staff agreed with the intervenors, that the technical improvements implemented at the PLNGS were important to improving its safety, but noted that without adequate consideration from the human factors perspective, these safety improvements would not be nearly as effective. The Commission agreed with this assessment and was satisfied with the consideration given to human factors in the implementation of technical safety improvements at the PLNGS.

72. Following its examination of the information provided on the record for this hearing, the Commission is satisfied that the MSC at the PLNGS meets the specifications of G-323 and that NB Power had and will maintain an adequate Fitness for Duty program in place at the PLNGS.

[14] CNSC Regulatory Document REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*, March 2017.
[15] CNSC Regulatory Document REGDOC-2.2.4, *Fitness for Duty*, under development.

3.3.4 Conclusion on Human Performance Management

73. Based on its consideration of the information presented on the record for this hearing, the Commission concludes that NB Power has appropriate programs in place and that current efforts related to human performance management provide a positive indication of NB Power's ability to adequately carry out the activities under the proposed licence.

74. The Commission considered the information provided by NB Power and CNSC staff and is satisfied that the minimum requirements for qualified and certified staff are being met at the PLNGS. The Commission expects NB Power to continue the implementation of identified improvements and corrective actions for Fuel Handling Operator training programs at PLNGS and expects annual updates in this regard provided by CNSC staff through the NPP ROR.

75. The Commission anticipates the implementation of the following REGDOCs at the PLNGS during the current licence period:
    - REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*
    - REGDOC-2.2.4, *Fitness for Duty* (covering areas such as medical and psychological fitness for duty, including drug and alcohol testing, under development)

3.4 Operating Performance

76. The Commission examined operating performance at the PLNGS, which includes an overall review of the conduct of the licensed activities and the activities that enable effective performance as well as improvement plans and significant future activities at PLNGS. Throughout the current licence period, CNSC staff rated NB Power's performance in the operating performance SCA as "satisfactory."

77. The Commission notes that NB Power's *Navigating for Excellence Handbook* for the PLNGS was admitted into the record during this hearing and is publicly available for review.

3.4.1 Conduct of Licensed Activity

78. The Commission evaluated NB Power's Operations Program, which is comprised of standards, process and procedures to ensure the safety of the public and the environment, as well as high levels of equipment reliability during both normal and accident conditions. NB Power provided detailed information about its Operating Policies and Principles (OP&Ps) and reported that nuclear safety was paramount to NB Power, with the defence-in-depth concept adopted at the PLNGS to ensure that there were multiple overlapping engineering, administrative and people-based barriers to ensure safety. NB Power also reported that, throughout the current licence period, steady progress had been made towards minimizing reactivity management events, and

that a PLNGS Reactivity Oversight Committee had been established.

79. CNSC staff confirmed the information provided by NB Power and submitted that CNSC compliance verification activities showed that the PLNGS was operated safely and that NB Power implemented CNSC-approved programs in accordance with PLNGS licence requirements. CNSC staff also reported that NB Power appropriately managed unplanned transients at the PLNGS during the current licence period and that these did not present a risk to nuclear safety, human health or the environment.

80. The Commission reviewed how NB Power used operating experience to improve its operating performance. NB Power submitted that it used

- an Operating Experience Program, which provided an opportunity to capitalize on lessons learned from both the PLNGS and industry
- a Corrective Action Program Health Index performance metric to evaluate performance improvement
- a Corrective Action Program
- trending to identify degrading or potentially degrading station conditions

81. Regarding operating performance in terms of reactor power and outages, the NB Power representative informed the Commission that the forced loss rate[16] at the PLNGS was improving significantly, from 19.86% in 2015 to 2.48% in 2016.

82. NB Power informed the Commission about its procedure-development and verification process at the PLNGS, noting that this process was subject to continuous improvement activities. On this topic, CNSC staff reported that areas for improvement of procedural adequacy and adherence at PLNGS were identified during the current licence period and that two directives were issued to NB Power. CNSC staff also provided details regarding its regulatory oversight in regard to the directives, noting that, although the areas for improvement were identified as potentially safety significant, they did not present an immediate risk to the health and safety of persons or the environment. CNSC staff submitted that the implementation of CAPs on this issue would continue until NB Power satisfies all CNSC requirements.

83. The Commission noted NB Power's commitment to top-quartile performance and excellence at the PLNGS and requested additional information about how NB Power would achieve this goal. The NB Power representative submitted that the PLNGS was already meeting top-quartile performance in many areas of its operations and provided information about areas that still required improvement. The NB Power representative explained that NB Power had established goals and associated metrics for PLNGS operations and that these metrics were assessed against performance on an annual basis, with improvements implemented to operations if the goals were not met.

[16] Forced loss rate is defined as "Operating period forced loss rate is defined as the ratio of the unplanned energy losses during a given period of time, considering only the operating period, to the reference energy generation minus energy losses corresponding to planned outages and their possible unplanned extensions, during the same period, expressed as a percentage." Source: IAEA, https://www.iaea.org/PRIS/Glossary.aspx.

The NB Power representative also informed the Commission that NB Power's commitment to excellence applied to CNSC ratings in the 14 SCAs, with NB Power continually striving for "fully satisfactory" ratings. The Commission was satisfied with NB Power's commitment in this regard.

84. Having examined the information submitted for this hearing, the Commission is satisfied that the PLNGS was operated and will continue to be operated safely. The Commission expresses satisfaction with NB Power's continuous improvement plans for PLNGS operations and encourages NB Power to continue its efforts in this regard.

3.4.2 Reporting and Trending

85. The Commission assessed the information submitted by CNSC staff regarding NB Power's continued adherence to the specifications of S-99, *Reporting Requirements for Operating Nuclear Power Plants*[17] until December 2014, and REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*[18] for the balance of the current licence period. The Commission noted that CNSC staff did not identify any nuclear safety-related regulatory issues from NB Power's reports.

86. Based on the information provided, the Commission is satisfied that NB Power met all reporting parameters as specified in S-99 and currently meets the parameters of REGDOC-3.1.1 and that no safety-related regulatory issues were reported by NB Power during the current licence period.

3.4.3 Outage Management Performance

87. The Commission considered the adequacy of NB Power's Outage Management Process, which was used to manage planned outages at PLNGS. NB Power submitted information on planned outage cycles, noting that safety and quality were top priorities in outage planning to ensure successful outage execution and that the next outages were planned for 2018 and 2020. The Commission also considered the information from NB Power about the determination of outage scope, planning and scheduling and notes that PLNGS had recently implemented CSA N290.11-13, *Requirements for reactor heat removal capability during outage of nuclear power plants*.[19] The Commission notes that NB Power successfully completed its latest planned outage in April 2017.

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[17] CNSC Regulatory Standard S-99, *Reporting Requirements for Operating Nuclear Power Plants*, March 2003.
[18] CNSC Regulatory Document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, Version 2, April 2016.
[19] N290.11-13, *Requirements for reactor heat removal capability during outage of nuclear power plants*, CSA Group, 2013.

88. CNSC staff confirmed the information provided by NB Power and submitted that NB Power performed all safety-related outage undertakings in accordance with CNSC-approved procedures during the current licence period. CNSC staff further reported NB Power conducted all appropriate follow-up actions for forced unplanned outages at NB Power during the current licence period.

89. Based on the information provided by NB Power and CNSC staff, the Commission is satisfied that planned outages were performed appropriately throughout the licence period and that NB Power had adequate procedures in place to carry out planned outages during the proposed licence period. The Commission is also satisfied that follow-up for forced outages was carried out and will continue to be carried out appropriately, meeting the objectives of N290.11-13.

3.4.4 Safe Operating Envelope

90. The Commission examined the information provided by NB Power and CNSC staff regarding the PLNGS Safe Operating Envelope (SOE). NB Power provided information about how the specifications of CSA N290.15, *Requirements for the safe operating envelope for nuclear power plants*[20] were met at the PLNGS throughout the current licence period.

91. CNSC staff confirmed the information provided by NB Power and submitted that in 2015, CNSC staff carried out an inspection focussing on NB Power's PLNGS SOE program, resulting in minor SOE maintenance findings. CNSC staff reported that NB Power was adequately addressing these findings, with ongoing compliance monitoring by CNSC staff.

92. Based on the information provided for this hearing, the Commission is satisfied that NB Power has an appropriate SOE program in place at the PLNGS that meets the specifications of N290.15. The Commission expects CNSC staff to continue monitoring NB Power's progress in addressing the SOE-related inspection findings.

3.4.5 Accident Management and Recovery

93. The Commission assessed the detailed information provided by NB Power regarding severe accident management and recovery programs at the PLNGS. NB Power submitted that the PLNGS was using G-306, *Severe Accident Management Programs for Nuclear Reactors*[21] and that an implementation plan for REGDOC-2.3.2, *Accident Management*[22] would be submitted to CNSC staff in September 2017. The Commission also considered the information provided by NB Power about

[20] N290.15, *Requirements for the safe operating envelope for nuclear power plants*, CSA Group, 2010.
[21] CNSC Regulatory Guide, *Severe Accident Management Programs for Nuclear Reactors*, May 2006.
[22] CNSC Regulatory Document REGDOC-2.3.2, *Accident Management*, version 2, September 2015.

- its programs to support and manage severe events and accidents, including the Severe Accident Management Guidelines (SAMGs)
- Abnormal Plant Operating Procedures (APOPs)
- the Incident Command System
- the Emergency Response Organization
- the Level II probabilistic safety assessment (PSA)
- the emergency mitigating equipment (EME) implemented at the PLNGS in response to Fukushima Action Plan

94. CNSC staff confirmed the information provided by NB Power and provided the Commission with information about safety improvements that were made to the PLNGS during refurbishment activities. CNSC staff also submitted that a 2013 inspection of NB Power's SAMG documentation showed that it met the objectives of G-306.

95. CNSC staff submitted that a 2013 inspection of NB Power's APOPs showed a need for APOP improvement. CNSC staff provided the Commission with information on the CAP that NB Power submitted to CNSC staff in 2014, and explained that the remaining areas of improvement were of low safety significance and that CNSC staff was satisfied with the progress being made to address the corrective actions.

96. Based on the information provided by NB Power and CNSC staff, the Commission is satisfied that NB Power has adequate programs in place at NB Power to manage and respond to design basis, beyond design basis and severe accident events at the PLNGS, with its program meeting the specifications of G-306. The Commission expects CNSC staff to continue its monitoring of NB Power's CAP for the improvement of the PLNGS APOPs, with annual reporting to the Commission on NB Power's progress in this regard through the NPP ROR.

97. The Commission notes NB Power's commitment to implement REGDOC-2.3.2 at the PLNGS as soon as practicable.

98. The Commission acknowledges interventions regarding severe accident management from several intervenors including the Canadian Environmental Law Association (CELA), Greenpeace Canada, G. Dalzell and S. Nijhawan. The issues submitted in these interventions are considered by the Commission in section 3.11, *Emergency Management and Fire Protection* of this decision.

3.4.6 Conclusion on Operating Performance

99. Based on the above information, the Commission concludes that the operating performance at the PLNGS during the current licence period provides a positive indication of NB Power's ability to carry out the activities under the proposed licence.

100. The Commission wishes to note its consideration of interventions from the Passamaquoddy First Nation, Mi'gmawe'l Tplu'tawnn Incorporated (MTI), the Maliseet Nation of New Brunswick, Sipekne'katik, CELA, Greenpeace Canada, PEACE-NB, New Clear Free Solutions, G. Dalzell, S. Nijhawan and other individuals, which expressed concerns about the safety of PLNGS operations.

101. The Commission also notes that other intervenors, including community organizations, local businesses, individuals, unions and industry groups expressed confidence in the safety and operating performance of the PLNGS, noting that NB Power had a comprehensive plan for continuous improvement in this regard.

102. On the basis of its review of the above information, the Commission is satisfied that NB Power will continue to ensure that appropriate operation performance-related programs are in place at the PLNGS to ensure the health and safety of persons and the environment.

103. The Commission is satisfied with CNSC staff's plans to include NB Power's SOE documentation in the PLNGS LCH under the proposed licence condition 3.1. The Commission reaffirms that, since the SOE is part of the PLNGS licensing basis, changes to the SOE documentation that may reduce safety margins will require Commission approval.

104. The Commission expects NB Power to continue its progress in addressing CNSC inspection findings related to operating performance and CNSC staff to continue its monitoring of the related CAPs, with annual updates to the Commission through the NPP ROR.

3.5 Safety Analysis

105. The Commission assessed safety analysis at the PLNGS, which includes a systematic evaluation of the potential hazards associated with the conduct of the licensed activity or the operation of a facility, and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards. Safety analysis supports the overall safety case for the PLNGS. CNSC staff reported that, throughout the current licence period, the PLNGS was operated safely and within licence limits, with NB Power's performance in this SCA rated as "satisfactory" by CNSC staff.

106. The Commission noted the opinion in the intervention from S. Nijhawan that CANDU reactors were not safe and should not be licensed, and asked for comments on this matter. CNSC staff provided information on this matter, noting that approximately 10% of the world's nuclear reactors were CANDU reactors and that they were all operating safely. The Commission is satisfied with the information provided on this point.

107. In regard to the concern about CANDU reactor positive void reactivity raised by PEACE-NB, CNSC staff provided the Commission with detailed information about how positive void reactivity was not a CANDU design flaw, that it allowed for the use of natural uranium providing considerable safety benefits, and provided information about how the positive void reactivity of CANDU reactors was managed to ensure safety. The Commission agrees with CNSC staff's assessment of this issue and is satisfied with the information provided on this point.

108. In response to S. Nijhawan's intervention, the Commission enquired about how CNSC staff ensured that safety analyses were carried out and reviewed by personnel with the appropriate credentials. CNSC staff provided detailed information regarding the credentials required for NB Power staff, CNSC staff and third-party reviewers in this regard, noting that this information was captured in the CNSC's regulatory framework. The NB Power representative concurred with the information provided by CNSC staff and provided additional details on this topic. The Commission was satisfied with the information provided on this point.

109. NB Power informed the Commission that all analytical, scientific and design computer programs used at PLNGS to support safety analyses, including those used by contractors, were compliant with CSA N286.7, *Quality Assurance of analytical, scientific and design computer programs for nuclear power plants.*[23] NB Power also informed the Commission that MAAP4-CANDU version of the MAAP-CANDU software was used for severe accident simulation at the PLNGS.

110. The Commission asked for comments regarding updates and improvements that have been made to the MAAP-CANDU software since its first release. CNSC staff provided the Commission with this information, noting that the program had undergone significant upgrades since its first release and that the International Atomic Energy Agency (IAEA) had recently validated and benchmarked the MAAP-CANDU software against several other severe accident scenarios. CNSC staff provided the Commission with additional information regarding the validation process for severe accident simulation programs, explaining that these had to be reviewed against national and international codes and standards, including N286.7. The Commission is satisfied that MAAP-CANDU is a valid severe accident simulation program and appropriate for use by NB Power for safety analysis.

111. The Commission notes that the safety concerns submitted in S. Nijhawan's intervention for this hearing were discussed in a Commission public meeting item dedicated to those concerns during the March 8, 2017 Commission meeting.[24] The Commission further notes that, during this hearing, S. Nijhawan indicated that additional references to research and information discussed in his interventions would be provided to the Commission. Until such time as this information is submitted to the Commission through appropriate intervention procedures, the Commission is of the

[23] N286.7, *Quality assurance of analytical, scientific and design computer programs for nuclear power plants*, CSA Group, 2016.
[24] *Minutes of the Canadian Nuclear Safety Commission (CNSC) held on March 8, 2017.*

view that no new information was brought forth in the intervention submitted for this hearing in regard to the safety concerns that were discussed on March 8, 2017 and considers the matter of these safety issues closed unless new and credible information is brought forth. Furthermore, the Commission remains satisfied that the passive autocatalytic recombiners (PARs) installed in all Canadian NGS, including the PLNGS, are adequate and fit for purpose.[25]

3.5.1 Deterministic Safety Analysis

112. NB Power provided the Commission with detailed information on the deterministic safety analyses and processes at the PLNGS, noting that the *PLNGS Safety Report*[26] provided a summary of the deterministic analyses that were performed by NB Power. NB Power also provided the Commission with information on how events were selected for the analyses and how identified changes were incorporated into the PLNGS design process, with any changes that impacted the safety case analyzed, documented and included in the *PLNGS Safety Report*. CNSC staff confirmed that the 2016 *PLNGS Safety Report* was accepted by CNSC staff in April 2017.

113. Regarding NB Power's implementation of REGDOC-2.4.1, *Deterministic Safety Analysis*[27] in place of RD-310, *Safety Analysis for Nuclear Power Plants*,[28] NB Power informed the Commission that an implementation plan was submitted to CNSC staff in July 2016. CNSC staff confirmed this information and provided the Commission with additional details in this regard, noting that REGDOC-2.4.1 would be fully implemented at the PLNGS by July 1, 2017. CNSC staff also submitted that NB Power would conduct updated deterministic safety analyses in accordance with REGDOC-2.4.1 during the proposed licence period.

114. Based on the information provided on the record for this hearing, the Commission is satisfied that NB Power's current deterministic safety analysis for the PLNGS is adequate and that PLNGS has large safety margins.

3.5.2 Probabilistic Safety Assessment

115. The Commission assessed the information provided by NB Power about its Probabilistic Safety Assessment (PSA) Program. NB Power reported that, as part of the refurbishment project, a Level II PSA, compliant with REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*,[29] was carried out for the PLNGS. NB Power also reported that these PSA results were summarized in the *PLNGS Safety*

[25] *Minutes of the Canadian Nuclear Safety Commission (CNSC) held on March 8, 2017*, Paragraph 40.
[26] The *PLNGS Safety Report* was last revised and issued to the CNSC in June 2016, in accordance with NB Power's LCH for PLNGS for the current licence period.
[27] CNSC Regulatory Document REGDOC-2.4.1, *Deterministic Safety Analysis*, May 2014.
[28] CNSC Regulatory Document RD-310, *Safety Analysis for Nuclear Power Plants*.
[29] CNSC Regulatory Document REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*, May 2014.

Report and that they demonstrated compliance with prescribed overall plant safety goals for the frequency of severe core damage and large radiological releases from the PLNGS reactor containment building. CNSC staff confirmed the information provided by NB Power, reporting that the PLNGS PSA Program was revised to ensure that it met the objectives of REGDOC-2.4.2, with a full implementation by July 1, 2017, and that the program satisfied regulatory requirements.

116. The Commission examined the detailed information provided by CNSC staff on NB Power's first PSA submission in 2008, based on the parameters of S-294, *Probabilistic Safety Assessment for Nuclear Power Plants*, as well as on the 2016 PSA update. CNSC staff reported that the updated PLNGS result for the Level 1 PSA (severe core damage frequency – SCDF) for all contributors was 3.40E-5 events per reactor-year and that the result for the Level 2 PSA (large release frequency – LRF) for all contributors was 6.27E-6 per reactor-year. As such, CNSC staff confirmed that both the Level 1 and Level 2 PSAs were well within the safety limits of 1E-4 and 1E-5 events per reactor-year, respectively. CNSC staff also reported that NB Power submitted its *PSA Summary Report* to CNSC staff in 2016 and that it met the parameters of S-294. The Commission also reviewed the information submitted by CNSC staff comparing the 2008 and 2016 PSA results and reasons for increases and decreases, noting the results for individual PSA components

117. Regarding the increases from 2008 to 2016 in SCDF and LRF for internal floods, CNSC staff explained that more accurate information was used to recalculate the flood risk at the PLNGS in 2016, resulting in a slightly increased flood risk. NB Power confirmed this information and provided additional details about the comprehensive assessment that was carried out in this regard. CNSC staff confirmed to the Commission's satisfaction that, even with this increase, NB Power met the PSA limits and targets for internal floods at the PLNGS.

118. In considering the interventions from New Clear Free Solutions, Greenpeace Canada, G. Dalzell and PEACE-NB, the Commission asked for clarification on the CNSC's regulatory requirements for PSA. CNSC staff submitted that the CNSC required a licensee to submit PSA methodology including proposed limits and targets. CNSC staff further explained that NB Power submitted this methodology to the CNSC, with the limits in line with the internationally adopted standard INSAG-12,[30] that CNSC accepted the methodology and that it was part of NB Power's licensing basis.

119. CNSC staff provided additional information regarding the role of a PSA, noting that PSAs did not represent a pass/fail scenario, and explained that, internationally, the regulatory expectation of licensees was to submit a PSA methodology to the regulator. CNSC staff also explained that, since the PSA methodology was part of the licensing basis, CNSC staff held the licensee accountable to the methodology through regulatory oversight activities and that the licensee was also held accountable for the implementation of identified enhancements and improvements. The NB Power

[30] INSAG-12, *Basic Safety Principles for Nuclear Power Plants 75-INSAG-3 Rev. 1*, International Atomic Energy Agency, 1999.

representative submitted that NB Power was committed to improvement through the continuous assessment of vulnerabilities at the PLNGS and improvements that could be made in that regard. CNSC staff added that the NB Power LCH specifically reflected the expectation that a licensee shall meet the specifications of REGDOC-2.4.2, which included the implementation of corrective actions and compensatory measures when a PSA target was not met, and provided the Commission with additional information in this regard. Asked about whether NB Power satisfied all the regulatory requirements for PSA at the PLNGS, CNSC staff confirmed that NB Power did meet all PSA requirements. The Commission is satisfied with the information provided in this regard.

120. In response to the CANDU Owners Group's (COG) intervention, the Commission asked for comment on the process by which Fukushima Action Items (FAIs) were developed and how it was determined that these would, in fact, improve nuclear safety and emergency preparedness. The COG representative provided detailed information on the methodology that was followed to identify improvements following the Fukushima Daiichi accident and how those improvements were assessed by industry and by regulators following their implementation. The Commission was satisfied with the information provided on this matter.

121. The Commission asked for comments in regard to the intervention from PEACE-NB that suggested that mathematical errors were made in the PLNGS safety assessments. CNSC staff submitted that there were several internationally-accepted methods to carry out safety assessment calculations and that the errors, as suggested by the intervention, were not errors and that CNSC staff was satisfied that the calculations were done correctly. The Commission is satisfied that mathematical errors were not made in the PLNGS safety analysis calculations.

Seismicity

122. The Commission considered the detailed information provided by NB Power and CNSC staff about the 2016 seismic PSA (SPSA) results for PLNGS, which met the safety limits for both SCDF and LRF. NB Power submitted that the SPSA did not identify potential vulnerabilities at the PLNGS that challenged safety objectives. CNSC staff explained that SPSAs were not carried out by industry in 2008 and that, in 2016, CNSC staff accepted NB Power's SPSA methodology, with CNSC staff finding that it met the parameters of S-294.

123. The Commission also considered the detailed 2008 and 2016 PSA-based seismic margin assessment (SMA) results provided by NB Power and CNSC staff, noting that a review level earthquake (RLE) for the PLNGS was one with a peak ground acceleration (PGA) of 0.344g,[31] representing a 1 in 10,000 year earthquake. CNSC staff also reported that the 2016 PSA-based SMA studies submitted by NB Power were of good quality, complete and prepared following CNSC-accepted methodology.

[31] Units of 'g' refer to acceleration du to gravity.

124. CNSC staff emphasized that the RLE was not a licence requirement or a safety goal and provided further information regarding the 0.344g RLE, noting that it was used as a stress test for the PLNGS, and that the purpose of examining systems, structures and components (SSC) at the RLE was to identify areas of improvement with respect to seismic safety and to test overall seismic capability. NB Power provided detailed information regarding its calculation of seismic capacity of the PLNGS as it related to failure analysis, noting that an increased seismic capacity represented stronger structures and equipment.

125. In regard to the decrease in the PSA-based SMA results for high consequence low probability failure (HCLPF) LRF from 0.42g in 2008 to 0.35g in 2016, CNSC staff also provided details about the reasons for this decrease, including results from additional studies that were carried out for the PLNGS. CNSC staff reported that, even with this decrease, the HCLPF for LRF at the PLNGS met the RLE of 0.344g and that the decrease did not represent a safety risk.

126. The Commission considered the location of safety-related equipment at the PLNGS. NB Power submitted that this equipment was located at various locations above ground level at the PLNGS and that detailed modeling and finite element analysis was performed to determine how the equipment and building would be affected during an RLE. NB Power further reported that the seismic response at each floor elevation for safety-related equipment was accounted for in the SPSA.

127. Referencing the New Clear Free Solutions intervention, the Commission asked about the assertion that CNSC staff changed the PLNGS SPSA safety limits during the current licence period. In its intervention, New Clear Free Solutions further submitted that these safety limits formed part of the licensing basis approved by the Commission in the 2011 *Record of Proceedings, Including Reasons for Decision*[32] (2011 Decision) and could therefore be changed only by a decision of the Commission. CNSC staff informed the Commission that, during the current licence period, no changes were made to the PLNGS licensing basis which included a design basis[33] earthquake at 0.2g, adding that the PLNGS satisfied all licensing requirements in this regard. CNSC staff also explained that, during the current licence period, there had been no changes to the PSA safety limits accepted by the Commission as stated in the 2011 decision and that NB Power met all safety limits in terms of SCDF and LRF.

[32] CNSC Record of Proceedings, Including Reasons for Decision – New Brunswick Power Nuclear Corporation, *Request for Approval to Reload Fuel and Restart the Point Lepreau Nuclear Generating Station, and Application to Renew the Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station*, (NB Power RoD), 2012.

[33] The "design basis" is defined as the range of conditions, according to established criteria, that the facility must withstand without exceeding authorized limits for the planned operation of safety systems.

128. In reference to the assertion made in the New Clear Free Solutions intervention that the PLNGS RLE was 0.4g in 2008 and that it was decreased to 0.344g during the current licence period, CNSC staff explained that, in 2008 the RLE was, in fact, 0.3g and was increased to 0.344g following the most recent seismic analyses using internationally-accepted methodology. CNSC staff noted that NB Power had demonstrated additional seismic capacity of the PLNGS at 0.4g in 2008 and that this was not a licensing requirement. NB Power concurred with the information provided by CNSC staff, confirming that the safety analysis at the PLNGS was performed using accepted methodology and that the PLNGS met all safety requirements. The Commission is satisfied with the information provided on this point.

129. In response to the intervention from New Clear Free Solutions, the Commission called for clarification on whether a third-party review of the PLNGS SPSA and of the SMA-based PSA were carried out. The NB Power representative provided detailed information about the third-party reviews that had been carried out in this regard and noted that a PSA Summary was posted on the NB Power website. The Commission is satisfied that the appropriate internal reviews by CNSC staff and NB Power, as well as third-party reviews were carried out in this regard.

130. Based on the information provided, the Commission finds that CNSC staff's analysis of the PSA for PLNGS is adequate and that the PSA demonstrates that NB Power meets the SCDF limit of 1E-4 per reactor-year and LRF limit of 1E-5 per reactor-year for the PLNGS from all contributors: internal events, internal flood, internal fire and seismic PSAs.

131. The Commission appreciates the detailed PSA-related information provided by NB Power and CNSC staff for this hearing. The Commission is of the opinion that PSAs are one of multiple tools used for safety analysis at PLNGS and are used in a complementary manner to deterministic safety analysis and the defence-in-depth concept. Furthermore, the Commission notes that the main benefits of PSAs are to identify dominant risk contributors, safety improvement opportunities and the comparison of options for reducing risk.

132. The Commission is satisfied that the PLNGS licensing basis in regard to seismic capacity of a 0.2g design basis earthquake was not modified during the current licence period and remains as approved in the Commission's 2011 licence renewal decision on this matter. Further, the Commission wishes to note that, in its 2011 decision, the Commission acknowledged that

> "Based on the above information, the Commission is satisfied that the PLNGS meets the required safety goals."[34]

and that the Commission was referencing an RLE of 0.3g and not 0.4g. The Commission was satisfied with the safety limits (goals) as stated and that represented the probability of a 1 in 10,000 year earthquake.

[34] NB Power RoD, October 6, 2011, and December 1 and 2, 2011, Paragraph 65.

133. The Commission wishes to make it clear that the design basis earthquake of 0.2g forms part of the PLNGS licensing basis approved by the Commission in this decision. The Commission is satisfied with the explanation provided by CNSC staff in regard to the PLNGS design basis earthquake and is satisfied that the design basis of 0.2g is appropriate, that PLNGS is meeting regulatory requirements and that the results are indicative of overall seismic safety at the PLNGS. The Commission is also satisfied, based on the information presented during this hearing, that an RLE of 0.344g for the PLNGS is adequate for this licence renewal.

134. Furthermore, the Commission states that, while NB Power demonstrated during the 2011 hearing that a large release of fission products from the PLNGS would be prevented at 0.4g, this was not, and is not, a licensing requirement. A 0.4g earthquake is representative of a 1 in 100,000 year earthquake and the Commission expresses agreement with the following statement from the Commission's 2011 decision,

> "CNSC staff noted that there was no requirement to qualify the facility (the PLNGS) against an earthquake of one in 100,000 years." [35]

Notwithstanding, the Commission notes its expectation for NB Power to pursue its continuous improvement efforts in this regard during the proposed licence period.

3.5.3 Criticality Safety

135. NB Power informed the Commission about its procedures and guidance at the PLNGS for in- and ex-core criticality control of nuclear fuel. NB Power noted that since only natural and depleted uranium were used at PLNGS, there were no criticality concerns in light water or air due to the fuel's low fissile content and that nuclear fuel was segregated from heavy water at all times. CNSC staff confirmed this information.

136. Based on the information provided the Commission is satisfied that PLNGS is maintaining appropriate programs for to ensure criticality safety at PLNGS.

3.5.4 Severe Accident and Hazard Analysis

137. The Commission assessed the information provided by NB Power regarding severe accident analyses that were undertaken at PLNGS to evaluate residual risk. NB Power submitted that a total of 47 severe accident cases were analyzed and that these supported part of the basis for SAMGs at the PLNGS as described in by REGDOC-2.3.2 and in section 3.4.5 of this *Record of Decision*. NB Power provided the Commission with details on reactor-specific processes included in the postulated events, design modifications to enhance defence-in-depth provisions, the effect of harsh environmental factors, the mitigation of radiological consequences and additional

[35] NB Power RoD, October 6, 2011, and December 1 and 2, 2011, Paragraph 63.

design features installed at PLNGS in response to the *CNSC Integrated Action Plan on the Lessons Learned from the Fukushima Daiichi Nuclear Accident* (Fukushima Action Plan).[36]

138. CNSC staff provided the Commission with information on NB Power's Fire Hazard Assessment (FHA) and Fire Safe Shutdown Analysis (FSSA) which were revised during the current licence period to conform with the specifications of CSA N293-07, *Fire protection for nuclear power plants*.[37] CNSC staff reported that, although several minor improvements to the FHA and FSSA were identified as being merited, CNSC staff was satisfied that NB Power was addressing these through a CAP and that the objectives of N293-07 were being met.

139. The Commission assessed NB Power's closure of Fukushima Action Items (FAIs) during the current licence period. NB Power submitted that all industry-wide FAIs had been addressed and closed during the current licence period, with five outstanding PLNGS-specific FAIs related to emergency response and accident mitigation. CNSC staff confirmed the information provided by NB Power, explaining that these outstanding FAIs did not present a risk to the health and safety of persons or the environment and that CNSC staff would continue to monitor these FAIs in the proposed licence period.

140. The Commission considered interventions from G. Dalzell, S. Nijhawan, CELA and several other organizations and asked about how FAIs would improve safety at the PLNGS. CNSC staff stated that international benchmarking of safety improvements confirmed that the additional safety systems underwent extensive testing to ensure their functionality and that Canada was a leader in this regard. The Canadian Nuclear Society representative submitted that the Canadian Nuclear Society was of the opinion that Canadian nuclear operators and the CNSC were well ahead of the international community in terms of these safety improvements and that they greatly improved the safety of Canadian NGS. The Commission was satisfied with the information provided in this regard.

141. On the basis of the information provided, the Commission is satisfied that the severe accident and hazard analyses performed by NB Power were adequate to evaluate and further mitigate residual risks at the PLNGS.

142. The Commission is satisfied that NB Power has adequately addressed industry-wide FAIs and encourages NB Power to continue its efforts in addressing the PLNGS-specific FAIs. The Commission expects CNSC staff to provide annual updates on the status of the PLNGS-specific FAIs during the NPP ROR.

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[36] *CNSC Integrated Action Plan on the Lessons Learned from the Fukushima Daiichi Nuclear Accident*, CNSC, 2013.
[37] N293-07, *Fire protection for nuclear power plants*, CSA Group, 2007.

3.5.5 Management of Safety Issues (including Research and Development Programs)

143. The Commission considered the information provided by NB Power and CNSC staff regarding the procedures and processes used at PLNGS for the identification and management of safety-related issues. NB Power provided details on how new information and emerging issues revealed by operating experience, research and development (R&D) initiatives and performance analysis were tracked and managed at the PLNGS. CNSC staff confirmed the information provided by NB Power, explaining that NB Power reported on its R&D activities annually in conformance with REGDOC-3.1.1 and that NB Power continued to maintain a robust R&D capability to address emerging issues.

144. CNSC staff also provided the Commission with detailed information regarding four Category 3 CANDU Safety Issues (CSIs) that were open at PLNGS, noting that these open CSIs did not present a safety concern and represented technical areas where additional research was required. The Commission notes that CSIs were also discussed in detail at the March 8, 2017 Commission meeting[38] and finds that CSIs are being addressed adequately by NB Power for the PLNGS.

145. In its intervention, COG provided the Commission with information regarding the Electric Power Research Institute (EPRI) Nuclear Technology Transfer Award that was awarded to an NB Power employee. The Commission commended NB Power on its commitment to innovation in the nuclear field.

146. The Commission invited comments about the research that the intervenor RESD Inc. had done regarding the fitness for service of PLNGS fuel channels. CNSC staff responded that CNSC specialists in this field were tracking this research to ensure that CNSC staff remained aware of all of the latest research and knowledge in this field. CNSC staff stated, however, that it was of the opinion that fuel channels at the PLNGS were fit for service. The NB Power representative concurred with CNSC staff, stating that the fuel channel model used at the PLNGS was conservative and that this research provided additional data to ensure its robustness. The Commission appreciated the information provided in this intervention. The Commission is satisfied that the fuel channel model used by NB Power is adequate and that the PLNGS fuel channels are fit for service.

147. Based on the information provided, the Commission is satisfied that NB Power has an adequate program in place for the management of emergent safety issues. The Commission also expresses its satisfaction hat NB Power has a well-developed research and development program that supports research innovation.

[38] *Minutes of the Canadian Nuclear Safety Commission (CNSC) held on March 8, 2017*.

3.5.6 Conclusion on Safety Analysis

148. On the basis of the information presented, the Commission concludes that the systematic evaluation of the potential hazards and the preparedness for reducing the effects of such hazards is adequate for the operation of the facility and the activities under the proposed licence. The Commission finds that NB Power's safety analysis program for the PLNGS meets regulatory requirements and that NB Power has adequate preventive measures and strategies in place and PLNGS to ensure the protection of workers, members of the public and the environment and that the facilities at PLNGS meet safety requirements.

149. The Commission expects NB Power to continue its implementation of REGDOC-2.4.1 and to work with industry partners to develop a whole-site PSA for the PLNGS.

150. The Commission wishes to make it clear that the design basis earthquake of 0.2g forms part of the PLNGS licensing basis approved by the Commission in this decision. The Commission is also satisfied that a 0.344g RLE for the PLNGS is appropriate for this licence renewal.

151. The Commission expresses the view that, although specific vulnerabilities assessed in a PSA are proprietary, a licensee should be as transparent as possible in the public availability of non-proprietary or non-sensitive PSA information.

3.6 Physical Design

152. The Commission considered the physical design of facilities at PLNGS, including the activities to design the systems, structures and components to meet and maintain the design basis of the facility. The design basis is the range of conditions, according to established criteria, that the facility must withstand without exceeding authorized limits for the planned operation of safety systems. CNSC staff rated NB Power's performance in this SCA as "satisfactory" throughout the current licence period.

153. NB Power informed the Commission that the physical design of the PLNGS incorporated a defence-in-depth approach with multiple redundant safety systems in place to ensure continuous safety. NB Power provided detailed information about the five layers of defence-in-depth applied to the PLNGS nuclear fuel program, the four PLNGS special safety systems and the two-group concept applied in the PLNGS design that protect the facility against common cause and external events.

3.6.1 Design Governance

154. The Commission assessed the adequacy of the PLNGS Design Configuration process. NB Power submitted that the PLNGS programs and procedures complied with N291-08, *Requirements for safety-related structures for CANDU nuclear power plants*,[39] as well as all relevant regulatory requirements. NB Power also provided the Commission with information on improvements that were being made to the Design Configuration process and submitted information about the detailed design change control requirements had been implemented at PLNGS.

155. NB Power informed the Commission that the PLNGS was compliant with N290.12-14, *Human factors in design for nuclear power plants*.[40] CNSC staff confirmed this information, reporting that it was satisfied with the program used by NB Power for incorporating human factors in the design activities at the PLNGS.

156. NB Power provided the Commission with details about the Environmental Qualification program at the PLNGS, noting that it had been implemented and maintained in accordance with N290.13-05, *Environmental Qualification for CANDU Nuclear Power Plants*.[41] CNSC staff confirmed to the Commission that it was satisfied with the Environmental Qualification program implemented at PLNGS.

Pressure Boundary Program

157. The Commission assessed the information provided by NB Power and CNSC staff about the pressure boundary program at the PLNGS. NB Power submitted that PLNGS was compliant with N285.0-12/N285.6, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants/Material standards for reactor components for CANDU nuclear power plants*.[42] CNSC staff confirmed this information.

158. NB Power submitted that an implementation plan for the PLNGS transition to N290.0-11, *General requirements for safety systems of nuclear power plants*[43] would be submitted to CNSC staff in September 2017. NB Power also submitted that an implementation schedule for N290.14-15, *Qualification of pre-developed software for use in safety-related and control applications in nuclear power plants*[44] at PLNGS would be submitted to CNSC staff by June 2018. CNSC staff confirmed that it was satisfied with this approach.

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[39] N291-08, *Requirements for safety-related structures for CANDU nuclear power plants*, CSA Group, Update 2, 2014.
[40] N290.12-14, *Human factors in design for nuclear power plants*, CSA Group, 2014.
[41] N290.13-05, *Environmental Qualification for CANDU Nuclear Power Plants*, CSA Group, Update 1, 2009.
[42] N285.0-12/N285.6, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants/Material standards for reactor components for CANDU nuclear power plants*, CSA Group, 2012.
[43] N290.0-11, *General requirements for safety systems of nuclear power plants*, CSA Group, 2011.
[44] N290.14-15, *Qualification of pre-developed software for use in safety-related and control applications in nuclear power plants*, CSA Group, 2015.

159. Addressing the issue of the acceptable limit of likelihood of failure for pressure boundary components at the PLNGS, CNSC staff informed the Commission that inspections showed that the pressure boundary program at the PLNGS provided adequate mechanisms to maintain the fitness for service of pressure boundary components from all susceptible degradation mechanisms. The Commission was satisfied with the information provided on this point.

160. Based on the information provided for this hearing, the Commission concludes that the programs that NB Power has in place for design governance at the PLNGS are adequate and satisfy the parameters of the applicable codes and standards. The Commission expects NB Power to submit implementation plans for N290.0-11 and N290.14-15 as detailed above.

3.6.2 System and Components Design

161. The Commission considered the adequacy of the design of PLNGS systems and components. In regard to the PLNGS electrical power system design, CNSC staff submitted that NB Power maintained an adequate electrical power system at the PLNGS throughout the current licence period, with one area of improvement identified in regard to two out of three 250V DC battery banks not meeting maintenance requirements in 2016. CNSC staff confirmed that NB Power had implemented a CAP in this regard and that CNSC staff would conduct ongoing compliance verification during the proposed licence period.

162. CNSC staff reported to the Commission that NB satisfied all regulatory requirements in regard to PLNGS instrumentation and control design.

163. CNSC staff informed the Commission that NB Power was implementing an aging management program for cables at the PLNGS and that CNSC staff would continue to monitor NB Power's progress in the implementation of these programs throughout the proposed licence period, with updates to the Commission in the annual NPP ROR.

Fire Safety and Fire Protection Systems

164. The Commission considered the adequacy of the Fire Protection Program at the PLNGS, with NB Power explaining that PLNGS met IRC-10NBC, *National Building Code of Canada 2010*,[45] IRC-10NFC, *National Fire Code of Canada 2010*,[46] and N293-12, *Fire protection for nuclear power plants*.[47]

[45] IRC-10NBC, *National Building Code of Canada 2010*, National Research Council, 2010.
[46] IRC-10NBF, *National Fire Code of Canada 2010*, National Research Council, 2010.
[47] N293-12, *Fire protection for nuclear power plants*, CSA Group, 2012.

165. NB Power also informed the Commission that the station design took into account the potential for fire as it related to all forms of safety and noted that the design considered the Fire Probabilistic Safety Assessment. The Commission also evaluated the detailed information provided by NB Power in regard to fire system and equipment performance, fire prevention and the PLNGS ERT.

166. CNSC staff reported that a code compliance review at PLNGS confirmed NB Power's adherence with the referenced fire-related codes and standards and noted that fire protection systems at NB Power were also in conformance with associated National Fire Protection Association Standards. CNSC staff further confirmed that third party reviews of NB Power's proposed station modifications that had the potential to impact fire protection satisfied CNSC requirements.

Seismic Qualification

167. CNSC staff submitted that the PLNGS fragility analysis showed that the system, structures and components (SSCs) constituting the Safe Shutdown Equipment List had a HCLPF PGA above the RLE of 0.344g with two minor exceptions where the HCLPF was 0.2g and for which acceptable CAPs were implemented.

168. Asked to comment on the risk represented by the two components that had an HCLPF of 0.2g, CNSC staff provided additional information on the two components, noting that they were outside the reactor containment building and did not present a safety risk. CNSC staff explained that the PLNGS design basis earthquake was 0.2g and all safety-significant equipment met the design basis, which was the regulatory requirement. CNSC staff submitted to the Commission's satisfaction that NB Power had committed to analyze the potential significance of these components and the implementation of potential improvements.

169. On the basis of the information provided for this hearing, the Commission is satisfied that the systems and components design programs at NB Power are adequate and meet the specifications of the appropriate codes and standards.

3.6.3 Site Characterization

170. The Commission considered the adequacy of the processes used to describe the distinguishing characteristics, qualities, physical features and environment of the PLNGS site. NB Power informed the Commission that site characterization information for the PLNGS was included in the 2016 *PLNGS Safety Report* and provided the Commission with additional information about the updated information in the *PLNGS Safety Report*.

171. CNSC staff reported to the Commission that, as required by FAIs 2.1.1 and 2.1.2, NB Power submitted its other High Wind Assessment (HWA) and site-specific Probabilistic Tsunami Hazard Assessment (PTHA) in June 2015. CNSC staff submitted that the PTHA showed that tsunamis were not a significant concern for the PLNGS and that, following reviews by CNSC staff, Natural Resources Canada (NRCan) and Environment and Climate Change Canada (ECCC), the related FAIs were closed in March 2016. The Commission is satisfied that these FAIs were adequately addressed by NB Power.

172. The Commission considered NB Power's updated *Assessment of Other External Hazards for Point Lepreau Site*, which was previously issued in 2008. CNSC staff reported that NB Power's analysis of possible external hazards that had not been assessed by the PSA Program was found to be adequate and accepted by CNSC staff.

173. In its consideration of several interventions, including those from G. Dalzell, New Clear Free Solutions and PEACE-NB, the Commission requested additional information on how NB Power carried out its screening of external hazards during the PLNGS hazard assessment. The NB Power representative provided details about the international standards and guidelines used to establish hazards screening criteria, followed by information on the qualitative and quantitative assessments that were carried out. NB Power submitted that the assessments identified five types of events that required additional consideration and that a comprehensive analysis of hazards combinations was also carried out, leaving the seismic hazard as the only credible external hazard to the PLNGS. The Commission is satisfied with the information provided on this point and agrees with the assessment that the seismic hazard remains the only credible external hazard to the PLNGS.

Site-Specific Seismic Hazard Assessment

174. The Commission examined the information provided by NB Power and CNSC staff regarding the site-specific seismic hazard assessment (SSSHA) that the Commission required NB Power to complete as part of the 2011 PLNGS licence renewal.[48] The Commission notes that the final SSSHA included a probabilistic seismic hazard assessment as well as a paleoseismology investigation, and that a summary of the assessment was posted on NB Power's website in December 2014. The Commission also acknowledges that NB Power's assessments in this regard were accepted by CNSC staff and underwent third-party review.

175. NB Power provided the Commission with detailed information about the SSSHA findings in regard to the PLNGS design basis. NB Power submitted that design spectra was slightly increased at higher frequencies and that, although research had shown that frequency aspects of an earthquake did not damage plant structure or equipment,

[48] CNSC Record of Proceedings, Including Reasons for Decision – New Brunswick Power Nuclear Corporation, *Request for Approval to Reload Fuel and Restart the Point Lepreau Nuclear Generating Station, and Application to Renew the Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station*, 2011.

NB Power was conducting research into the impact of these frequencies.

176. In regard to beyond design basis assessment, NB Power submitted that the SSSHA showed that the magnitudes of very rare earthquakes that were unlikely to occur over the lifetime of PLNGS were larger than historically regarded as credible. As such, an interim seismic risk assessment was carried out which showed that the risk to the PLNGS due to seismic events was acceptably low. NB Power also reported that a seismic site response analysis showed that attenuation in the PGA seismic response was present at the PLNGS site, reducing the PGA from 0.575g to 0.344g.

177. The Commission asked for information on evidence of possible ground liquefaction near the PLNGS site and how this was considered in the SSSHA. NB Power provided details of the paleoseismology study that was conducted during the current licence period and explained the areas where liquefaction features were found, noting that there was no evidence of liquefaction features near the PLNGS. NB Power also informed the Commission that the liquefaction features were studied and considered in the SSSHA, with a third-party expert panel validating NB Power's approach on this issue. The Commission was satisfied with the information provided in this regard.

178. Asked to comment on his third-party review of NB Power's SSSHA, Dr. John Adams from NRCan submitted that NB Power's assessment represented a rigorous estimate of the seismic hazard at the PLNGS, with the 0.344g RLE being of a larger size than that considered in the *National Building Code of Canada, 2010*. The Commission expressed appreciation for Dr. Adams' third-party review of the SSSHA and enquired about whether the review would be made public. Dr. Adams submitted that NRCan would allow the release of the report publicly, with NB Power and CNSC staff confirming the future public release of the report.

179. The Commission enquired about why fragility analysis, rather than the conservative deterministic failure margin, was used for the SSSHA. The NB Power representative provided information on both methods, explaining that, although fragility analysis was more resource-intensive, it provided NB Power with more detailed seismic characterization information. CNSC staff confirmed the information provided by NB Power, noting that fragility analysis was accepted by international and CSA Group standards.

180. Based on the information presented on the record for this hearing, the Commission is satisfied that adequate characterization was carried out for the PLNGS site.

181. The Commission notes its satisfaction with the SSSHA that was carried out for the PLNGS and concludes that it fulfilled the Commission's direction in the 2011 Decision. The Commission expects the third-party review of the site-specific SHA to be released to the public as soon as practicable.

3.6.4 Conclusion on Physical Design

182. On the basis of the information presented, the Commission concludes NB Power continues to implement and maintain an effective design program at the PLNGS and that the design of PLNGS is adequate for the operation period included in the proposed licence. The Commission is satisfied with CNSC staff's assessment of the adequacy of the physical design of the PLNGS.

3.7 Fitness for Service

183. Fitness for Service covers activities that are performed to ensure that the systems, structures and components (SSCs) at PLNGS continue to effectively fulfill their intended purpose. CNSC staff rated NB Power's performance in this SCA as "satisfactory" throughout the current licence period.

3.7.1 Equipment Fitness for Service

184. The Commission considered the information provided by NB Power and CNSC staff regarding the fitness for service of equipment at the PLNGS. NB Power reported that its equipment reliability processes were governed by RD/GD-210, *Maintenance Programs for Nuclear Power Plants*[49] and met the specifications of N286-12. NB Power also provided detailed information about its Equipment Reliability Improvement Plan (ERIP) which addressed an analysis that was carried out based on INPO AP-913, *Equipment Reliability Process Description*[50] and was intended to meet the objectives of REGDOC-2.6.3, *Aging Management*.[51] CNSC staff confirmed the information provided by NB Power and submitted that the ERIP was accepted by CNSC staff.

185. CNSC staff provided the Commission with detailed information regarding several equipment problems encountered at the PLNGS during the current licence period, noting that these were monitored through ongoing regulatory oversight activities and reported to the Commission through regular status reports on power reactors. CNSC staff confirmed to the Commission that CNSC's compliance verification activities showed that NB Power had procedures in place to monitor the fitness for service of equipment at the PLNGS to support the continued safe operation for the proposed licence period. The Commission is satisfied with CNSC staff's assessment in this regard.

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[49] CNSC Regulatory Document/Guidance Document RD/GD-210, *Maintenance Program for Nuclear Power Plants*, 2012.
[50] INPO AP-913, *Equipment Reliability Process Description*, Revision 1, Institute of Nuclear Power Operators, 2001.
[51] CNSC Regulatory Document REGDOC-2.6.3, *Aging Management*, 2014.

186. Based on the information presented on the record for this hearing, the Commission is satisfied that NB Power has adequate process in place to ensure that the equipment at the PLNGS will remain fit for service throughout the current licence period.

3.7.2 Maintenance

187. The Commission considered the adequacy of NB Power's PLNGS maintenance programs. NB Power provided the Commission with detailed information on its *ME-1, Establish Maintenance Programs* process for PLNGS SSCs, noting that these consisted of requirements, measures, policies, methods, activities and procedures for maintaining SSCs.

188. NB Power informed the Commission about the PLNGS maintenance organization which supported equipment fitness for service requirements. NB Power also reported on preventive maintenance at the PLNGS, explaining that an electronic feedback process for all types of maintenance was implemented in 2015, allowing the continuous improvement of the maintenance program through the application of operational experience.

189. CNSC staff confirmed the information provided by NB Power and reported that NB Power met the expectations of RD/GD-210 throughout the current licence period. CNSC staff reported that with a preventive maintenance completion ratio of 86%, NB Power had a maintenance program that adequately controlled the number of open corrective maintenance activities and maintained PLNGS SSC performance, with NB Power meeting regulatory expectations in this regard.

190. In its submission, NB Power addressed the maintenance backlog at PLNGS, noting that work activities were categorized and prioritized based on the industry standard INPO AP-928, *Work Management Process Description*.[52] NB Power provided the Commission with detailed information regarding its efforts to reduce maintenance backlog at PLNGS during the current licence period. CNSC staff submitted data about the PLNGS maintenance backlog and preventive maintenance deferrals to the Commission, noting that these were new performance indicators and reportable under REGDOC-3.1.1. CNSC staff reported that it would continue to verify the implementation of these improvement measures, with updates to the Commission through the annual NPP ROR.

191. The Commission requested additional information on the status of the PLNGS maintenance backlog, as raised in the intervention from G. Dalzell. CNSC staff submitted that the maintenance backlog for 2016 had been reduced to below industry average, with safety significant maintenance issues taking precedence over other maintenance issues. CNSC staff also reported that the maintenance backlog continued to decrease during 2017 and indicated satisfaction with the actions taken by NB Power to address the PLNGS maintenance backlog. NB Power confirmed the information

[52] INPO AP-913, *Work Management Process Description*, Revision 3, Institute of Nuclear Power Operators, 2010.

provided by CNSC staff and provided the Commission with information on the outstanding maintenance backlog as well as the corrective actions that were taken to reduce the PLNGS maintenance backlog. The information provided satisfies the Commission on this point.

192. The Commission assessed the system health monitoring process at the PLNGS. NB Power provided information about and the objectives of the *ME-2, Monitor and Manage System Health* process at PLNGS which applied to select PLNGS SSCs PLNGS, including all safety-significant systems. NB Power also reported that it was continuously improving the PLNGS system health monitoring process to align with best practices over the next three to four years.

193. CNSC staff provided the Commission with details about compliance verification activities carried out to evaluate PLNGS system health monitoring process during the current licence period that resulted in two action notices. CNSC staff further reported that a follow-up inspection in 2015 found that the governance for the PLNGS system health monitoring process was not fully compliant with regulatory requirements and that its implementation was not fully effective, resulting in a "below expectations" rating for maintenance in 2015. CNSC submitted that a CAP was put in place to address this issue and that NB Power had committed to complete the CAP by the end of 2017, with ongoing compliance verification by the CNSC. CNSC staff informed the Commission that it was of the opinion that the areas for improvement did not present a safety risk.

194. Regarding the implementation of the system health monitoring process CAP at the PLNGS, the Commission requested additional information on the significance of this issue in relation to this licence renewal application. The NB Power representative provided the Commission with details on the corrective actions taken to improve the PLNGS system health monitoring process, noting that significant improvements had been realized in this regard. CNSC staff reported that NB Power had implemented satisfactory corrective actions to address this issue and that, while the ratings were not finalized, preliminary information showed that NB Power would achieve a "satisfactory" rating in this area for 2016. CNSC staff also provided the Commission with information on the outstanding actions items that had to be completed by NB Power, explaining that these actions did not present a safety risk and that CNSC staff was satisfied with NB Power's plans for action closure.

195. After considering the information provided on the record for this hearing, the Commission is satisfied that NB Power has adequate maintenance programs in place at PLNGS for the proposed licence period.

196. The Commission is satisfied that the PLNGS maintenance backlog does not present a safety risk but expects NB Power to continue its efforts in reducing the PLNGS maintenance backlog during the proposed licence period.

197. The Commission fully expects that NB Power resolves the areas for improvement related to the system health monitoring process at the PLNGS in accordance with the CAP that was put in place in this regard, with annual reporting to the Commission by CNSC staff through the annual NPP ROR.

3.7.3 Reliability

198. The Commission assessed NB Power's PLNGS reliability program. NB Power reported that RD/GD-98, *Reliability Programs for Nuclear Power Plants*[53] had been implemented at the PLNGS during the current licence period and that the PLNGS met the objectives of RD/GD-98. NB Power also submitted that the PLNGS Mandatory Surveillance Program assured that systems important to safety met specific reliability criteria and that a self-assessment was completed in 2015 to improve this program. CNSC staff confirmed the information provided by NB Power.

199. CNSC staff reported that NB Power's PLNGS reliability program continued to meet regulatory requirements and that NB Power reported to the CNSC annually on the performance of its reliability program, in conformance with REGDOC-3.1.1. CNSC staff provided the Commission with additional information regarding compliance verification activities conducted in regard to the PLNGS reliability program during the current licence period, noting that two minor inspection findings resulted in the implementation of CAPs that were being monitored through the CNSC compliance verification program.

200. Asked to provide additional information about the metrics used to measure reliability at the PLNGS, the NB Power representative explained that the Equipment Reliability Index was the primary indicator used by NB Power in this regard and provided the Commission with information on other indicators that were also used. CNSC staff confirmed this information and stated to the Commission's satisfaction that NB Power reported to the CNSC on the PLNGS reliability metrics in accordance to the specifications of REGDOC-3.1.1.

201. Based on the information presented, the Commission is satisfied that NB Power has implemented an adequate reliability program at PLNGS.

202. The Commission notes NB Power's efforts in regard to the PLNGS reliability program improvements and encourages NB Power to continue the implementation of additional planned improvements.

[53] CNSC Regulatory Document/Guidance Document RD/GD-98, *Reliability Programs for Nuclear Power Plants*, 2012.

3.7.4 Aging Management

203. The Commission examined the information submitted by NB Power and CNSC staff regarding the PLNGS aging management program. NB Power provided information about PLNGS activities that addressed aging management and about plant life management studies that were carried out by NB Power throughout the current licence period.

204. NB Power reported to the Commission that the PLNGS complied with RD-334, *Aging Management for Nuclear Power Plants*[54] and that REGDOC-2.6.3, *Aging Management*,[55] would be fully implemented in July 2017. NB Power also noted that its primary heat transport feeders were inspected in accordance with Clause 13 of N285.4-09, *Periodic inspection of CANDU nuclear power plant components*.[56]

205. CNSC staff confirmed the information provided by NB Power and submitted that, for the implementation of REGDOC-2.6.3, NB Power had developed an integrated aging management program. CNSC staff reported that NB Power implemented adequate processes to ensure the continued health of safety-significant SSCs and that the PLNGS aging management program satisfied regulatory requirements.

206. Based on the information provided, the Commission is satisfied that NB Power has an appropriate aging management plan in place at the PLNGS.

3.7.5 Chemistry Control

207. NB Power informed the Commission about the PLNGS chemistry control program, noting that the program applied to all PLNGS systems that supported chemistry control. NB Power reported that all elements of the PLNGS chemistry control program were governed by N286-05.

208. CNSC staff reported to the Commission that NB Power reported on its Chemistry Index and Chemistry Compliance Index on a quarterly basis in accordance with REGDOC-3.1.1. CNSC staff provided the Commission with information regarding steam generator blowdown sulphate concentrations that rose above NB Power's internal action level in 2012 and required a forced plant outage. CNSC staff reported that this issue was fully resolved in 2014 and that, overall, satisfactory chemistry performance was maintained throughout the current licence period at the PLNGS.

209. Asked to provide additional details about the PLNGS chemistry control program, the NB Power representative informed the Commission that the quality assurance program processes for chemistry control were maintained in the PLNGS management system, with N286-05 embedded into these processes. The NB Power representative also

[54] CNSC Regulatory Document RD-334, *Aging Management for Nuclear Power Plants*, 2011.
[55] CNSC Regulatory Document REGDOC-2.6.3, *Aging Management*, 2014.
[56] N285.4-09, *Periodic inspection of CANDU nuclear power plant components*, CSA Group, 2009.

provided the Commission with information about actions that would be taken in the event that action levels were reached. CNSC staff confirmed this information and provided additional information about CNSC regulatory oversight for the PLNGS chemistry control program. The Commission was satisfied with the information provided on this point.

210. Based on the information provided by NB Power and CNSC staff, the Commission is satisfied that NB Power has maintained and will continue to maintain an adequate chemistry control program in place at the PLNGS.

3.7.6 Periodic Inspection and Testing

211. NB Power provided the Commission with detailed information about the PLNGS periodic inspection programs for pressure retaining systems and components, and their supports. NB Power reported that all original equipment and components at the PLNGS underwent the required initial inspections and now underwent periodic inspections in conformance with N285.5-08, *Periodic inspection of CANDU nuclear power plant containment components*.[57]

212. CNSC staff confirmed the information provided by NB Power regarding its implementation of appropriate periodic inspection programs at PLNGS and reported that a 2014 inspection found that NB Power conducted periodic activities in accordance with approved programs and that NB Power satisfied regulatory requirements and expectations in this regard. CNSC staff also confirmed NB Power complied with N285.4-09 for inspection of the primary heat transport and auxiliary systems, feeders and steam generators. The Commission notes NB Power's submission that implementation plans to support the alignment of PLNGS periodic inspection programs to N285.4-14[58] and N285.5-13[59] would be submitted to the CNSC staff by October 31, 2017.

213. NB Power informed the Commission that in-service examination and testing of the PLNGS reactor building was in compliance with N287.7-08, *In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants*.[60] CNSC staff provided the Commission with details of the 2014 PLNGS reactor building leakage rate test, noting that the leak rate was 0.69% volume of free air per day, below the limit of 1.0% volume per day. The Commission notes NB Power's plans to submit implementation plans for its transition to N287.7-10 to the CNSC by October 31, 2017.

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[57] N285.5-08, *Periodic inspection of CANDU nuclear power plant components*, CSA Group, 2008.
[58] N285.4-14, *Periodic inspection of CANDU nuclear power plant components*, CSA Group, 2014.
[59] N285.5-13, *Periodic inspection of CANDU nuclear power plant components*, CSA Group, 2013.
[60] N287.7-08, *In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants*.

214. Based on the information provided, the Commission is satisfied that NB Power has adequate processes and programs in place to support safe operations at the PLNGS.

215. The Commission expects NB Power to submit implementation plans to the CNSC and to implement the updated standards at PLNGS as detailed in the information provided on the record for this hearing.

3.7.7 Conclusion on Fitness for Service

216. Based on the information provided on the record for this hearing, the Commission is satisfied with NB Power's programs for the inspection and life-cycle management of key safety systems at the PLNGS. Based on the above information, the Commission concludes that the equipment as installed at the PLNGS is fit for service and that appropriate programs are in place to ensure that the equipment remains fit for service throughout the current licence period.

3.8 Radiation Protection

217. As part of its evaluation of the adequacy of the measures for protecting the health and safety of persons, the Commission considered the past performance of NB Power in the area of radiation protection. The Commission also considered how the PLNGS radiation protection program ensured that both radiation doses to persons and contamination were monitored, controlled and kept as low as reasonably achievable (ALARA), with social and economic factors taken into consideration. Throughout the current licence period, CNSC staff rated NB Power's performance in this SCA as "satisfactory."

218. The Commission considered the information provided by NB Power and CNSC staff to assess whether the PLNGS radiation protection program satisfied the requirements of the *Radiation Protection Regulations*.[61] NB Power submitted that it was committed to the continuous improvement of the PLNGS radiation protection program and provided information in this regard, including the 2016 revision and improvement of program documentation. CNSC staff submitted that, throughout the current licence period, NB Power implemented an appropriate and effective radiation program at the PLNGS that satisfied regulatory requirements.

219. CNSC staff reported that NB Power improved its use of radiation protection performance indicators during the current licence period and that, in accordance with REGDOC-3.1.1, NB Power began submitting formal quarterly reports on safety performance indicators to the CNSC in 2015, with no safety significant results or adverse trends observed.

[61] SOR/2000-203.

220. The Commission asked NB Power about how the PLNGS radiation protection manager fit into the overall organization. The NB Power representative explained that the radiation protection manager reported to the health and safety manager at the PLNGS; however, improvements to the PLNGS radiation protection program included radiation protection becoming a standalone group during the proposed licence period. The Commission was satisfied with the information provided and strongly encourages that the standalone radiation protection group be established at the PLNGS as soon as practicable.

3.8.1 Application of ALARA

221. The Commission assessed the information submitted by NB Power and CNSC staff regarding the application of ALARA at the PLNGS. NB Power submitted that, as per the ALARA principle, individual and collective doses were well below regulatory and administrative limits throughout the current licence period and that ALARA planning was performed for all work conducted at the PLNGS.

222. CNSC staff provided the Commission with information about the ALARA Committee at the PLNGS, which was responsible for integrating ALARA into planning, scheduling and work control at the PLNGS, and about NB Power's 5-year ALARA plan. CNSC staff reported that an inspection in February 2016 showed that NB Power's ALARA program satisfied regulatory requirements and expectations.

223. Based on the information considered for this hearing, the Commission is satisfied that the ALARA concept is adequately applied to all PLNGS activities.

3.8.2 Worker Dose Control

224. NB Power provided the Commission with detailed information regarding the average and maximum effective doses to workers at the PLNGS and reported that doses to all workers at the PLNGS, which included both NB Power personnel and contractors, were below regulatory limits throughout the current licence period. NB Power also informed the Commission that action levels[62] at the PLNGS were not exceeded during the current licence period, indicating that the PLNGS operated safely and in accordance with radiation and environmental protection programs.

225. CNSC staff confirmed that the PLNGS radiation protection program was implemented effectively to ensure that doses to workers remained below regulatory limits and provided the Commission with additional information regarding worker doses during the current licence period.

[62] The *Radiation Protection Regulations* define an action level as a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken.

226. CNSC staff reported that a 2016 inspection focussed on worker dose control showed that some PLNGS work control documentation required more detail regarding work activities in order to ensure that potential exposure conditions were identified and that appropriate protective measures were implemented. CNSC staff confirmed to the Commission's satisfaction that these improvements were implemented by NB Power during the current licence period.

227. In its consideration of the intervention from CELA, the Commission requested information on radiological risk guidance provided to nuclear energy workers (NEW) in an emergency situation. CNSC staff responded that on-site workers were appropriately trained on the radiological exposure risks that they would face and the actions that they may have to carry out during an emergency. CNSC staff also provided the Commission with information about current NEW dose limits during an emergency and explained that the CNSC was in the process of reducing these limits to align with IAEA recommendations. The Commission was satisfied with the information provided on this point.

3.8.3 Radiological Hazard Control

228. The Commission assessed NB Power's identification and control of existing and potential radiological hazards during work activities at the PLNGS. NB Power submitted that the use of alarm monitors, enhanced contamination control measures and contamination monitoring zones were used to monitor for radiation and contamination, to prevent the spread of contamination and to control workers' doses. CNSC staff confirmed the information provided by NB Power, submitting that radiological hazards were being monitored and controlled appropriately at the PLNGS.

229. NB Power reported that an annual compliance report was submitted to CNSC staff for the use of nuclear substances and radiation devices at the PLNGS, in conformance with NB Power's current operating licence. NB Power also reported that sealed sources were leak tested in accordance with the *Nuclear Substances and Radiation Devices Regulations*[63] and that the PLNGS had designated staff trained and qualified in the transport and packaging of radioactive material.

230. CNSC staff reported to the Commission that NB Power had implemented an adequate alpha monitoring and control program at PLNGS that satisfied regulatory requirements and provided the Commission with information about enhancements that NB Power made to this program during the current licence period.

231. On the basis of the information provided for this hearing, the Commission is satisfied that NB Power is, and will continue to, adequately identify and control radiological hazards at the PLNGS.

[63] SOR/2000-207.

3.8.4 Control of Dose to the Public

232. The Commission considered the effectiveness of NB Power's programs to prevent uncontrolled releases of contaminants or radioactive materials to the public from the PLNGS site. NB Power submitted that the dose to the public was maintained at well below the regulatory limit of 1 mSv per year,[64] throughout the current licence period. NB Power also noted that new derived release limits[65] (DRL) were calculated during the current licence period to achieve conformance with N288.1-14, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities.*[66]

233. CNSC staff confirmed the information provided by NB Power, explaining that the maximum annual effective dose to a member of the public resulting from PLNGS operations during the current licence period was 0.61 µSv, 0.061% of the regulatory limit.

234. In response to an intervention from the Passamaquoddy Nation, the Commission called for CNSC staff to address the statement that "there is no safe low level of radiation" and that cancer-related deaths in the aftermath of the Fukushima accident were directly attributable to radiation doses. CNSC staff informed the Commission that, although the context and source of that statement could not be determined, this was an issue that was thoroughly studied, with both the World Health Organization and the United Nations Scientific Committee on the Effects of Atomic Radiation independently determining that cancer was not induced at levels that would be expected from a normally operating NGS or from an accident with doses even significantly above background levels, such as the Fukushima accident. CNSC staff also provided additional information in regard to the relation of dose to cancers in both workers and members of the public. The Commission was satisfied with the information provided in this regard.

235. Based on the Commission's assessment of the information provided for this hearing, the Commission is satisfied that NB Power is adequately controlling radiological doses to the public.

3.8.5 Conclusion on Radiation Protection

236. Based on the information provided on the record for this hearing, the Commission concludes that, given the mitigation measures and safety programs that are in place to control radiation hazards, NB Power provides, and will continue to provide, adequate

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[64] The regulatory dose limit for a member of the public is 1 mSv (1,000 µSv) per year and the natural background dose is estimated between 2 mSv – 5 mSv (2,000 µSv – 5,000 µSv) per year.

[65] The DRL for a given radionuclide is the release rate that would result in an annual committed effective radiation dose of 1 mSv to the most exposed group of the public (also known as the critical receptor) for that nuclear substance.

[66] N288.1-14, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*, CSA Group, 2014.

protection to the health and safety of persons and the environment throughout the proposed licence period.

237. The Commission is satisfied that NB Power's radiation protection program at the PLNGS meets the requirements of the *Radiation Protection Regulations*.

238. The Commission expresses satisfaction with NB Power's commitment to continuous improvement with its radiation safety program and encourages NB Power to continue its efforts in this regard during the proposed licence period.

3.9 Conventional Health and Safety

239. The Commission examined NB Power's implementation of a conventional health and safety program at the PLNGS, which covers the management of workplace safety hazards. The conventional health and safety program is mandated by provincial statutes for all employers and employees to minimize risk to the health and safety of workers posed by conventional (non-radiological) hazards in the workplace. This program includes compliance with applicable labour codes and conventional safety training. Throughout the current licence period, CNSC staff rated NB Power's performance in this SCA as "fully satisfactory."

240. NB Power provided the Commission with detailed information regarding its conventional health and safety program, reporting that the PLNGS fully complied with the *New Brunswick Occupational Health and Safety Act*,[67] with WorkSafe NB the provincial authority mandated to oversee the Act in New Brunswick. NB Power also reported on program improvements identified through self-assessments during the current licence period. CNSC staff confirmed that NB Power maintained a conventional health and safety program at the PLNGS in accordance with regulatory requirements and that NB Power continued to achieve a high level of personnel safety at the PLNGS.

241. NB Power submitted that the PLNGS consistently achieved top-quartile performance in conventional health and safety, had a goal of zero industrial safety events and had exceeded 5.5 million person-hours without a lost-time accident. NB Power reported that its shared commitment to safety model expected all employees to take part in health and safety at the PLNGS and provided additional information regarding how PLNGS achieved this milestone.

242. CNSC staff provided the Commission with additional details regarding the PLNGS accident severity, accident frequency and industrial safety accident rates. CNSC staff noted that the results of these performance indicators were very low in comparison with other workplaces in Canada and were an indicator of a well-established conventional health and safety program.

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[67] *Occupational Health and Safety Act* (S.N.B. 1983, c. O-0.2).

243. The Commission considered the information provided by NB Power regarding conventional health and safety practices and awareness at the PLNGS. NB Power provided information about the importance of management commitment and responsibility, employee responsibility, personnel safety and the 'safety first' priority in all activities at PLNGS. CNSC staff confirmed the information provided by NB Power, noting that NB Power's emphasis on safety was reflected in the PLNGS *Nuclear Safety Manual*.

244. Asked about the role and responsibilities of the PLNGS health and safety manager, the NB Power representative explained that the employee in this position was responsible for health and safety programs across the PLNGS. The NB Power representative further stated that the safety culture at the PLNGS emphasized that every employee was responsible for their own safety and attributed employee commitment to health and safety to the strong PLNGS safety record.

245. Upon request from the Commission, the International Brotherhood of Electrical Workers, Local 37 representative and also the Co-Chair of the PLNGS on-site Joint Health and Safety Committee (JHSC) provided detailed information on the overall operation of the JHSC, including monthly meetings as mandated by WorkSafe NB, and on the resolution of safety concerns at the PLNGS. The NB Power representative provided additional details about its shared commitment to safety at the PLNGS through the JHSC. The Commission was satisfied with the information provided about the JHSC.

246. The Commission considered interventions from unions, industry organizations and individuals that submitted information about health and safety training for contractors working at the PLNGS site and requested additional comment in this regard. All of the intervenors that provided responses in this regard to the Commission stated that, prior to allowing personnel to work at the PLNGS site, NB Power ensured that they were appropriately trained or provided their personnel with high quality health, safety and radiological protection training. The NB Power representative confirmed that NB Power evaluated a contractor's program to determine whether it met the rigours of the PLNGS program and that, if the contractor's program was found to be insufficient, the contracted employees had to complete PLNGS-specific health and safety training. The Commission was satisfied on this point.

247. Based on the information presented, the Commission concludes that NB Power's conventional health and safety program at the PLNGS satisfied regulatory requirements. The Commission also concludes that the health and safety of workers and the public was adequately protected during the operation of the facility for the current licence period and that the health and safety of persons will continue be adequately protected during throughout the proposed licence period.

248. The Commission considered the interventions from unions with employee members at the PLNGS, noting the high level of collaboration and mutual respect between the unions and NB Power in regard to worker health and safety. The Commission

encourages this continued collaboration during the proposed licence period.

3.10 Environmental Protection

249. The Commission examined NB Power's environmental protection programs at the PLNGS which identify, control and monitor all releases of radioactive and hazardous substances, and aim to minimize the effects on the environment which may result from the licensed activities. These programs include effluent and emissions control, environmental monitoring and estimated doses to the public. CNSC staff rated NB Power's performance in this SCA as "satisfactory" throughout the current licence period.

250. The Commission considered whether the PLNGS environmental protection programs adequately met the specifications of REGDOC-2.9.1, *Environmental Protection Policies, Programs and Procedures*.[68]

3.10.1 Effluent and Emissions Control (Releases)

251. The Commission considered NB Power programs to control the release of effluent and emissions from the PLNGS to the environment. NB Power informed the Commission that the New Brunswick Department of Environment and Local Government issued the PLNGS an *Approval to Operate* in regard to releases from the facility, noting that if a non-compliance occurred, NB Power was required to submit a report to this department.

252. NB Power provided the Commission with information regarding liquid waste and gaseous waste management at the PLNGS. NB Power submitted that the releases of liquid wastes were maintained below DRLs and that emissions to the air were well below regulatory limits. NB Power also reported that it continued to improve its environmental protection programs through involvement in industry-wide organizations and initiatives. CNSC staff confirmed this information and also reported that NB Power updated its DRLs in 2012 in accordance with N288.1-08, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*.[69]

253. CNSC staff submitted to the Commission that the effluent and emissions control programs at the PLNGS met the requirements of the *Class I Nuclear Facilities Regulations*[70] and that radiological and non-radiological releases at the PLNGS remained below regulatory limits during the current licence period. CNSC staff also

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[68] CNSC Regulatory Document REGDOC-2.9.1, *Environmental Protection Policies, Programs and Procedures*, 2013.
[69] N288.1-08, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*, CSA Group, 2008.
[70] SOR/2000-204.

reported that NB Power had mechanisms in place to continually improve its effluent and emissions control programs at the PLNGS and that NB Power committed to implementing N288.5-11, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*[71] by June 30, 2018.

254. On the issue of high concentrations of iron in aquatic receptors, the NB Power representative noted that groundwater in New Brunswick had very high levels of iron and that they did not present a risk to the health and safety of persons or the environment. However, to confirm that the high iron levels were due to naturally-occurring iron in the area rather than a separate issue, NB Power committed to studying the iron levels in these aquatic receptors in greater detail during the proposed licence period. The Commission was satisfied with NB Power's response on this matter and NB Power's commitment to study the iron levels in aquatic receptors.

255. On the basis of the information provided for this hearing, the Commission is satisfied that NB Power has and will continue to have adequate programs in place for the control of effluent and emissions at the PLNGS to protect the environment and meet regulatory requirements. The Commission encourages NB Power to continue its efforts of continuous improvements in this regard.

3.10.2 Environmental Management System

256. The Commission assessed the information provided by NB Power and CNSC staff about the PLNGS Environmental Management System (EMS). NB Power submitted that the PLNGS EMS met the specifications of REGDOC-2.9.1. NB Power also reported that its EMS at the PLNGS was ISO 14001:2004[72] certified and that NB Power planned to achieve ISO 14001:2015[73] certification by 2018. CNSC confirmed the information provided by NB Power.

257. Based on the information provided, the Commission is satisfied that NB Power has maintained, and will continue to maintain, an adequate EMS at the PLNGS.

3.10.3 Environmental Assessment and Monitoring

258. In its evaluation of EAs conducted at the PLNGS site, the Commission considered the information submitted by NB Power as well as CNSC staff's EA Report for this licence renewal. NB Power provided the Commission with detailed information regarding EAs that had been carried out at the PLNGS site throughout the history of the facility. CNSC staff submitted that the EA conducted under the NSCA in 2016 for this licence renewal showed that NB Power had made and would continue to make

[71] N288.5-11, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*, CSA Group, 2011.
[72] ISO 14001:2004, *Environmental Management Systems*, International Organization for Standardization, 2004.
[73] ISO 14001:2015, *Environmental Management Systems*, International Organization for Standardization, 2015.

adequate provision for the protection of the environment and persons.

259. CNSC staff reported that an inspection of NB Power's environmental monitoring program in 2014 showed that the control, monitoring and reporting of environmental releases at the PLNGS were adequate and in compliance with regulatory requirements.

260. The Commission examined NB Power's radiation environmental monitoring program (REMP). NB Power submitted that the REMP assessed the radiological impact of all operations at the PLNGS site and that the average dose to the critical groups[74] remained well below the regulatory limit of 1 mSv per year. CNSC staff confirmed this information and provided additional details about the estimated doses to critical groups, noting that NB Power maintained and would continue to maintain radiological doses to the public well below the regulatory dose limits.

261. CNSC staff submitted that NB Power's REMP for the PLNGS complied with all applicable federal and provincial regulatory requirements. CNSC staff also reported on NB Power's commitment to revise and update its REMP in accordance with N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*[75] by November 30, 2017 and N288.5-11 by June 30, 2018.

262. Asked if the environmental monitoring data for the PLNGS was posted publicly, the NB Power representative submitted that the environmental monitoring report and a high-level summary of radiation emissions to the environment since the beginning of PLNGS operations was available on the NB Power website. The NB Power representative also stated that NB Power had engaged with First Nations to provide them with additional information about environmental monitoring in the vicinity of the PLNGS. The Commission was satisfied with the public availability of the PLNGS environmental monitoring information.

263. Regarding the adequacy of NB Power's radiological monitoring stations near the PLNGS site, the NB Power representative explained that, although most of the monitoring stations were near the PLNGS site, NB Power also had monitoring stations at much greater distances from the PLNGS and that the results from these stations were included in NB Power's environmental monitoring report. The Health Canada (HC) representative provided additional information on monitoring stations that the Canadian Radiological Monitoring Network had in distant locations, including Charlottetown, PE. The Commission is satisfied with the information provided on this point and is of the opinion that the locations of environmental monitoring stations are adequate.

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[74] A critical group is defined as a uniform or reasonably homogeneous group of people whose characteristics (such as habits, location or age) cause them to be representative of the more highly exposed individuals, receiving the highest effective dose or equivalent dose (as applicable) than other groups in the exposed population.

[75] N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*, CSA Group, 2010.

264. The Commission, considering the concerns from the Maliseet Nation of New Brunswick, MTI, the Passamaquoddy Nation, CELA and Gordon Dalzell regarding radiological contamination from PLNGS operations, enquired about a path forward to alleviate some of the intervenors' concerns. The Maliseet Nation of New Brunswick representative responded that the inclusion of Maliseet Nation people in the PLNGS environmental monitoring programs would alleviate some of these concerns, noting that discussions in this regard had started with NB Power. The NB Power representative expressed NB Power's commitment to working with the Maliseet Nation. CNSC staff provided the Commission with information on how the Maliseet Nation could be included in the Independent Environmental Monitoring Program (IEMP) and about the flexible structure of the CNSC's Participant Funding Program (PFP) that could assist the Maliseet Nation, as well as all other interested Indigenous Groups, with the conduct of independent environmental studies. The Commission is satisfied with the information provided in this regard and encourages NB Power and CNSC staff to continue to work with the Maliseet Nation to address concerns about PLNGS operations and to find mechanisms to allow the Maliseet Nation to participate in environmental monitoring for the PLNGS.

Independent Environmental Monitoring Program

265. The Commission examined the information provided by CNSC staff in regard to the CNSC's IEMP. CNSC staff provided detailed results from monitoring that was carried out in 2016 in publicly accessible areas outside the perimeter of the PLNGS, noting that the measured radioactivity in all samples were below CNSC reference levels.[76] CNSC staff reported to the Commission's satisfaction that, prior to carrying out sampling for the IEMP, the CNSC had discussions with Indigenous groups in regard to the traditional Indigenous foods and medicines that should be sampled.

266. CNSC staff reported that IEMP results from 2014 and 2015 also showed that measured radioactivity in all samples were below CNSC references levels. On this basis, CNSC staff submitted that the IEMP results confirmed that the public and the environment around the PLNGS were protected and that there were no health impacts as a result of PLNGS operations. Furthermore, CNSC staff reported that the IEMP results were consistent with NB Power environmental monitoring results.

267. Based on the information submitted by CNSC staff in the EA Report, the Commission is satisfied that the EA adequately shows that NB Power made and will continue to make adequate provision for the protection of the environment and persons at the PLNGS site.

[76] CNSC reference levels are established based on conservative assumptions about the exposure scenario and using N288.1-14. On this basis, the reference level for a particular radionuclide in a particular medium represents the activity concentration that would result in a dose of 0.1 mSv per year.

268. The Commission is satisfied that NB Power's and the CNSC's environmental monitoring show that the public and the environment around the PLNGS site remain protected.

269. The Commission expects NB Power to implement the updated standards for the environmental monitoring programs at the PLNGS as per the timelines submitted during this hearing.

3.10.4 Environmental Risk Assessment

270. The Commission assessed the adequacy of the environmental risk assessment (ERA) carried out by NB Power in support of the PLNGS return to operation following refurbishment. NB Power submitted that a site-wide environmental risk assessment (ERA) was submitted to CNSC staff in 2015 and that the ERA was completed in accordance with N288.6-12, *Environmental risk assessment at Class I nuclear facilities and uranium mines and mills*.[77] NB Power also submitted that the results from the ERA were used to establish the basis for CSA N288.4-10 and N288.5-11.

271. CNSC staff provided the Commission with additional information about NB Power's ERA, noting that CNSC staff requested several amendments to the PLNGS thermal plume assessment and requested a more substantial analysis on the impingement and entrainment of fish resulting from PLNGS operations. CNSC staff reported that NB Power provided the additional information to the CNSC in March and November 2016, and January 2017, and that CNSC staff was satisfied that the data used in the ERA was sufficiently conservative and that the ERA showed that NB Power was implementing adequate measures for the protection of the environment.

272. In regard to the PLNGS thermal plume assessment, which was conducted by a third-party expert, CNSC staff reported agreement with the overall conclusion of the assessment that showed that it was unlikely a large area of marine habitat would be affected by a large temperature change from the cooling water discharge. CNSC staff also submitted that NB Power's implementation of N288.6-12 would include an evaluation to determine whether additional investigations were needed to confirm the thermal plume assessment results. The ECCC representative concurred with this approach following a review of NB Power's plans in this regard. CNSC staff confirmed to the Commission's satisfaction that an update on the PLNGS thermal plume assessment would be provided to the Commission during the annual NPP ROR.

Fish Impingement and Entrainment

273. The Commission assessed the information submitted for this hearing regarding the impingement and entrainment of fish resulting from PLNGS operations. CNSC staff

[77] N288.6-12, *Environmental risk assessment at Class I nuclear facilities and uranium mines and mills*, CSA Group, 2012.

submitted that the annual losses of commercial species due to cooling water intake were less than 1% of the annual commercial landings for New Brunswick and that, on this basis, CNSC staff was of the opinion that the impacts on fish due to cooling water intake at PLNGS continued to be minimal. Asked about how an acceptable magnitude of loss was determined, CNSC staff explained that metrics included, but were not limited to, population-level dynamics, area fishing quotas and commercial landings.

274. The Commission requested additional information regarding the cooling water intake and its design features to mitigate the impingement and entrainment of fish and other marine life. CNSC staff provided the Commission with detailed information on the cooling water intake system at the PLNGS, noting that it was designed with a capacity of two reactors and that the impingement and entrainment mitigation measures in place were highly effective and specifically designed to protect the marine life found in the Bay of Fundy.

275. The Commission considered the concerns expressed by the Passamaquoddy First Nation, MTI and the Maliseet Nation in regard to the effects of the PLNGS on traditional and commercial fishing activities at the PLNGS. CNSC staff submitted information about some of the concerns expressed in theses interventions, including concerns about the population levels and health of marine species including lobster, scallops and sea urchins. CNSC staff confirmed to the Commission's satisfaction that analyses showed the impact of PLNGS operations on the population and health of these species was negligible.

276. The Commission also considered the interventions submitted by several commercial fisheries, environmental groups and individuals in regard to fishing activities in the Bay of Fundy and noted that, in general, these intervenors were satisfied that the PLNGS did not have a negative effect on their fishing activities.

277. Based on the information presented on the record for this hearing, the Commission is satisfied that the ERA was carried out satisfactorily and showed that NB Power was adequately protecting the environment in the vicinity of the PLNGS site. The Commission anticipates that the updated standards will be implemented at the PLNGS as proposed during this hearing.

3.10.5 Fisheries Act *Authorization*

278. The Commission notes that, since operations at the PLNGS result in harm to fish that support a commercial, recreational or Indigenous fishery, a subsection 35(1) *Fisheries Act*[78] (FA) authorization from the Department of Fisheries and Oceans (DFO) may be required for the PLNGS. The need for an FA authorization is based on the definition of "serious harm" in the FA, which deals directly with impacts to fish rather than the general environmental protection requirements of the NSCA and CEAA 2012 which assess impacts at a population level.

[78] R.S.C., 1985, c. F-14.

279. CNSC staff provided the Commission with information about the FA authorization process, noting that, as per a CNSC-DFO Memorandum of Understanding, CNSC staff would oversee NB Power's self-assessment and draft application for the FA authorization. CNSC staff reported that, based on an updated FA authorization self-assessment submitted by NB Power in January 2017, CNSC staff opined that an FA authorization would be required in accordance with subsection 35(1) of the FA. CNSC staff provided the Commission with information on the next steps in this process, including engagement with Indigenous groups and the identification of offsets. The Commission notes that it will be the DFO, not the Commission, to make decisions under the FA.

280. CNSC staff provided the Commission additional information about how NB Power mitigated the impact on fish from PLNGS operations, noting that, since there were no population-level impacts, the PLNGS was licensable under the NSCA. The NB Power representative added that the PLNGS used the best available technology to prevent the impingement and entrainment of fish and that the data that NB Power submitted for the FA authorization self-assessment was very conservative.

281. In reference to the MTI intervention, the Commission asked for comment on the unexplained fish kills in the Bay of Fundy in late 2016 and whether these were related to PLNGS operations. The NB Power representative responded that NB Power had discussed this event with the DFO and that there was no direct link to PLNGS operations. CNSC staff confirmed this information, indicating that its own review found no correlation between the fish kills and PLNGS activities.

282. Regarding the Aboriginal consultation activities that would be carried out for the FA authorization, CNSC staff informed the Commission that Aboriginal consultation would include discussion of offset policies which would be used to counterbalance residual effects of impingement and entrainment of fish. NB Power and the DFO representative confirmed the information provided by CNSC staff and confirmed their commitment to the consultation process for the FA authorization. The NB Power representatives and CNSC staff also confirmed to the Commission's satisfaction that all First Nations that intervened during this hearing would be consulted in regard to the FA authorization.

283. The Commission concludes that the environmental protection requirements of the NSCA as they relate to the protection of the environment generally are satisfied. The Commission notes that the renewal of NB Power's PROL for the PLNGS does not limit the ability of the DFO to fulfill its mandate under the FA. On this basis, the Commission is satisfied with CNSC staff's assessment in relation to the requirement for a subsection 35(1) FA authorization for the PLNGS.

3.10.6 Protection of the Public

284. The Commission assessed NB Power's programs to mitigate risk to members of the public from hazardous substances discharged from the PLNGS. NB Power provided the Commission with information regarding the approvals it had obtained under provincial legislation to operate the PLNGS.

285. CNSC staff reported that an August 2015 inspection focussing on NB Power's hazardous waste management program identified several areas of improvement related to procedures and procedural adherence. CNSC staff informed the Commission that these areas of improvement did not represent a risk to the health and safety of people or the environment.

286. Based on the information provided, the Commission is satisfied that NB Power's programs to mitigate risk to members of the public from PLNGS operations are adequate. The Commission expects NB Power to adequately implement corrective actions during the proposed licence period to address the 2015 inspection findings.

3.10.7 Conclusion on Environmental Protection

287. Based on the assessment of the application and the information provided on the record at the hearing, the Commission is satisfied that, given the mitigation measures and safety programs that are in place to control hazards, NB Power will provide adequate protection to the health and safety of persons and the environment throughout the proposed licence period.

288. The Commission is satisfied that the PLNGS environmental protection programs adequately meet the specifications of REGDOC-2.9.1.

289. The Commission is satisfied that the EA conducted by CNSC staff under the NSCA and the CNSC EA Report were adequate for the Commission's consideration of environmental protection for this licence renewal application.

290. The Commission is also satisfied that the measures implemented at the PLNGS are adequate for the purposes of environmental protection of marine species under the NSCA.

291. The Commission notes NB Power's commitment to develop mechanisms to include Indigenous traditional knowledge and the sampling of monitoring of traditional foods and medicines of Indigenous peoples in the PLNGS environmental monitoring programs. The Commission notes that CNSC staff includes Indigenous traditional knowledge in the IEMP sampling program and has committed to further work with Indigenous groups in this regard.

292. The Commission is satisfied with CNSC staff's assessment in relation to the requirement for a subsection 35(1) FA authorization for the PLNGS. It will be DFO that will make any decisions under the FA and the Commission expects CNSC staff to provide updates in this regard during the annual presentation of the NPP ROR.

3.11 Emergency Management and Fire Protection

293. The Commission considered NB Power's emergency management and fire protection programs which cover the measures for preparedness and response capabilities implemented by NB Power in the event of emergencies and non-routine conditions at the PLNGS. This includes nuclear emergency management, conventional emergency response, and fire protection and response. Throughout the current licence period, CNSC staff rated NB Power's performance in this SCA as "satisfactory."

294. NB Power submitted that the Emergency Management Program at PLNGS was designed to manage the consequences of all events that could impact the PLNGS, NB Power employees, the public and the environment. NB Power provided the Commission with information regarding overall PLNGS emergency preparedness program, explaining that the program employed an all-hazards approach including prevention/mitigation, preparedness, response and recovery. NB Power noted that its PLNGS Emergency Management Plan was limited to emergency management on the PLNGS site, with off-site planning a provincial responsibility through the New Brunswick Emergency Measures Organization (NBEMO). NB Power reaffirmed its commitment to collaboration with the NBEMO in this regard.

295. The Commission examined the improvements that NB Power made to the PLNGS Emergency Management Program. NB Power reported that RD-353, *Testing the Implementation of Emergency Measures*[79] was implemented in 2013 and that in 2014, the implementation of SAT-based training for the Emergency Response Team (ERT) and Emergency Preparedness Department provided a significant enhancement to emergency-preparedness related training activities at PLNGS. CNSC staff confirmed that NB Power had implemented significant emergency management related improvements at the PLNGS during the current licence period.

296. CNSC staff provided the Commission with additional information regarding enhancements made to the PLNGS Emergency Management Program, including the acquisition of portable emergency mitigation equipment (EME), participation in the 2012 and 2015 *Exercises Intrepid* and the installation of an automated near boundary gamma detection system.

297. Several interventions from municipalities and local first responder organizations provided information regarding the coordination between NB Power and various levels of government in the event of an emergency. The Commission notes that, although some areas for improvement were identified, the interventions indicated that adequate

[79] CNSC Regulatory Document RD-353, *Testing the Implementation of Emergency Measures*, 2008.

plans were in place for a coordinated response in the event of an emergency at the PLNGS.

298. Commenting on the intervention from the Point Lepreau Chief Warden, the Commission requested additional information about the Point Lepreau Warden Service. The NB Power representative provided the Commission with details about the warden service, explaining that the wardens were employed by NBEMO and provided an effective community link in the event of an emergency at the PLNGS. Asked about the area that was covered by the warden service, the NB Power representative responded that the service covered the 20-km PLNGS Emergency Planning Zone (EPZ), which included First Nations and visitors in that zone. The Commission is satisfied with the information provided on this point.

3.11.1 Conventional Emergency Management

299. The Commission considered the adequacy of NB Power's conventional emergency (non-nuclear) management programs at the PLNGS. NB Power submitted detailed information regarding improvements that were made to conventional emergency management at PLNGS during the current licence period, including the establishment of a dedicated PLNGS ERT.

300. NB Power reported that the PLNGS ERT participated in multiple medical, fire, incident command and beyond-design-basis drills and exercises during the current licence period. CNSC staff confirmed the information provided by NB Power and submitted that NB Power's PLNGS conventional emergency management satisfied regulatory requirements.

301. Based on the information provided on the record for this hearing, the Commission is satisfied with NB Power's programs to manage conventional emergencies at PLNGS.

3.11.2 Nuclear Emergency Management

302. The Commission considered the information submitted by NB Power and CNSC staff about nuclear emergency management at the PLNGS. NB Power provided detailed information regarding the all-hazards approach taken for nuclear emergency management at the PLNGS, including the development and maintenance of a full suite of emergency procedures. NB Power also submitted that PLNGS had a detailed on-site emergency response plan and that NB Power supported the NBEMO with the maintenance of the NBEMO's *Point Lepreau Nuclear Off-Site Emergency Plan*[80] (PLNGS off-site emergency plans).

[80] *Point Lepreau Nuclear Off-Site Emergency Plan*, New Brunswick Emergency Measures Organization, Province of New Brunswick, March 2016.

303. CNSC staff submitted that it had reviewed NB Power's *Point Lepreau Emergency Response Plan* and was of the opinion that the plan met the expectations of RD-353 and G-225, *Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills*.[81] CNSC staff submitted that inspections of NB Power's emergency plans conducted during the current licence period, as well as reviews of off-site plans, confirmed that all components of the nuclear emergency response plans were adequate and satisfied CNSC requirements.

304. NB Power indicated that REGDOC-2.10.1, *Emergency Preparedness and Response*[82] would be implemented during the proposed licence period, with an implementation plan to be submitted to CNSC staff by September 30, 2017. CNSC staff confirmed the information provided by NB Power, explaining that, when included in the LCH, REGDOC-2.10.1 would become a compliance verification criterion that staff would use to verify that NB Power was meeting licensing and regulatory requirements. The Commission as satisfied with this approach.

305. NB Power provided the Commission with information regarding the near boundary gamma monitoring system that was installed at PLNGS during the current licence period. NB Power explained that this system would enhance radiation monitoring during events by providing an early warning of a radiation release to the ERT and real-time radiation survey data during events, and that it would greatly reduce the potential of exposure of first responders in the event of an emergency.

306. The Commission noted the recommendation for automatic gamma monitoring at the PLNGS in CELA's intervention and asked for additional information in this regard. The NB Power representative provided the Commission with information on the in-station gamma monitoring system that was already in place, with the HC representative providing information on HC monitoring facilities outside of the PLNGS. The NB Power representative also explained how this data would be shared with the CNSC, NBEMO, HC and other organizations, both during normal operations and during an emergency.

307. The Commission examined PLNGS communication capabilities during an emergency and the coordination of these capabilities with emergency organizations and first responders. NB Power provided information in this regard, noting that communication capabilities at PLNGS had been greatly expanded and interoperability with first responders established during the current licence period.

308. The Commission considered several interventions which addressed the public notification system in the event of an emergency at the PLNGS and requested additional information on this matter. The NBEMO representative informed the Commission that the Everbridge Aware public notification system was the first level of public notification in the EPZ and stated that the system was tested at least annually. The NBEMO representative further stated that additional levels of notification included

[81] CNSC Regulatory G-225, *Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills*, 2001.
[82] CNSC Regulatory Document REGDOC-2.10.1, *Emergency Preparedness and Response*, 2014.

the warden service, social media and conventional media, and that the national public alerting system Alert Ready would be used to alert the public outside of the EPZ. The Commission is satisfied with the graded public notification approach used by NB Power and the NBEMO.

309. Asked to provide additional details about the new Off-site Emergency Operations Centre (EOC), the NB Power explained that the EOC was outside of the EPZ, with the NBEMO responsible for the operation of the off-site EOC and noting that the intent was to have the off-site EOC fully operational for the 2018 *Exercise Intrepid*.

310. NB Power provided the Commission with additional information regarding the completion of FAIs related to beyond design basis events during the current licence period and explained that PLNGS EME was seismically qualified and would be functional in all situations to mitigate a severe accident. CNSC staff confirmed this information and also reported that plans for automatic data transfer from PLNGS to the CNSC EOC in the event of an emergency were well underway and would be tested during the 2018 *Exercise Intrepid*.

311. The Commission requested confirmation from NB Power that, in the event of a total station blackout, enough cooling water would be available to cool the reactor at the PLNGS. The NB Power representative responded that, in addition to the large storage capacity of water at the PLNGS site, PLNGS was surrounded by the Bay of Fundy from which water could be drawn, if required. The Commission further asked about power requirements during an emergency. The NB Power representative confirmed that extensive analyses had been conducted to confirm that NB Power could supply the electricity that was required to mitigate a beyond-design-basis accident at the PLNGS. The explanations satisfy the Commission on these points.

312. Further on Fukushima lessons learned, the Commission enquired about whether updated IAEA guidance in regard to planning and procedures in the event of a nuclear emergency will be reflected in Canada's regulatory framework. CNSC staff provided the Commission with information on how Canada's regulatory framework supported updated IAEA nuclear emergency management guidance and that HC's updated *Canadian Guidelines for Intervention During a Nuclear Emergency*[83] would also provide updated information in this regard that was in line with IAEA guidance. The HC representative provided the Commission with additional information on the updated guidelines, noting that they would be published in September 2017.

313. The Commission asked HC for clarification in regard to the status of the Federal Nuclear Emergency Plan (FNEP) as it pertained to the PLNGS. The HC representative provided information about HC's role and collaboration with NB Power and the NBEMO, explaining that the FNEP had been updated with post-Fukushima lessons learned and that HC was in the process of finalizing the New Brunswick-specific annex to the FNEP. In regard to emergency planning for the PLNGS, the HC representative stated that HC's review had found the off-site nuclear emergency plans indicated an

[83] *Canadian Guidelines for Intervention During a Nuclear Emergency*, Health Canada, 2003.

effective response capability in the event of a nuclear emergency at the PLNGS. The HC representative also provided the Commission with details about an IAEA emergency preparedness review that Canada would be taking part in, noting that NBEMO was actively participating in that process and that the results of the review would be made public. The Commission expressed support for this IAEA review and suggested that the review results and the response to any recommendations be presented at a future Commission proceeding, if feasible.

314. NB Power provided the Commission with details on its 2015 *Exercise Intrepid*, noting that, through the exercise, each organization involved in emergency response at the PLNGS was able to fully exercise on-site and off-site emergency response plans. The Commission notes that, during the current licence period, NB Power and CNSC staff provided several updates on *Exercise Intrepid* and lessons learned through presentations at public Commission meetings and is satisfied with the information provided throughout the current licence period in this regard.

315. Addressing the issue of managing more than one emergency at one time, the NBEMO representative responded that the NBEMO has had to deal with concurrent emergencies in the past, including during the 2012 *Exercise Intrepid*, showing that the NBEMO had adequate planning and capacity in this regard. The Commission was satisfied on this point.

316. The Commission asked about NBEMO's collaboration with neighbouring emergency management organizations. The NBEMO representative provided information on its collaboration with the Nova Scotia Emergency Measures Organization, as well as the Maine Emergency Management Agency, explaining that both organizations were aware of the PLNGS off-site emergency plans and had participated in PLNGS emergency exercises.

NB Power's PLNGS Technical Planning Basis – Radiation Emergency

317. The Commission noted the concern expressed by CELA that NB Power's *Technical Planning Basis – Radiation Emergency* (technical planning basis)[84] was last updated in 2004 and enquired about its adequacy in light of lessons learned post-Fukushima. The NB Power representative explained that, because the PLNGS had recently undergone refurbishment and there was a notable increase in safety measures at the facility, including post-Fukushima improvements, the planning basis remained conservative and consistent with international guidelines. The NB Power representative also stated that the planning basis was undergoing an update to reflect the PLNGS post-refurbishment and indicated that NB Power had provided the NBEMO with the updated plan so that changes to the provincial PLNGS off-site plan could be made accordingly.

[84] *Technical Planning Basis – Radiation Emergency*, Point Lepreau Generating Station, IR-78600-02, Rev. 0, NB Power, 2004.

318. CNSC staff confirmed that it was of the opinion that the 2004 PLNGS technical planning basis remained conservative and adequate for emergency management planning. CNSC staff further informed the Commission that, as part of the Fukushima Action Plan, the safety case of the PLNGS was reviewed, including the validation of the technical planning basis and PLNGS source term, with SAMG implementation becoming a licensing requirement. The NB Power representative concurred with CNSC staff, explaining that the severity of accident progression that was seen during the Fukushima accident and was previously not considered credible had, in fact, been considered in the 2004 PLNGS planning basis and, as such, NB Power maintained that the planning basis remained very conservative and adequate, even post-Fukushima.

319. The Commission requested additional information regarding the upgrades that had been done to the PLNGS since the 2004 technical planning basis was developed. The NB Power representative provided information on the upgrades that had been made to the PLNGS design and safety systems, explaining that upgrades were done both before and after refurbishment and that these safety upgrades were exercised and validated during both the 2012 and 2015 *Exercises Intrepid*.

320. Asked to respond to concerns from several intervenors including CELA, Greenpeace Canada and G. Dalzell regarding the types of accidents considered in the PLNGS technical planning basis, CNSC staff clarified that the technical planning basis included design-basis and beyond-design-basis accidents, as well as severe accident releases where fuel damage was extensive and the containment system failed.

321. Noting the intervention from CELA, the Commission asked about the source term considered in the 2004 PLNGS planning basis. The NB Power representative provided information about the source term that was considered in the event of an early containment failure, noting that it was very conservative. CNSC staff added that the PLNGS reactor core had not changed since 2004 and as such, the source term would not change in any updates to the technical planning basis. The Commission is satisfied that the source term considered in the PLNGS technical planning basis is appropriate.

322. In response to a concern in CELA's intervention that SAMGs were not appropriately considered in emergency planning, NB Power representatives and CNSC staff submitted to the Commission that SAMGs were implemented into emergency planning, had been validated during the 2012 and 2015 *Exercises Intrepid*, and provided additional information in this regard.

323. Noting that NB Power had provided the NBEMO with its draft updated PLNGS technical planning basis, the Commission enquired about whether NBEMO was satisfied with the information provided by NB Power. The NBEMO representative confirmed to the Commission's satisfaction that the NBEMO was satisfied with NB Power's technical planning basis update. The NB Power representative stated to the Commission's satisfaction that the NBEMO worked closely with NB Power to ensure a complete integration of both on-site and off-site emergency plans, and to include changes and improvements to the PLNGS in the annually-updated NBEMO emergency

off-site plans. The Commission was satisfied with the information provided in this regard.

PLNGS Emergency Plans

324. In its consideration of CELA's recommendation for review of the adequacy of the PLNGS emergency plans and the province's readiness in the event of a nuclear emergency, and also the interventions from Greenpeace Canada, G. Dalzell and S. Nijhawan questioning the adequacy of the current EPZ, the Commission invited submissions on these topics. The NBEMO representative provided the Commission with detailed information about the current emergency planning zones, including the 4-km precautionary action zone, 12-km protective action zone and the 20-km EPZ, explaining that these zones were based on NB Power's technical planning basis. CNSC staff confirmed this information and stated that, as part of the CNSC's defence-in-depth approach to nuclear safety, CNSC staff benchmarked NB Power's emergency technical planning basis against IAEA guidance. CNSC staff further explained that the size of the EPZ was dependent on many factors and that, as such, the IAEA did not provide requirements, only suggestions. CNSC staff further stated that, based on the review of NBEMO's and NB Power's emergency planning documents, CNSC staff was satisfied that the current EPZ in the event of a severe accident at the PLNGS was adequate. The Commission was satisfied with the information submitted on this point.

325. In considering the intervention from CELA, the Commission requested information on the status of evacuation plans in the event of a nuclear emergency at the PLNGS. The NBEMO representative provided detailed information on how evacuations in the EPZ could be conducted, noting that evacuations were considered in the 2015 *Exercise Intrepid*. In regard to the adequacy of considering evacuations only in the EPZ, the NBEMO representative explained to the Commission that the NBEMO plans were flexible and adaptable, allowing evacuation beyond the 20-km zone if required and provided additional information on how the plans could be scaled up. CNSC staff confirmed this information, stating that the IAEA encouraged the leveraging of existing all-hazards plans and explained the basis on which CNSC staff was satisfied that a 20-km evacuation zone was adequate. CNSC staff also stated that IAEA guidance in this regard recognized the risk of mass evacuation versus the health risks associated with a small exposure and recommended that post-emergency radiological surveys directed evacuations.

326. The Commission asked for comment about the concerns raised by CELA in regard to shadow evacuations. The NBEMO provided information about its consideration of shadow evacuation within a 25-km zone in the PLNGS off-site plans, noting that a detailed study about population and evacuation times, including shadow evacuations, had recently been carried out and was reflected in off-site emergency plans. The Commission is satisfied with the information provided in regard to evacuation in the EPZ in the event of an emergency at the PLNGS and is satisfied that shadow evacuations had been adequately considered in the PLNGS off-site emergency plan.

327. In response to interventions from several organizations and individuals, the Commission asked about whether the marine EPZ, including fishing boats in the Bay of Fundy, was considered during emergency planning. The NB Power representative informed the Commission that it was and provided information in this regard. The NB Power representative also stated the marine response was the responsibility of the NBEMO and was considered during the 2015 *Exercise Intrepid*. The NBEMO representative confirmed this information, explaining that the NBEMO had two emergency warden zones in the Bay of Fundy and that the 2017 PLNGS off-site emergency plan would have updated information about all marine activities occurring in the marine EPZ. The Commission is satisfied that the marine EPZ is considered in the PLNGS off-site emergency plan.

328. The Commission called for information about the public availability of the PLNGS off-site emergency plans. The NBEMO representative explained the operational nature of the current plans, noting that they were developed for use by first responders. The NBEMO representative further stated that the NBEMO was creating a public-friendly version of the emergency plans, that these plans would be ready in the summer of 2017 and that they would be posted on the NBEMO website. The Commission was satisfied with this information but is of the opinion that the public should have greater access to emergency plans and requested an update on the NBEMO's public-friendly emergency plans during the presentation of the 2016 NPP Report.

329. The Commission acknowledged the CELA and Greenpeace Canada recommendations that the NBEMO should carry out more public consultation regarding the PLNGS off-site emergency plans and asked the NBEMO about whether the public was consulted on these updates. The NBEMO representative responded that the public was not consulted on the annual changes to the plans; however, should there be a major change that would affect stakeholders, the NBEMO would conduct public consultation in this regard. The Commission was satisfied with the information provided on this point and encourages the NBEMO to do as much outreach and public consultation as appropriate in this regard.

330. In reference to the recommendations in the intervention from CELA, the Commission requested additional details about NB Power recovery plans in the event of a nuclear emergency at the PLNGS. The NB Power representative explained that NB Power had done recovery planning with the NBEMO during the current licence period, including several tabletop exercises to establish the first steps of a recovery plan. The NB Power representative further reported that the 2018 *Exercise Intrepid* would include recovery planning. CNSC staff confirmed this information and further stated that REGDOC-2.10.1 included specifications for a licensee's recovery plan and that NB Power would be required to demonstrate how an emergency at the PLNGS would be managed into the recovery phase in order to meet the expectations of REGDOC-2.10.1.

331. Regarding recovery operations and the harvesting of foods in the event of a severe accident at the PLNGS, the NBEMO representative explained that the New Brunswick Department of Agriculture, Aquaculture and Fisheries maintained a database of farms,

fisheries and the allowable radiological limits for foods harvested in the vicinity of the PLNGS. The HC representative confirmed this information and stated that the coordination between federal partners, NB Power and the NBEMO was well established in this regard. The NB Power representative added that this component of emergency response and recovery was successfully exercised during the 2015 *Exercise Intrepid*.

332. The Commission enquired about discrepancies between the NBEMO's PLNGS off-site emergency plans and information submitted into the record for this hearing, as cited in the intervention from CELA. In this regard, the NBEMO representative clarified that the off-site plans were current in terms of population and public institutions in the EPZ. In regard to the Warden Zone map in the off-site plans, the NBEMO representative submitted that the warden zones had not changed in 30 years and that this map was up to date. The NBEMO representative also confirmed to the Commission that the off-site plans did consider beyond-design-basis accidents and that this would be clarified in the 2017 update to the plans. Further, the NBEMO representative explained that the 2016 plans considered by the intervenor had not yet been updated with all of the lessons learned from the 2015 *Exercise Intrepid* or recently-revised HC intervention levels due to their unavailability. The NBEMO representative confirmed to the Commission's satisfaction that the updates, omissions and required clarifications noted during this hearing would be included in the 2017 PLNGS off-site plans. The Commission is satisfied with the clarification provided in regard to the concerns raised by CELA during this hearing.

333. The Commission requested comments on the appropriateness of the fact that the NBEMO's PLNGS off-site emergency plans used concepts from the IAEA's GS-R-2[85] rather than the post-Fukushima GSR Part 7,[86] as raised in CELA's intervention. CNSC staff explained that the IAEA safety standards were recommendations, not requirements, and provided information about the updates that were made to GSR Part 7. The Commission is satisfied with the information provided in this regard and is of the opinion that the use of GS-R-2 in the NBEMO's current PLNGS off-site plans does not present a safety risk to the public or the environment. The Commission, however, encourages the implementation of concepts from GSR Part 7 as soon as practicable.

334. The Commission enquired about whether changes to REGDOC-2.10.1 would arise from the implementation of GSR Part 7 in Canada. CNSC staff responded that, since REGDOC-2.10.1 was based on GSR Part 7, changes to this REGDOC were not anticipated.

335. Addressing the topic of potassium iodide (KI) availability in the vicinity of the PLNGS and noting that NB Power met the specifications of REGDOC-2.10.1, CNSC staff provided the Commission with information about KI distribution in the EPZ and

[85] IAEA Safety Standards Series No. GS-R-2, *Preparedness and Response for a Nuclear or Radiological Emergency*, International Atomic Energy Agency, 2002.
[86] IAEA Safety Standards Series no. GSR Part 7, *Preparedness and Response for a Nuclear or Radiological Emergency*, International Atomic Energy Agency, 2015

availability beyond the EPZ. The NBEMO representative provided the Commission additional statistics on where KI was pre-distributed and the availability of KI in alternate locations. The Commission is satisfied with the information provided on this point.

336. Based on the information submitted for this hearing, the Commission is satisfied that NB Power has appropriate emergency plans in place to protect the health and safety of persons and the environment in the event of a nuclear emergency at the PLNGS. The Commission notes, however, the lack of full transparency and public availability of emergency planning documents and directs NB Power to publicly disclose its nuclear emergency technical planning basis document, *Technical Planning Basis – Radiation Emergency* by August 2017.

337. The Commission expects NB Power to implement REGDOC-2.10.1 during the proposed licence period. The Commission also expects CNSC staff to provide updates on the new PLNGS Off-site Emergency Operations Centre during the presentation of the annual NPP ROR.

338. The Commission agrees with the CNSC staff's analysis that the PLNGS emergency planning zones, including the 20-km EPZ, are adequate for emergency planning purposes and that the NBEMO off-site plans based on NB Power's 2004 technical planning basis and more recent safety analyses are adequate. The Commission requests the status of updates and modifications made to the NBEMO off-site plans, to be presented during the annual NPP ROR.

3.11.3 Fire Protection

339. The Commission examined the adequacy of the PLNGS fire protection program. The Commission notes that the 2012 PLNGS licence renewal decision included a regulatory hold point pursuant to licence condition 16.4[87] regarding the performance of the PLNGS fire protection program and compliance with N293-07, *Fire protection in CANDU nuclear power plants*.[88] The Commission acknowledges that this hold point was lifted in December 2014 after NB Power satisfied all requirements in this regard.

340. NB Power provided the Commission with comprehensive details about the improvements that were made to the PLNGS fire protection program during the current licence period, including achieving compliance with N293-07. CNSC staff submitted that fire protection at the PLNGS was closely monitored by CNSC staff during the current licence period and provided details about inspections and other regulatory oversight activities which showed that, while regulatory requirements were mostly satisfied, the improvement of several fire protection program elements was required. CNSC staff submitted that it was satisfied with NB Power's response to CAPs and that

[87] CNSC Record of Proceedings, Including Reasons for Decision – New Brunswick Power Nuclear Corporation, *Request for Approval to Reload Fuel and Restart the Point Lepreau Nuclear Generating Station, and Application to Renew the Power Reactor Operating Licence for the Point Lepreau Nuclear Generating Station*, Paragraph 174.
[88] N293-07, *Fire Protection in CANDU nuclear power plants*, CSA Group, 2007.

the areas of improvements did not present safety risks. CNSC staff further submitted that it would continue to monitor NB Power's performance in this regard through ongoing compliance verification activities and that meetings with NB Power were held approximately every six weeks in regard to this issue.

341. NB Power reported that N293-12[89] was implemented at the PLNGS in August 2016 and that it continued its participation in the technical committee for N393-13, *Fire protection for facilities that process, handle, or store nuclear substances*. NB Power submitted information regarding additional multiple analyses and audits that directed the improvements made to the PLNGS Fire Protection Program during the current licence period. CNSC staff confirmed its satisfaction with NB Power's increased efforts in this regard during the current licence period.

342. The Commission called for submission regarding the remaining improvements that had been identified for the PLNGS fire protection program. The NB Power representative provided the Commission with detailed information regarding improvements that were identified for the PLNGS fire protection program, reporting that these were matters of continuous improvements, that the PLNGS fire protection program met regulatory requirements and that improvements were addressed through benchmarking and CAPs.

343. NB Power also provided the Commission with information about the PLNGS ERT's extensive fire protection training during the current licence period, noting that NB Power operated a fire training grounds at the PLNGS and collaborated with the Saint John Fire Department in regard to SAT-based training activities. CNSC staff reported that several inspections focussed on NB Power's ERT at the PLNGS were carried out during the current licence period showed that the fire protection capabilities were continuously improving at the PLNGS through more frequent drills and training and program enhancements.

344. NB Power submitted that several mutual aid agreements had been established with local fire departments including the Musquash Volunteer Fire Department and the Saint John Fire Department. NB Power also provided information on how the mutual aid agreements allowed local firefighters to participate in training, drills and exercises at the PLNGS and that annual exercising of the agreements demonstrated their effectiveness. NB Power submitted that these emergency-response mutual aid agreements had been identified as an international best practice. Asked to comment on this collaboration with NB Power, the City of Saint John and Musquash Volunteer Fire Department representatives submitted that this collaborative approach to emergency training and management resulted in better planning and preparation in the response process.

345. Based on the information provided, the Commission is satisfied that NB Power has an adequate fire protection program in place at the PLNGS that meets regulatory requirements. The Commission expects NB Power to continue the implementation of fire protection focussed improvement plans at the PLNGS, with continued regulatory

[89] N293-12, *Fire Protection in CANDU nuclear power plants*, CSA Group, 2012.

oversight by CNSC staff throughout the proposed licence period.

3.11.4 Conclusion on Emergency Management and Fire Protection

346. Based on the above information provided on the record for this hearing, the Commission concludes that the PLNGS nuclear and conventional emergency management preparedness programs and the fire protection measures in place, and that will be in place during the proposed licence period, are adequate to protect the health and safety of persons and the environment.

347. Based on the information submitted for this hearing, the Commission is satisfied that the NB Power Point Lepreau Emergency Response Plan and the NBEMO's PLNGS Off-Site Emergency Plans consider design-basis, beyond-design-basis and severe nuclear accidents. Further, the Commission is satisfied that NB Power's current technical planning basis is adequate for emergency planning purposes. The Commission acknowledges NB Power's commitment to update its nuclear emergency technical planning basis and expects annual updates on the progress of this project to be provided during CNSC staff's presentation of the annual NPP ROR, starting in August 2017.

348. The Commission appreciates the efforts made by the NBEMO in regard to the PLNGS off-site emergency plan and the annual updates that are made to these plans. The Commission encourages NBEMO to improve the public availability of its PLNGS off-site emergency plans and looks forward to an update on NBEMO's initiative to publish a public-friendly emergency planning document later in 2017.

349. Based on the information considered for this hearing, the Commission is satisfied that the 20-km EPZ is protective of the public and the environment and that there would be minimal impact outside of the EPZ in the event of an emergency at the PLNGS.

350. The Commission is satisfied with the improvements that were made to NB Power fire protection program during the current licence period and the increased regulatory oversight by CNSC staff. The Commission encourages NB Power to continue improvements in this regard throughout the proposed licence period.

351. The Commission notes that, although several interventions expressed concerns about the adequacy of the PLNGS emergency response plan and the NBEMO's PLNGS off-site emergency plan, the first response organizations in the communities near the PLNGS, as well as other community organizations, expressed support for and confidence in the emergency plans currently in place for the PLNGS. The Commission agrees with CNSC staff's analysis that on-site and off-site emergency planning for the PLNGS meets regulatory requirements and is satisfactory in protecting the health and safety of persons and the environment.

352. The Commission acknowledges the recommendations made by intervenors in regard to NB Power's PLNGS emergency planning. The Commission is satisfied with the information provided on the record for this hearing on these how these suggestions could be addressed, noting that several of the recommendations have already been implemented by NB Power and the NBEMO.

353. The Commission expresses satisfaction with NB Power's collaboration with provincial and federal partners, community organizations including local hospitals and schools, local municipalities and first responder organizations during emergency planning activities. The Commission encourages NB Power to increase the participation of communities outside of the EPZ in the 2018 *Exercise Intrepid*, where practicable. In this regard, the Commission looks forward to an update regarding the results of and lessons learned from the upcoming 2018 *Exercise Intrepid*.

3.12 Waste Management

354. The Commission assessed NB Power's PLNGS site-wide waste management program. This included the operation of the Solid Radioactive Waste Management Facility (SRWMF) which is located on the PLNGS site. Throughout the current licence period, CNSC staff assessed NB Power's performance in this SCA, including waste minimization, segregation, characterization, and storage programs, as "satisfactory."

355. NB Power asserted its commitment to the safe management of waste and waste minimization at PLNGS. NB Power provided the Commission with information about the waste minimization practices implemented at PLNGS, including the "Likely Clean Program," which significantly reduced the volume of radioactive waste generated, and the incineration of solid radioactive waste at an appropriately-licensed external facility. CNSC staff confirmed this information, noting that NB Power had appropriate programs in place for the minimization, characterization and segregation of waste resulting from the operation of the PLNGS.

356. Asked to clarify the meaning of "likely clean", the NB Power representative explained that the waste generated in Zone 3 of the PLNGS was screened for radiation and that only waste with counts above background radiation was considered radioactive and treated as such.

357. CNSC staff noted that a 2015 inspection focusing on conventional hazardous waste management program at PLNGS identified areas for improvement related to procedures and procedural adherence. CNSC staff reported that these action items were being tracked through the CAPs related to procedural non-compliance as previously reported in subsections 3.2.1 and 3.4.1 .

358. The Commission examined NB Power's compliance with codes and standards related to waste management. CNSC staff submitted that NB Power was in compliance with

N292.3-08, *Management of low and intermediate-level radioactive waste*[90] and would submit an implementation plan for N292.3-14 to CNSC staff by September 30, 2017. In regard to N292.0-14, *General principles for the management of radioactive waste and irradiated fuel*,[91] CNSC staff reported that NB Power had committed to submitting an implementation plan to CNSC staff by September 30, 2017.

3.12.1 Solid Radioactive Waste Management Facility

359. The Commission considered the adequacy of NB Power's structure of and programs for the operation of the SRWMF. NB Power provided detailed information about the SRWMF, explaining that the facility was designed to provide at least 50 years of interim storage for radioactive waste originating from PLNGS operations. NB Power also reported that quarterly information on the SRWMF inventory was submitted to the CNSC and that, as of September 30, 2016, 1,768.99 m^3 and 1,011.22 m^3 of waste was in storage in Phases I and III of the facility, respectively.

360. The Commission noted that the PLNGS PROL provided for the transfer of spent fuel between the Spent Fuel Bay and the SRWMF. In this regard, NB Power submitted information to the Commission regarding its management of used PLNGS fuel bundles, explaining that after a minimum of seven years in the Spent Fuel Bay, the used fuel was transferred to Phase II of the SRWMF and stored in above-ground concrete canisters designed to provide maintenance-free storage for at least 50 years. NB Power reported that the SRWMF contained 187 sealed used fuel canisters.

361. CNSC staff submitted to the Commission that it was of the opinion that NB Power had appropriate programs in place to operate the SRWMF safely and in accordance with regulatory requirements. CNSC staff provided the Commission with information about minor SRWMF inspection findings during the current licence period. CNSC staff reported that, to address these finding, NB Power developed a preventive maintenance plan acceptable to CNSC staff.

362. In its consideration of the intervention from Greenpeace Canada, the Commission asked additional information about the maintenance of the SRWMF. The NB Power representative explained that the SRWMF maintenance schedule, noting frequent inspections by NB Power and CNSC staff. The NB Power representative confirmed to the Commission's satisfaction that, as radioactive waste management technologies and methods evolved, NB Power's waste management plans evolved accordingly. CNSC staff confirmed the information provided by NB Power, explaining that the SRWMF could be maintained for the entire lifespan of the PLNGS, through to the end of decommissioning.

363. The Commission acknowledges interventions from MTI, the Passamaquoddy Nation, Greenpeace Canada and individuals that expressed concerns about the storage of spent

[90] N292.3, *Management of low and intermediate-level radioactive waste*, CSA Group, 2008 and 2014.
[91] N292.0-14, *General principles for the management of radioactive waste and irradiated fuel*, CSA Group, 2014.

fuel waste from PLNGS operations. The Commission notes that the Nuclear Waste Management Organization has been mandated by the Government of Canada for the long-term management of spent fuel. However, based on the information submitted for this hearing, the Commission is satisfied that NB Power has appropriate programs in place for the management of spent fuel at the PLNGS throughout the proposed licence period. The Commission notes that additional consideration of these interventions as they relate to financial guarantees and decommissioning is found in section 3.17, *Decommissioning Plans and Financial Guarantee* of this decision.

3.12.2 Conclusion on Waste Management

364. Based on the above information and considerations of the hearing materials, the Commission is satisfied that NB Power has appropriate programs in place to safely manage waste at the PLNGS.

365. The Commission also concludes that NB Power is operating and will continue to operate the SRWMF safely throughout the proposed licence period. Furthermore, the Commission is satisfied that the SRWMF is being appropriately maintained and inspected to ensure its safe operation throughout its proposed lifespan.

366. The Commission expects NB Power to submit implementation plans and implement the latest versions of applicable standards in accordance with the schedule in the proposed LCH and submitted during this hearing.

3.13 Security

367. The Commission examined NB Power's security program at the PLNGS, which is required to implement and support the security requirements stipulated in the relevant regulations and the licence. This includes compliance with the applicable provisions of the *General Nuclear Safety and Control Regulations*[92] and the *Nuclear Security Regulations*.[93] During the current licence period, CNSC staff rated NB Power's performance in this SCA as "satisfactory."

368. NB Power provided the Commission with information on the comprehensive PLNGS nuclear security program, including its compliance with regulations and CNSC regulatory documents. NB Power also provided detailed information about the CNSC and IAEA guidance documents that were used as a general framework for security program procedures. CNSC staff confirmed that NB Power's PLNGS nuclear security program complied with regulations, standards and guidance documents.

[92] SOR/2000-202.
[93] SOR/2000-209.

369. NB Power submitted information about improvements made to security-related facilities and equipment at the PLNGS during the current licence period, noting that these upgrades not only met, but in some cases exceeded requirements and guidelines. CNSC staff confirmed this information to the Commission.

370. NB Power submitted information regarding the PLNGS personnel screening processes and explained that these processes met the specifications of REGDOC-2.12.2, *Site Access Security Clearance*[94] and the *Standard on Security Screening*.[95]

371. In response to several interventions that indicated that members of the public had access to the PLNGS for various collaborative and outreach programs, the Commission enquired about visitor security protocols. The NB Power representative provided the Commission with information on PLNGS visitor security protocols, explaining that visitors did not enter the protected area. The Commission was satisfied with the information provided in this regard.

372. NB Power informed the Commission that the training that was provided to Nuclear Response Force Members at PLNGS met the specifications of REGDOC-2.12-1, *High Security Sites: Nuclear Response Force*.[96] CNSC staff submitted that, during the current licence period, a need for NB Power to improve the nuclear security training and drill program was identified, with NB Power addressing CNSC staff's findings satisfactorily.

373. Noting PEACE-NB's concerns about potential PLNGS site access from air or water, the Commission asked for additional information on this matter. The NB Power representative explained that the design basis threat was considered in the protocols for these scenarios and provided additional information regarding PLNGS security protocols. The Commission is satisfied with the information provided on this point.

Cybersecurity

374. NB Power provided details about the PLNGS cybersecurity program, noting that an implementation plan for N290.7-14, *Cyber security for nuclear power plants and small reactor facilities*[97] was submitted to CNSC staff in August 2016. CNSC staff confirmed that the PLNGS cybersecurity program at PLNGS satisfied CNSC requirements and that NB Power had confirmed its plans to fully implement N290.7-14 by December 2019.

375. The Commission enquired about the appropriateness of the implementation time frame for N290.7-14 considering the current rapid pace of technological changes. The NB Power representative provided comprehensive information regarding the current

[94] CNSC Regulatory Document REGDOC-2.12.2, *Site Access Security Clearance*, 2013.
[95] *Standard on Security Screening*, Government of Canada, 2014.
[96] CNSC Regulatory Document REGDOC 2.12.1, *High Security Sites: Nuclear Response Force*, 2013.
[97] N290.7-14, *Cyber security for nuclear power plants and small reactor facilities*, CSA Group, 2014.

cybersecurity program at the PLNGS, explaining that all of the systems controlling nuclear-related operations were separate from all external networks and that the internal oversight committee had validated NB Power's approach for cyberattack prevention. CNSC staff added that N290.7-14 was a new standard with a very modern approach and that, since NB Power already had a cybersecurity program that met CNSC expectations, the implementation of the standard would serve to further improve the program at the PLNGS. CNSC staff confirmed to the Commission that CNSC inspections had shown that the PLNGS cybersecurity program was satisfactory.

376. In its consideration of the intervention from G. Dalzell, the Commission further enquired about compensatory measures that were being taken at the PLNGS until N290.7-14 was fully implemented. CNSC staff provided the Commission with additional details on how program improvements were triaged by NB Power, explaining that CNSC staff closely monitored the implementation of N290.7-14, was satisfied with NB Power's progress in this regard and that risks in the area of cybersecurity at the PLNGS were adequately mitigated. The Commission was satisfied with the information provided by NB Power and CNSC staff on this matter.

377. On the basis of the information provided on the record for this hearing, the Commission is satisfied that NB Power's performance with respect to maintaining security at the PLNGS has been acceptable. The Commission concludes that NB Power has made adequate provision for the physical security of the PLNGS, and is of the opinion that NB Power will continue to make adequate provision for security during the proposed licence period.

378. The Commission is satisfied that NB Power's cybersecurity program is adequate to protect the PLNGS from cyberattacks and other cybersecurity-related concerns. The Commission expects NB Power to implement N290.7-14 during the proposed licence period in accordance with the schedule presented during this hearing.

3.14 Safeguards

379. The Commission examined the adequacy of NB Power's safeguards program at the PLNGS. The CNSC's regulatory mandate includes ensuring conformity with measures required to implement Canada's international obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT). Pursuant to the NPT, Canada has entered into safeguard agreements with the IAEA. The objective of these agreements is for the IAEA to provide credible assurance on an annual basis to Canada and to the international community that all declared nuclear material is in peaceful, non-explosive uses and that there is no undeclared nuclear material or activities in this country. CNSC staff rated NB Power's performance in this SCA as "satisfactory" throughout the current licence period.

380. NB Power provided the Commission with information on the PLNGS safeguards program, how the IAEA safeguards were implemented at the PLNGS and explained

that the safeguards program also satisfied the requirements of the *General Nuclear Safety and Control Regulations*, the *Class I Nuclear Facilities Regulations*, and the *Nuclear Non-proliferation Import and Export Control Regulations*.[98] NB Power also submitted that RD-336, *Accounting and Reporting of Nuclear Material*[99] was implemented at the PLNGS to ensure that the safeguards program enables Canada to meet its safeguards obligations in relation to NB Power's licensed activities.

381. CNSC staff confirmed the information submitted by NB Power and provided the Commission with information regarding safeguards compliance verification and submitted that NB Power continued to comply with all regulatory requirements through the implementation of effective safeguard measures and maintenance of nuclear non-proliferation commitments at the PLNGS.

382. The Commission asked for comments in regard to an intervention that suggested that Canada contributed to the international proliferation of nuclear weapons. CNSC staff confirmed that this statement was incorrect and provided information on Canada's strong safeguards program which includes strict international requirements for the import and export of nuclear materials. The Commission finds that there is no basis for the assertion that Canada contributes to the proliferation of nuclear weapons.

383. Based on the above information, the Commission is satisfied that NB Power has provided and will continue to provide adequate measures in the areas of safeguards and non-proliferation at the PLNGS that are necessary for maintaining national security and measures necessary for implementing international agreements to which Canada has agreed.

3.15 Packaging and Transport

384. The Commission examined NB Power's packaging and transport program at the PLNGS. Packaging and transport covers the safe packaging and transport of nuclear substances and radiation devices to and from the licensed facility. The licensee must adhere to the *Packaging and Transport of Nuclear Substances Regulations, 2015*[100] (PTNSR, 2015) and Transport Canada's *Transportation of Dangerous Goods Regulations*[101] (TDG Regulations) for all shipments. During the current licence period, CNSC staff rated NB Power's performance in this SCA as "satisfactory."

385. NB Power provided the Commission with information on the PLNGS packaging and transport activities, noting that they were carried out in accordance with the PTNSR, 2015, that documentation for shipments was prepared in accordance with the TDG Regulations and that an emergency response plan had been registered and approved by Transport Canada.

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[98] SOR/2000-210.
[99] CNSC Regulatory Document RD-336, *Accounting and Reporting of Nuclear Material*, 2010.
[100] SOR/2015-145.
[101] SOR/2001-286.

386. CNSC staff confirmed the information provided by NB Power, explaining that packaging and transport compliance verification activities during the current licence period showed only positive findings and that the packaging and transport of nuclear substances at the PLNGS satisfied regulatory requirements and met CNSC expectations.

387. Based on the information presented on the record for this hearing, the Commission is satisfied that NB Power is meeting, and will continue to meet, regulatory requirements regarding packaging and transport.

3.16 Aboriginal Engagement and Public Information

3.16.1 Participant Funding Program

388. The Commission assessed the information provided by CNSC staff regarding public engagement in the licensing process as enhanced by the CNSC's Participant Funding Program (PFP). CNSC staff submitted that, in September 2016, up to $75,000 in funding to participate in this licensing process was made available to Indigenous groups, not-for-profit organizations and members of the public to review NB Power's licence renewal application and associated documents, and to provide the Commission with value-added information through topic-specific interventions.

389. A Funding Review Committee (FRC), independent of the CNSC, recommended that six applicants be provided with up to $108,462 in participant funding. These applicants were required, by virtue of being in receipt of participant funding, to submit a written intervention and make an oral presentation at Part 2 of the public hearing commenting on NB Power's licence renewal application. One PFP applicant withdrew its request prior to Part 2 of the hearing. As such, $76,512 in participant funding was awarded to the following recipients:

- Canadian Environmental Law Association (CELA) – Conservation Council of New Brunswick (CCNB)
- Sipekne'katik First Nation
- Mi'gmawe'l Tplu'taqnn Incorporated (MTI)
- Maliseet First Nations (Madawaska Maliseet, Tobique, Kingsclear, St. Mary's and Oromocto First Nations)
- Passamaquoddy Nation Recognition Group Inc.

390. The Commission noted concerns from several intervenors regarding PFP and intervention timelines, and asked for comments on this matter. CNSC staff provided the Commission with information regarding the timelines, noting that CNSC staff tried to ensure the timely provision of all publicly available documents to ensure that

intervenors had sufficient time for the preparation of their interventions.

391. The Commission wishes to acknowledge that, due to the delays experienced by CELA in obtaining the PLNGS off-site emergency plans, CELA asked for an extension of time to submit its intervention to the Commission. In making its decision to grant CELA's request, the Commission was satisfied that CELA's intervention submission date of April 3, 2017, more than 30 days before Part 2 of the hearing, would cause no prejudice to the other participants.

392. In response to interventions from CELA, Greenpeace Canada, New Clear Free Solutions, PEACE-NB and individuals, the Commission asked for comments regarding the public availability of documents referenced during this hearing. CNSC staff responded that the CNSC made all documents referenced in CNSC CMDs available to the public, unless otherwise noted in the CMD. The NB Power representative provided the Commission with information regarding its document disclosure policies and submitted detailed information why some documents could not be provided to intervenors for confidentiality and sensitivity reasons. The Commission recognizes the sensitive nature of some NGS-related documentation. However, the Commission strongly encourages licensees and CNSC staff to simplify the provision of public documents referenced in CMDs and to clearly identify documents that are not publicly available.

393. The Commission also noted concerns from several intervenors that inadequate participant funding was awarded through the PFP and that these amounts were not sufficient for the development of in-depth interventions. CNSC staff acknowledged the intervenors' concerns and submitted that the CNSC's two PFP streams, project-specific funding and funding for general matters of regulatory interest, provided intervenors with multiple funding options and opportunities for participation in CNSC proceedings.

394. Based on the information submitted for this hearing, the Commission concludes that Indigenous groups, members of the public and other stakeholders were encouraged to participate in this licence renewal process.

395. The Commission appreciates the intervenors' comments regarding public participation in these licence renewal proceedings. The Commission expects CNSC staff to review its practices and service standards for PFP timelines. With respect to Commission proceeding timelines, the Commission intends to provide publicly-available hearing documents in a timely manner to ensure that intervenors are able to fully participate in Commission proceedings. The Commission also notes the availability of the two PFP streams and encourages intervenors to make use of the PFP for future participation in Commission proceedings.

3.16.2 Aboriginal Engagement

396. The common law duty to consult with Aboriginal peoples applies when the Crown contemplates action that may adversely affect established or potential Aboriginal and/or treaty rights. The CNSC, as an agent of the Crown and as Canada's nuclear regulator, recognizes and understands the importance of building relationships and engaging with Canada's Aboriginal peoples. The CNSC ensures that all of its licensing decisions under the NSCA uphold the honour of the Crown and considers Aboriginal peoples' potential or established Aboriginal and/or treaty rights pursuant to section 35 of the *Constitution Act, 1982*.[102]

397. The Commission examined the information submitted by NB Power regarding its ongoing engagement with First Nations near the PLNGS site. NB Power asserted its commitment to its engagement with First Nations about NB Power business undertakings, PLNGS operations and other major NB Power projects, and provided the Commission with details on the communication media it used in this regard.

398. NB Power submitted that, during the proposed licence period, REGDOC-3.2.2, *Aboriginal Engagement*[103] will be integrated into PLNGS Aboriginal engagement activities. CNSC staff submitted that NB Power did not have any upcoming projects that would raise the duty to consult and that, as such, CNSC staff was satisfied with NB Power's approach in this regard.

399. NB Power reported that it was finalizing its First Nations Strategic Approach to enhance and complement NB Power's current policies and guides for its relationships with local First Nations. NB Power provided details about this initiative, explaining that it was based on education, employment, cultural awareness and sensitivity programs.

400. The Commission asked whether NB Power had invited First Nations to visit the PLNGS. The Maliseet Nation, Passamaquoddy Nation, and MTI representatives confirmed that NB Power had extended invitations to them for PLNGS site tours and that these were accepted. The NB Power representative stated that interested First Nations were welcome to visit the PLNGS at any time.

401. The Commission requested additional information on NB Power's First Nations outreach programs. The NB Power representative submitted information about the First Nations in New Brunswick with which NB Power had engaged over the current licence period and stated that NB Power actively employed First Nations community members. The NB Power representative also provided information about the partnership that NB Power had with the New Brunswick Community College to host information sessions for First Nations communities and about NB Power's engagement with the Joint Economic Development Initiative, which promotes First Nations inclusion in industry.

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[102] *Constitution Act, 1982*, Schedule B to the *Canada Act 1982*, 1982, c. 11 (U.K.).
[103] CNSC Regulatory Document REGDOC-3.2.2, *Aboriginal Engagement*, 2016.

402. CNSC staff provided the Commission with information about 18 First Nations groups that were identified as having a potential interest in the PLNGS licence renewal and about the consultation activities that were carried out with the identified groups. CNSC staff explained that the primary concerns raised by First Nations groups included potential impacts on community commercial fisheries in the Bay of Fundy, environmental and health impacts associated with the operation of the PLNGS and meaningful consultation. CNSC staff submitted that offers to meet with the First Nations groups to discuss their concerns and answer their questions were made and that CNSC staff encouraged their participation in this licence renewal process.

403. CNSC staff submitted that, since the proposed licence renewal did not include any significant modifications to the PLNGS, this renewal would not cause adverse impacts to any potential or established Aboriginal and/or treaty rights. Therefore, CNSC staff was of the opinion that the proposed licence renewal did not raise the duty to consult. CNSC staff explained, however, that continued communication with interested Aboriginal groups was, and would continue to be, maintained throughout the proposed licence period to ensure that the groups received all information requested and to establish and maintain relationships with the groups.

404. In its intervention, the Maliseet Nation of New Brunswick expressed disappointment about a lack of engagement prior to this licence renewal and the Commission requested additional information on this matter. The NB Power representative acknowledged that, prior to 2000, NB Power carried out limited engagement with First Nations and provided detailed information about how NB Power's First Nations engagement program had evolved since that time. NB Power also provided the Commission with information regarding a recently-signed engagement memorandum of understanding (MOU) with the Maliseet Nation of New Brunswick and upcoming engagement activities, and expressed NB Power's commitment to addressing the Maliseet Nation of New Brunswick's concerns regarding PLNGS operations. CNSC staff provided the Commission with information about the CNSC's current and future consultation activities, including regularly scheduled meetings, with the Maliseet Nation of New Brunswick. The Maliseet Nation of New Brunswick representative indicated that the MOU with NB Power and planned consultation activities with CNSC staff were satisfactory.

405. In reference to the intervention from the Maliseet Nation of New Brunswick, the Commission enquired about whether archaeological and historical and current First Nations land use studies in the area surrounding the PLNGS were planned. The Maliseet Nation of New Brunswick representative responded that such a study should be carried out to ensure accurate First Nations history records for the area, noting that the funding for such a study had not yet been secured. The Commission is of the opinion that the study of First Nations historical context for the PLNGS should be encouraged.

406. The Commission asked NB Power for additional details on its engagement activities with the Passamaquoddy Nation. The NB Power representative explained that NB Power had been engaging with the Passamaquoddy Nation for several years and that NB Power was committed to share, educate and provide awareness on all aspects of the PLNGS with the Passamaquoddy Nation. The NB Power representative also confirmed that NB Power had signed a waiver stating that these engagement activities were not part of the formal consultation process. The Passamaquoddy Nation representative confirmed this information and provided additional details in regard to consultation activities.

407. Asked about CNSC consultation activities with the Passamaquoddy Nation, CNSC staff reported that the CNSC remained committed to engagement with the Passamaquoddy Nation and was in contact with them throughout this licence renewal process. The Passamaquoddy Nation representative indicated appreciation for these activities carried out by CNSC staff.

408. In regard to NB Power's engagement with MTI, the NB Power representative stated that NB Power had established an ongoing respectful relationship with MTI and provided information on NB Power's monthly meetings and outreach activities with MTI, and its attendance at MTI community meetings. The MTI representative acknowledged NB Power's engagement efforts but explained that a greater level of engagement, such as environmental monitoring by Indigenous peoples and the inclusion of Indigenous knowledge in research studies, including the monitoring of traditional foods and medicines of Indigenous peoples, was required to increase First Nations' confidence in the safety of the PLNGS' operations. The MTI representative added that MTI had an extensive team of highly-skilled personnel who could contribute to a monitoring program at and around the PLNGS but a mechanism for this was still required. The NB Power representative responded to the Commission's satisfaction that NB Power was committed to its engagement activities with MTI and was looking forward to collaborating with First Nations groups in order to establish environmental monitoring programs and finding ways to include Indigenous knowledge in NB Power's research activities.

409. On the same topic, CNSC staff confirmed the information provided by NB Power in regard to engagement activities with MTI and provided the Commission with details on CNSC staff's engagement with MTI throughout the current licence period and leading up to this licence renewal hearing. CNSC staff also provided the Commission with information on how the CNSC could facilitate the inclusion of members of First Nations in the IEMP and the inclusion of Indigenous knowledge in research studies, noting that the PFP was a mechanism that could potentially be employed in this regard. The Commission wishes to express its satisfaction with the information contained in MTI's *New Brunswick Mi'gmaq Indigenous Knowledge Study Process Guide*, which was submitted into the record for this hearing, and encourages the continued establishment of internal capacity for the inclusion of Indigenous knowledge as described by the MTI representative.

410. In regard to NB Power's engagement activities with the Sipekne'katik First Nation, the NB Power representative stated that NB Power was committed to continuing the relationship that it had established with the Sipekne'katik First Nation and provided further information on future engagement activities. The Sipekne'katik representative confirmed that the Sipekne'katik First Nation looked forward to establishing a relationship and ongoing communication with NB Power.

411. Based on the information provided for this hearing, the Commission is satisfied that Aboriginal engagement activities carried out for this licence renewal were adequate. The Commission anticipates that NB Power will continue its expansion of Aboriginal engagement activities, including the finalization of the NB Power First Nations Strategic Approach.

412. The Commission expressed satisfaction with NB Power's First Nations Strategic Approach and encourages NB Power to implement this approach as soon as practicable.

413. The Commission expects NB Power to implement REGDOC-3.2.2 during the proposed licence period.

414. The Commission directs CNSC staff to provide First Nations with additional information on how the PFP could be employed to establish Indigenous environmental monitoring programs and to carry out Indigenous knowledge studies.

3.16.3 Public Information

415. The Commission assessed NB Power's public information and disclosure program (PIDP) for the PLNGS. A public information program is a regulatory requirement for licence applicants and licensed operators of Class I nuclear facilities. Paragraph 3(j) of the *Class I Nuclear Facilities Regulations*[104] requires that licence applications include

> "the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed."

416. The Commission also assessed how NB Power's PIDP met the specifications of RD/GD-99.3, *Public Information and Disclosure*.[105] NB Power provided the Commission with information regarding its public and stakeholder consultations and communication activities including meetings, PLNGS media days, workshops and the Community Relations Liaison Committee (CRLC). NB Power also submitted information regarding PIDP evaluation, internal communications and its Annual and

[104] SOR/2000-204.
[105] CNSC Regulatory/Guidance Document RD/GD-99.3, *Public Information and Disclosure*, 2012.

Quarterly Reports. CNSC staff confirmed to the Commission that NB Power had a well-established PIDP that satisfied regulatory requirements and provided details about several best practices that had been implemented by NB Power.

417. Asked about whether NB Power's PIDP included all communities that had expressed interest in PLNGS operations, the NB Power representative confirmed to the Commission's satisfaction that the NB Power public disclosure protocol required that information be communicated to all interested members of the public and communities, including Indigenous communities. The NB Power representative also submitted that NB Power made every reasonable effort to meet community-specific information needs and requests as well.

418. The Commission enquired about public opinion surveys conducted for the PLNGS. The NB Power representative provided information about annual surveys, noting that NB Power revised the PLNGS PIDP based on the survey responses and provided information on how NB Power ensured that Indigenous communities were well-represented in the survey results. Asked if the results were publicly posted on NB Power's website, the NB Power representative responded that they were not; however, the results were available to the public upon request. The Commission suggested that future survey results be posted on NB Power's website.

419. The Commission enquired about the outreach that NB Power conducted outside the EPZ. The NB Power representative provided details about outreach activities, such as open houses, that NB Power carried out in the City of Saint John and surrounding communities, including activities carried out upon request from an intervenor. The NB Power representative also stated that the *Nuclear – Preparedness Guide* was distributed throughout the EPZ and was available to all members of the public on the NB Power website. The NB Power representative also stated to the Commission's satisfaction that this expanded outreach would be continued throughout the proposed licence period.

420. Upon request from the Commission, several intervenors who were also members of the PLNGS CRLC, provided the Commission with information about how the CRLC shared information with communities near the PLNGS site. The intervenors also provided the Commission with information regarding CRLC membership, including local government and committee representation, stating the expectation that CRLC members shared information with their communities.

421. In considering the intervention from the New Brunswick Community College and the Faculty of Engineering, Université de Moncton, the Commission requested additional information on collaborative initiatives between NB Power and local educational institutions. The NB Power representative responded that NB Power engaged with these educational institutions through curriculum support, co-op and summer employment opportunities. Asked about whether NB Power collaborated with the NB Department of Education to include nuclear energy production in its curriculum, the NB Power representative explained that NB Power had collaborated with the Department of Education and provided information about an initiative starting in the

2017-18 school year that would introduce nuclear-related subject matter in NB Grade 4 classrooms.

422. Based on the information presented for this hearing, the Commission is satisfied that NB Power's PLNGS PIDP has and will continue to communicate to the public information about the health, safety and security of persons and the environment and other issues related to the PLNGS. The Commission expressed satisfaction with the best practices identified in NB Power's PIDP and encourages NB Power to continue its efforts in this regard.

423. The Commission encourages NB Power to assess the feasibility of publicly posting the minutes of the PLNGS CRLC on its website. The Commission also suggests that future PLNGS survey results be posted on NB Power's website.

3.16.4 Conclusion on Aboriginal Engagement and Public Information

424. Based on the information presented, the Commission is satisfied that, overall, NB Power's PIDP meets regulatory requirements and is effective in keeping First Nations and the public informed of PLNGS operations. The Commission acknowledges the many best practices already implemented by NB Power and encourages its efforts in creating, maintaining and improving its dialogue with the neighbouring communities.

425. Several First Nations informed the Commission that the PLNGS was built on traditional and ancestral territories and that the facility adversely impacted their Aboriginal and/or treaty rights. The Commission recognizes that First Nations were not consulted at the time of the construction of the PLNGS. The Commission, however, acknowledges the current efforts and commitments made by NB Power in relation to Aboriginal engagement and CNSC staff's efforts in this regard on behalf of the Commission. Based on the information presented on the record for this hearing, the Commission is satisfied that this licence renewal will not result in any changes to PLNGS operations, that the renewal will not cause adverse impacts to any potential or established Aboriginal and/or treaty rights and that the duty to consult was not triggered in this matter. The Commission is also of the opinion that the engagement activities taken for the review of the PLNGS licence renewal application have been adequate.[106]

426. The Commission expects NB Power to establish an environmental program with First Nations' input and to establish mechanisms in order to include Indigenous knowledge in NB Power's environmental protection and monitoring activities. The Commission also notes that CNSC's PFP is a mechanism that Indigenous groups can access in regard to environmental monitoring activities and the inclusion of Indigenous knowledge in these activities.

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[106] *Rio Tinto Alcan v. Carrier Sekani Tribal Council,* 2010 SCC 43[2010] 2 S.C.R. 650 at paras 45 and 49.

427. The Commission recognizes the difficulty that many intervenors had in the receipt of publicly-available documents. The Commission is of the opinion that, in the absence of previously-established security or sensitivity issues, all documents should be made available to the public upon request. The Commission intends on providing publicly available hearing documents to members of the public quickly to ensure that intervenors are able to fully participate in Commission proceedings.

3.17 Decommissioning Plans and Financial Guarantee

428. The Commission requires that NB Power has operational plans for the decommissioning and long-term management of waste produced during the lifespan of the PLNGS. In order to ensure that adequate resources are available for safe and secure future decommissioning of the PLNGS site, the Commission requires that an adequate financial guarantee for realization of the planned activities is put in place and maintained in a form acceptable to the Commission throughout the licence period.

429. NB Power reported that the PLNGS decommissioning plans met the specifications of N294-09, *Decommissioning of facilities containing nuclear substances*.[107] NB Power also provided the Commission with information on its Preliminary Decommissioning Plan (PDP).

430. CNSC staff confirmed the information provided by NB Power and informed the Commission that NB Power's PDP also met the specifications G-219, *Decommissioning Planning for Licensed Activities*. CNSC staff further reported that, during the next licence period, NB Power would implement N294-09 (2014 Update 1) at the PLNGS.

431. CNSC staff provided the Commission with detailed information on NB Power's financial guarantee for the PLNGS, explaining that, as per licence requirements, NB Power submitted its revised PDP, estimated decommissioning costs and proposed financial guarantee to the CNSC in June 2015. CNSC staff further reported that NB Power fulfilled licence requirements in providing annual written reports confirming that the financial guarantee remained adequate to meet decommissioning needs and in updating the PDP every five years. CNSC staff also submitted that the total value of the financial guarantee on March 31, 2016 was $673.1 million, whereas the funding requirement was $555.6 million, and that CNSC reviews showed that the financial guarantee was adequate to meet the decommissioning needs at the PLNGS.

432. The Commission enquired about whether NB Power had established an approximate start date for PLNGS decommissioning. The NB Power representative added that the financial guarantee estimate represented the most conservative scenario with decommissioning starting in approximately 2037, which was based on the shortest potential operating period after refurbishment of 25 years.

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[107] N294-09, *Decommissioning of facilities containing nuclear substances*, CSA Group, 2009; Update 1, 2014.

433. Noting the concern expressed by Greenpeace Canada about the amount of the financial guarantee set aside for nuclear fuel waste management, the Commission requested additional information on this matter. The NB Power representative responded that 33% of the financial guarantee was kept in a segregated account for this purpose. The NB Power representative also advised the Commission that 5% of the decommissioning fund was set aside for the decommissioning of low- and intermediate-level waste. CNSC staff confirmed this information, indicating that this percentage was established by the Nuclear Waste Management Organization and that NB Power met CNSC staff's expectations in this regard.

434. In its intervention, Greenpeace Canada stated the concern that NB Power's submission for this hearing implied that the PLNGS preliminary decommissioning plans relied on the establishment of a long-term nuclear waste storage facility in Ontario for the disposal of its nuclear waste. Noting that such a long-term nuclear waste disposal facility had not yet been approved, Greenpeace Canada expressed concerns about the length of time it may take to approve and construct a long-term waste management facility and submitted that NB Power's PDP required additional scrutiny from the Commission in this regard. The NB Power representative explained that the PLNGS PDP did not make assumptions about the nature of the disposal facility that would be used for fuel, low- and intermediate-level wastes generated at the PLNGS. The NB Power representative further stated that the PDP considered non-specific waste disposal costing assumptions, including the possibility of waste disposal outside of New Brunswick. The NB Power representative also stated that the PDP was flexible, with room to evolve in case of changes to waste disposal conditions or technology. CNSC staff confirmed this information and indicated that NB Power had met planning objectives for the waste disposal component of the PDP at the current PLNGS lifecycle stage and explained that the PDP was a living planning tool that helped CNSC staff assess whether NB Power's financial guarantee was adequate. The explanation satisfies the Commission on this point.

435. Based on this information considered at this hearing, the Commission concludes that the preliminary decommissioning plan and related financial guarantee for the PLNGS are acceptable for the purpose of the current application for licence renewal.

436. The Commission expects NB Power to implement N294-09 (2014 Update 1) during the current licence period, with an implementation plan submitted to CNSC staff as specified in the proposed LCH.

3.18 Cost Recovery

437. The Commission examined NB Power's standing under the *Cost Recovery Fees Regulations*[108] (CRFR) requirements for the PLNGS. Paragraph 24(2)(c) of the NSCA requires that a licence application is accompanied by the prescribed fee, as set out by the CRFR and based on the activities to be licensed.

[108] SOR/2003-212.

438. NB Power submitted that it was in good standing for cost recovery fee payments for the PLNGS, paying these fees quarterly. CNSC staff confirmed the information provided by NB Power, noting that, based on previous performance in this area, CNSC staff did not have concerns over NB Power's payment of future cost recovery fees.

439. Based on the information submitted by NB Power and CNSC staff, the Commission is satisfied that NB Power has satisfied the requirements of the CRFR for the purpose of this licence renewal.

3.19 Nuclear Liability Insurance

440. The Commission notes that NB Power is required to maintain nuclear liability insurance for the PLNGS. CNCS staff submitted that NB Power maintained nuclear liability insurance in accordance with the *Nuclear Liability Act*[109] (NLA) during the current licence period until December 31, 2016, with the *Nuclear Liability and Compensation Act*[110] (NLCA) coming into force on January 31, 2017. CNSC staff reported to the Commission that NRCan, the federal department responsible for the administration of the NLCA, had confirmed that NB Power had satisfied and should continue to satisfy its obligation under the NLCA during the balance of the current licence period and throughout the proposed licence period.

441. With the administration of the NLCA being the responsibility of NRCan rather than the CNSC, the Commission asked about how the CNSC would ensure NB Power's compliance in this regard. The NRCan representative provided the Commission with details about the administration of the NLCA and submitted that a mechanism to immediately inform the CNSC of non-compliances was in place. The Commission was satisfied on this point.

442. Based on the information provided on the record for this hearing, the Commission is satisfied that NB Power has satisfied, and will continue to satisfy, the requirements for the maintenance of nuclear liability insurance under the NLCA. The Commission expects annual updates in the NPP ROR in regards to NB Power's compliance with the NLCA.

3.20 Licence Length and Conditions

443. The Commission considered NB Power's application for the renewal of the current PLNGS operating licence for a period of 5 years. CNSC staff recommended the renewal of the licence for a period of 5 years, until June 30, 2022, submitting that NB Power is qualified to carry on the licensed activities authorized by the licence.

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[109] R.S.C., 1985, c. N-28 (repealed).
[110] S.C. 2015, c. 4, s. 120.

444. In order to provide adequate regulatory oversight of changes that are administrative in nature or less significant and do not require a licence amendment nor Commission approval, CNSC staff recommended that the Commission delegate authority for certain approval or consent, as contemplated in licence conditions that contain the phrase "a person authorized by the Commission," to the following CNSC staff:

- Director, Gentilly-2/Point Lepreau Regulatory Program Division
- Director General, Directorate of Power Reactor Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

445. Noting the implementation schedule for new and updated REGDOCs and standards in the proposed licence and LCH, the Commission enquired about the length of time required for the implementation of the standards and how that reflected on the maturity of NB Power's programs. CNSC staff provided the Commission with detailed information about the implementation of new and updated REGDOCs and standards, and explained that risk and safety significance of a new or updated standard was the primary consideration in determining an implementation schedule. The NB Power representative confirmed to the Commission's satisfaction that NB Power was continuously trying to improve in this regard, provided details on the implementation schedule in the proposed LCH and confirmed the risk-based strategy used to implement updated or new REGDOCs and standards. The Commission expressed its appreciation for the detailed information provided by NB Power and CNSC staff regarding the implementation of new and updated standards and encourages NB Power to continue to implement codes, standards and REGDOCs as soon as feasible at the PLNGS. Upon suggestion from the Commission, CNSC staff confirmed that standard and REGDOC implementation information would be included in the next NPP ROR.

446. The Commission is satisfied with CNSC staff's plans to include NB Power's SOE documentation in the PLNGS LCH under the proposed licence condition 3.1. The Commission reaffirms that, since the SOE is part of the PLNGS licensing basis, any change to the SOE documentation that may reduce safety margins requires Commission approval.

447. The Commission noted that several interventions raised concerns about NB Power not meeting some regulatory requirements and the number of outstanding corrective actions in several SCAs. The Commission asked CNSC staff about the reasonableness of a licence renewal in light of these apparent regulatory compliance issues. CNSC staff acknowledged that there were several areas in PLNGS operations and programs which required improvement. CNSC staff also provided information about the CNSC's comprehensive compliance verification program that continuously monitored a licensee's performance, identifying any compliance issues at the PLNGS and corrective actions that were required to be taken by NB Power. CNSC staff confirmed that corrective actions and compliance issues were considered in a risk-informed manner and that any safety-significant issues were dealt with immediately. The Commission is satisfied with the information provided on this point.

448. The Commission notes the quantity of assessments and analyses that were incomplete or under review during Parts 1 and 2 of this hearing. Although the Commission acknowledges and agrees with CNSC staff's position that not having the final reviews for these analyses is not an impediment to licensing and that the Commission has adequate information to make a well-reasoned and balanced decision, the Commission notes that the availability of this information would allow for the opportunity of increased stakeholder engagement and provide a more complete picture of facility operations. The Commission suggests that more consideration be given to the timing of assessment, analyses and their review by CNSC staff and third parties for future Commission proceedings.

449. The Commission acknowledges the concerns of several intervenors who submitted that the hearing process, while fully complying with the timelines set out in the CNSC *Rules of Procedure*, may not have provided enough time to allow their concerns to be heard and that the PFP resources did not adequately meet the intervenors' needs. The Commission encourages intervenors to take advantage of all of the opportunities provided by the CNSC for public participation including RORs, Commission meetings on specific issues and Commission hearings.

450. The Commission acknowledges that several intervenors recommended that NB Power be issued a licence for a shorter licence period for the PLNGS. The Commission considered the information provided by these licensees and the reasoning for this recommendation including procedural and program maturity, the FA authorization process and other environmental monitoring concerns, and concerns about seismic safety.

451. Based on the information examined by the Commission during the course of this hearing, the Commission is satisfied that a 5-year licence is appropriate for the PLNGS. The Commission accepts the licence conditions as recommended by CNSC staff. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority, and notes that it can bring any matter to the Commission as required.

452. In light of the information provided and the information examined by the Commission for this hearing, the Commission is satisfied that the outstanding corrective actions at the PLNGS are of lower safety significance and are being adequately addressed. The Commission expresses, however, its dissatisfaction at the number of outstanding corrective actions required to be completed by NB Power to meet regulatory requirements and fully expects NB Power to address these issues as soon as practicable. The Commission directs CNSC staff to provide annual updates on the status of the outstanding corrective actions for NB Power during the annual NPP ROR.

4.0 CONCLUSION

453. The Commission has considered the information and submissions of the applicant, CNSC staff and all participants as set out in the material available for reference on the record, as well as the oral and written interventions provided or made by the participants at the hearing.

454. The Commission is satisfied that NB Power meets the test set out in subsection 24(4) of the *Nuclear Safety and Control Act*. That is, the Commission is of the opinion that NB Power is qualified to carry on the activity that the proposed licence will authorize and that it will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

455. Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews the Nuclear Power Reactor Operating Licence issued to New Brunswick Power Corporation for the Point Lepreau Nuclear Generating Station located on the Lepreau Peninsula in New Brunswick. The renewed licence, PROL 17.00/2022, is valid from July 1, 2017 until June 30, 2022.

456. The Commission includes in the licence the conditions as recommended by CNSC staff in CMDs 17-H2 and 17-H2.B. The Commission also delegates authority for the purposes of licence conditions 3.2 and 15.2, as recommended by CNSC staff.

457. The Commission considers the environmental review that was conducted by CNSC staff to be acceptable and thorough. The Commission is satisfied that an EA under CEAA 2012 was not required for the PLNGS licence renewal application and notes that the NSCA provides a strong regulatory framework for environmental protection Further, the Commission is satisfied that NB Power has made, and will continue to make, adequate provision for the protection of the environment and the health of persons throughout the proposed licence period.

458. The Commission notes that CNSC staff can bring any matter to the Commission as applicable. The Commission directs CNSC staff to inform the Commission on an annual basis of any changes made to the Licence Conditions Handbook (LCH).

459. With this decision, the Commission directs CNSC staff to report annually on the performance of NB Power and PLNGS, as part of the annual *Regulatory Oversight Report for Canadian Nuclear Power Plants* (NPP ROR). CNSC staff shall present this report at a public proceeding of the Commission, where members of the public will be able to participate.

460. The Commission expects CNSC staff to continue increased regulatory oversight in the Management System safety and control area, with annual reports to the Commission through the NPP ROR.

461. The Commission appreciates the detailed data provided by CNSC staff and NB Power in the submissions. The Commission suggests future submissions present performance-related trending data in a graphical, rather than tabular, format to more effectively illustrate trends.

462. The Commission suggests that CNSC staff review which Safety Performance Indicators (SPIs) would be of interest to the Commission and to the public and report on these SPIs in the context of the annual NPP ROR.

M. Binder SEP 0 8 2017

Michael Binder Date
President,
Canadian Nuclear Safety Commission

Appendix A – Intervenors

City of Saint John, represented by K. Clifford	17-H2.35
Maliseet Nations of New Brunswick, represented by R. Letica, F. Sabattis and Z. Crafton-McDonald	17-H2.92
Canadian Nuclear Society, represented by P. Ozemoyah, C. Hunt and P. Easton	17-H2.12
Lorneville Mechanical Contractors, represented by S. Dumouchel	17-H2.37
CANDU Owners Group, represented by F. Dermarkar	17-H2.14
Saint John Naturalists' Club Inc., represented by J. Wilson	17-H2.24 17-H2.24A
Passamaquoddy Nation, represented by Chief H. Akagi, W. Nolan and Grand Chief R. Tremblay	17-H2.73
Gordon W. Dalzell	17-H2.25
North American Young Generation in Nuclear, represented by R. Horgan	17-H2.21
International Brotherhood of Electrical Workers, Local 37, represented by R. Galbraith and M. Goddard	17-H2.58
Canadian Nuclear Workers' Council, represented by D. Shier and D. Dixon	17-H2.28 17-H2.28A
Ron Mawhinney	17-H2.31 17-H2.31A
Andrew Dykeman	17-H2.55
Women in Nuclear (Win) New Brunswick, represented by G. Clark and M. Hawkes	17-H2.51
New Brunswick Emergency Measures Organization (NBEMO), represented by G. McCallum and R. Shepard	17-H2.52
Canadian Environmental Law Association and Conservation Council of New Brunswick, represented by K. Blaise	17-H2.93 17-H2.93A
MusquashVolunteer Fire Rescue Department, represented by W. Pollock	17-H2.33
Sunny Corner Enterprises Inc., represented by G. Lavoie	17-H2.13

Intervenors	
Greenpeace Canada, represented by S.-P. Stensil	17-H2.74
SNC Lavalin, represented by R. Whalen	17-H2.57
Mi'gmawe'l Tplu'taqnn Inc. (MTI), represented by K. Barnaby, D. Gorber and K. Narvie	17-H2.45 17-H2.45A
Corporate Research Associates Inc., represented by C. Wight	17-H2.59 17-H2.59A
New Clear Free Solutions, represented by C. Rouse	17-H2.94
Saint John Region Chamber of Commerce, represented by D. Duplisea	17-H2.79
Joseph Valardo	17-H2.65
Black & McDonald Limited, represented by M. Arseneault	17-H2.63
Jason McKay	17-H2.61
Centre for Nuclear Energy Research, represented by W. Cook	17-H2.40
RESD Inc., represented by P. Sedran	17-H2.96
Sipekne’katik, represented by J. Copage	17-H2.76
Leah Belding	17-H2.69
Sunil Nijhawan	17-H2.78
Keith Miller	17-H2.72
Canadian Nuclear Association, represented by J. Barrett and S. Coupland	17-H2.15
PEACE NB, represented by S. Murphy-Flatt	17-H2.95
Marlene Dewar	17-H2.66
Leanna Hickman-Leroy and H. Mawhinney	17-H2.85
Anne Harding	17-H2.89
Town of Rothesay	17-H2.2
Atlantica Centre For Energy	17-H2.3
Wayne Long, Member of Parliament, Saint John-Rothesay	17-H2.4
St. George and Area Food Bank	17-H2.5
Stephen Smith	17-H2.6
New Brunswick Community College	17-H2.8
New Brunswick Mentor Apprentice Probram (NB-MAP)	17-H2.9

Intervenors	
Town of St. George	17-H2.10
Maritime Electric	17-H2.11
David Small	17-H2.16
Joey Baird and some members of the Fundy Bay Senior Citizens' Club Inc.	17-H2.17
Saint John Energy	17-H2.18
Cooke Aquaculture	17-H2.19
Town of Shediac	17-H2.20
Saint John Regional Hospital Foundation	17-H2.22
Rick Doucet, Minister, Energy and Resource Development	17-H2.23
Patty Bent and Richard Young, Campobello VillageMart	17-H2.26
Timothy L. Curry	17-H2.27
TJ Harvey, Member of Parliament, Tobique-Mactaquac	17-H2.29
Fundy Shores School	17-H2.30
John Weir, Point Lepreau Chief Warden	17-H2.32
Mark Wilson, PTech	17-H2.34
Hon. Stephen Horsman, Deputy Premier, Legislative Assembly of New Brunswick	17-H2.36
Atlantic Cancer Research Institute	17-H2.38
Gilles Allain	17-H2.39
J. Smith Excavating	17-H2.41
Joel Levesque	17-H2.43
Saint John Port Authority (Port Saint John)	17-H2.44
J. Curtis Nason	17-H2.46
Town of Quispamsis	17-H2.47
Laurie Comeau	17-H2.48
Faculty of Engineering, Université de Moncton	17-H2.49
HAWK Marketing Service	17-H2.50
New Brunswick's Building Trades Unions	17-H2.53

Intervenors	
Coastal Enterprises Ltd.	17-H2.54
Town of Saint Andrews	17-H2.56
Boilermaker Contractors' Association of Canada	17-H2.60
Dave Wilson	17-H2.62
Jennifer Lennox	17-H2.64
Matt DeCourcey, Member of Parliament, Fredericton	17-H2.67
Association of Professional Engineers and Geoscientists of New Brunswick	17-H2.68
Northern Harvest Sea Farms	17-H2.70
Stéphane Boucher	17-H2.71
Connors Brothers Clover Leaf Seafood Company	17-H2.75
BWXT Canada Ltd	17-H2.77
Lyman Crawford	17-H2.80
Holly Breau	17-H2.81
Eileen Mawhinney	17-H2.82
Local Service District	17-H2.83
Town of Grand Bay-Westfield	17-H2.84
United Way of Central New Brunswick	17-H2.86
Darlene Weir	17-H2.87
Lester and Helen Hyslop	17-H2.88
Construction Association of New Brunswick	17-H2.90
United Way, serving Saint John, Kings and Charlotte	17-H2.91

New Clear Free Solutions

NB Power Licence Renewal Intervention

CNSC Hearing Notice No. 2017-H-02

Submitted by:
Chris Rouse
New Clear Free Solutions

TABLE OF CONTENTS

1.0 OVERVIEW

Please accept this intervention on the licence renewal for the Point Lepreau Generating Station from New Clear Free Solutions.

Our main concern is the 3 previously unknown earthquakes found near Lepreau during the paleo seismic hazard assessment. This assessment was part of the seismic hazard assessment the commission ordered in the 2011 licencing hearings. These earthquakes are larger than what was previously considered as credible. These are REAL earthquakes that have happened, and are no longer just a probability or assumption in a model. We would like to point out that these earthquakes were found to be several thousand years apart and given the timing of the last one another one during the life of Lepreau is most certainly credible. We would like to point out that Ken Burke the seismologist at the 2011 hearings has told the commission that the next significant earthquake would happen near were these earthquakes have been found.

We feel that REAL earthquakes should be given very serious consideration by the commission. One of the biggest lesson learned from Fukushima should be the need to protect the people from the faulty rational that allowed the licencee and regulator in Japan to dismiss the evidence of a REAL tsunami that they found happened in the past and they knew the plant could not withstand.

As a result of these three real earthquakes, the safety of Point Lepreau was re-assessed. The re-assessment found that large release seismic capacity from the previous PSA-Based SMA was over estimated at .42g and was now .35g. This is below the safety goal limit of .4g, and this has not been reported. The rational for this not being reported from NB Power is that they had requested that the CNSC Staff approve the change from.4g to .344g in their methodology and that the CNSC staff have accepted this new safety limit and therefore there is no safety limit exceeded.

It is very concerning that these new earthquakes have been found and NB Power and CNSC staff simply move the safety limit so it is no longer exceeded. This new safety limit is now the same as the core damage safety limit and now the plant has no defense in depth. We would like to remind the commission that the fundamental safety objective is to protect people and the environment from radiation not core damage accidents.

The safety goal limit of .4g was presented in the 2011 licence application by NB Power. The Commission in its reasons for decision also acknowledged the safety limits. The limit is part of the licencing basis and the CNSC staff cannot change them “downward”. There is provision for staff to increase the safety limit but not down. Once a safety limit is defined in the licencing basis it can only be changed by the commission in writing. Even if Staff could change the safety limit the commission should have been made aware of the change.

The main theme of our intervention is transparency. If safety limits are changed to make the plant safe we want it done transparently.

2.0 PSA SAFETY LIMITS AND TARGETS

2.1 Licencing Basis

The licensing basis for Point Lepreau is described in the very first license condition 1.1 which states:

> *"1.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, as defined in CNSC document INFO-0795: LICENSING BASIS OBJECTIVE AND DEFINITION, unless otherwise approved in writing by the Canadian Nuclear Safety Commission Tribunal (hereinafter "the Commission") or a person authorized by the Commission."*

The definition from INFO-0795 states the following:

> *"2. Definition*
>
> *The Licensing Basis for a regulated facility or activity is a set of requirements and documents comprising:*
>
> *(i) the regulatory requirements set out in the applicable laws and regulations*
>
> *(ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence*
>
> (iii) *the safety and control measures described in the licence application and the documents needed to support that licence application."*[1]

2.2 Applicable Laws

Canadian nuclear power plants are required to have safety goal limits and safety goal targets. The requirement for safety goal limits and targets are derived from Article 3, the purpose, of the Nuclear Safety and Control Act (NSCA), which states:

"3 The purpose of this Act is to provide for

> **(a)** the limitation, to a reasonable level and in a manner that is consistent with Canada's international obligations, of the risks to national security, the health and safety of persons and the environment that are associated with the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information; and

[1] http://nuclearsafety.gc.ca/pubs_catalogue/uploads/INFO_0795_E.pdf

(b) the implementation in Canada of measures to which Canada has agreed respecting international control of the development, production and use of nuclear energy, including the non-proliferation of nuclear weapons and nuclear explosive devices"

The requirement for limits is derived from the second word in the purpose "limitation". Canada's nuclear laws are unique in that they prescribes limits on risks. From our experience over the last 6 years it is apparent that CNSC staff and licensees would prefer that there be no limits put on Core Damage Risks and Large Release Risks. While they might like it to be this way, and have taken great steps to confuse the requirements around this area, it will take revisions to the NSCA to get rid of limits as a licensing requirement. As with most rules there are exceptions and the Commission could invoke Article 7 of the NSCA and give an exception to this requirement, but this must be transparently done.

The targets are defined within our international obligations, and specifically the Convention on Nuclear Safety.

"ARTICLE 6. EXISTING NUCLEAR INSTALLATIONS

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact."[2]

Point Lepreau is required to have PSA limits and targets regardless of what any regulatory document or licencee document may state, as this is a requirement of the NSCA. The limits need to be treated as risk based, and the targets treated as risk informed. Exceeding a limit requires regulatory action. This action is required to be reported to be transparent, but does not mean that the reactor needs to be shut down immediately or even if a license should be granted or not. It was suggested by CNSC staff that the whistleblower letter indicated that a license should not have been given because the 5 cases in presented. Examination of the letter would show that the whistleblower letter did not suggest this at all.

[2] https://www.iaea.org/sites/default/files/infcirc449.pdf

Exceeding a limit means that corrective actions must be undertaken to reduce the risk to a reasonable level. When targets are exceeded the licensee must do all practical upgrades to achieve a high level of nuclear safety. This can be risk informed, in that less priority can be given to a target that is just barely not met, but a result that is very close to the limit should be taken much more seriously and cost benefit can be used.

2.3 Licence Application

The current licencing basis is based on the 2011 NB Power licence applications which states following:

> ***"Risk Indicators***
> *Acceptance criteria for the PSA are presented below. The Level 1 limit and goal are presented as a frequency of occurrence, otherwise known as Severe Core Damage frequency (SCDF). The Level 2 limit and goal are presented as a frequency of occurrence, but in this case the term is Large Release Frequency (LRF). For the PSA-Based Seismic Margin Assessment, the limits for the Level 1 and Level 2 PSA are presented in terms of seismic capacity, referred to as the HCLPF (High Confidence Low Probability of Failure), with units of 'g' acceleration due to gravity.*
>
> *For the Internal Events, Fire and Flood PSA, the results at Level 1 and Level 2 are compared to the values listed below. The limit represents a threshold whereby a combined result above the limit would constitute an unacceptable level of risk. The region between the limit and the goal is an area which is acceptable, but efforts are expected to be made to reduce the level of risk on a cost-benefit basis. Achieving a frequency below the goal represents a satisfactory level of risk. For the PSA-Based Seismic Margin Assessment, the limit corresponds to the Review Level Earthquake (RLE), and is a pass or fail threshold against which the resulting plant seismic capacity is compared. In this case, a HCLPF value higher than then the one listed below is satisfactory.*

PSA LEVEL	INTERNAL EVENTS, FIRE AND FLOOD			PSA-BASED SEISMIC MARGIN ASSESSMENT	
	METRIC	LIMIT (Events/Year)	GOAL (Events/Year)	METRIC	LIMIT
LEVEL 1	Severe Core Damage	1E-04	1E-05	HCLPF	0.30g
LEVEL 2	Large Releases	1E-05	1E-06	HCLPF	0.40g

"[3]

[3] E-DOCS-#3794617-v1-CMD_11-H12_1_Written_Submission_from_NB_Power_Nuclear_on_the_Application_for_the_Point_Lepreau_L

In the commissions reasons for decision for the 2011 licencing hearings they quote the large release safety goal of .4g from NB Power and also acknowledge it by indicating they are satisfied that PLNGS meets the required safety goals of .3g for core damage and .4g for large release.

> *"58. NBPN stated that the design basis of the PLNGS is a 0.2g8 earthquake. NBPN further stated the seismic margin assessment determined that there was a high confidence that core damage would be prevented in the event of an earthquake with horizontal ground acceleration as high as 0.3g, which would be expected to occur about once every 10,000 years. NBPN further stated that there is a high confidence that a large release of fission products from containment, estimated to occur less frequently than once every 100,000 years, would be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g. NBPN noted that its assessment approximately corresponds to an earthquake with a magnitude of about 7 to 7.5 on the Richter scale located 30 to 35 km from the PLNGS site, which is not credible for the tectonic plate of New Brunswick. CNSC staff stated that it reviewed and accepted NBPN's seismic margin assessment.*

> *65. Based on the above information, the Commission is satisfied that the PLNGS meets the required safety goals. The Commission is satisfied that the seismic margin assessment has demonstrated with high confidence that core damage would be prevented in the event of an earthquake with horizontal ground acceleration as high as 0.3g, and that a large release of fission products from containment would be prevented for an earthquake with a horizontal ground acceleration of as high as 0.4g. The Commission is satisfied that the safety systems currently in place would safely shut down the reactor in the event of the worst possible earthquake in the region. "*[4]

The large release safety limit of .4g is unquestionably part of the current licencing basis. The licencing basis can only be changed with the *approval in writing by the Canadian Nuclear Safety Commission Tribunal (hereinafter "the Commission") or a person authorized by the Commission. CNSC staff have not been authorized by the commission to change the safety goal limits once they have been defined in the licencing basis.*

CNSC staff can make modification that increase the level of safety of the licencing basis[5], but are not allowed to reduce the level of safety such as lowering a seismic safety goal limit from .4g to .344g. Even if the commission did authorize the staff to change the safety limit they would at a minimum had to informed the commission members of the change which staff have not done.

Until the commission approves in writing the change of the seismic safety goal from .4g downward to .344g the .4g shall apply to the NB Powers PROL. This means that PLNGS is currently operating with a safety limit exceeded, as the current assessment shows PLNGS only has a large release HCLPF of .35g. This is required to have been reported, and to our knowledge has not been done despite our request to NB Power to do so.

NB Power was made aware of three previously unknown earthquakes near PLNGS, that were not previously regarded as credible, and they simply just requested the CNSC staff to change the safety limit when it is not met. This change of LRF safety limit is not mentioned in either NB Powers CMD or CNSC staffs CMD, and the new .344g is presented by CNSC Staff as if it where always the limit. The change in limit is discussed on NB Powers PSA Summary provided on their website.

[4] 2011-12-01-Decision-NBPower-e-Edocs3881211-Final
[5] E-DOCS-_3791996-POINT LEPREAU LCH INFO-DOC GUIDE [NBPN][1]

We request that the commission not approve of the change in large release safety goal limit of .4g to .344g. We request that NB Power be ordered to provide upgrades until the .4g limit is met. At a minimum, we request that the commission approve in writing in its reasons for decision that they approve of the change from .4g to .344g. We ask the commission to do this with the knowledge of the three previously unknown earthquakes found during the paleo seismic study that they ordered. If the limit is changed it must be done transparently and by the commission members.

3.0 TRANSPARENCY

3.1 Seismic Hazard Assessments

To date the Probability Seismic Hazard Assessment (PSHA) and the Paleo Seismic Hazard assessments that the commission ordered NB Power to undergo and make the results public are still not available publicly and have not been tabled to the commission members who ordered the assessments. NB Power has given them to New Clear Free Solutions but we would like to point out that the original draft version we had to use the NB Right to Information Act to get a copy, even though it was Chris Rouse who had originally asked the commission to order the hazard assessment at the 2011 hearings.

We request that all the hazard assessments that have been completed be tabled for the commission member to review for the annual public meeting. We also request that these documents be posted on NB Powers website.

3.2 Participant Funding

PEACE-NB as the principal funding applicant and New Clear Free Solutions as co-applicant applied for participant funding to hire Dr. Robert Kennedy to perform a third-party review of NB Powers Seismic PSA and Seismic Margin Analysis as indicated below.

> "We propose to have NB Powers Seismic PSA and Seismic Margin Analysis (SMA) be third party reviewed by Dr. Robert P. Kennedy from RPK Structural Mechanics Consulting in Oceanside California. This will include a review of the detailed seismic fragility and seismic margin and other documents that can be provided by the applicant. He will provide a written report to the commission that will identify any issues he may find or give confidence to the Commission, the applicant and public that this very important seismic work has been done correctly. He will be available for up to 3 days for the day 2 hearings in May where he can present his report and take questions from the Commission members.

> Dr. Kennedy is one of the most prominent seismic engineers in the industry, and is quoted in or authored almost every seismic guide and publication including the ones used to perform the seismic PSA and SMA for Point Lepreau. The CNSC used his review services before in "RSP-0270 – Comments on existing AECL documents used in the seismic evaluation of the NRU facility and recommended acceptance criteria for a current evaluation of the seismic adequacy of the NRU facility" and "RSP-0255 – Independent review of staff review guides related to engineering aspects of protections against malevolent acts, seismic hazard, external hazards other than seismic, and internal hazards".[6]

Sharon from PEACE-NB was awarded participant funding, but the portion for New Clear Free Solutions, which was to collect the documents needed, was not approved. We have asked both the CNSC and NB Power for the documents Dr. Kennedy needed for his third-party review in which we were not able to attain the documents needed for the review.

We were given reasons of security and third party confidentiality as reasons for not being able to receive the documents. We even stated that we did not want the documents ourselves and suggested that Dr. Kennedy sign a confidentiality agreement, but our requests were still denied. The only document that CNSC Staff and NB Power have available for Dr. Kennedy to review is the PSA summary written by NB Power on their website. In our original request to Dr. Kennedy to perform the third party review we sent a link to the summary provided by NB Power and his response to the summary is as follows:

> *"From: Robert Kennedy <bob@rpkstruct.com>*
>
> *Sent: November 15, 2016 7:38 PM*
>
> *To: 'Chris R'*
>
> *Subject: RE: Seismic Third Party Review*
>
> *Chris:*
>
> *I have reviewed Section 6.4 of Point Lepreau Nuclear Generating Station Probabilistic Safety Assessment – Summary Report 0087-03610-002-001-001-PSA-A-01. Insufficient information is presented in this summary report to enable any meaningful review to be made. I would need detailed seismic fragility and seismic margin documents in order to perform a meaningful review. The cost for an adequate review plus attendance at three days of meetings in Saint John, New Brunswick would be $30,000 CAD which is substantially more budget than you have available. If detailed seismic fragility and seismic margin documents can be made available to me, I am willing to donate up to 8 hours to review these documents to see whether a detailed third party review might be productive.*

[6] Participant Funding Application

Regards

Bob Kennedy

****

Robert P. Kennedy

RPK Structural Mechanics Consulting

7040 Dassia Way

Oceanside, CA 92056

760-295-8050

bob@rpkstruct.com

****

From: Chris R [mailto:Chris_R_31@hotmail.com]

Sent: Monday, November 14, 2016 3:42 PM

To: Bob Kennedy <bob@rpkstruct.com>

Subject: Seismic Third Party Review

Hi Mr. Kennedy

My name is Chris Rouse. You may remember me from 2012 when you reviewed a simplified hybrid seismic calculation performed by NB Power, the operators of the Point Lepreau nuclear generating station, for me and the charity that I was working at the time. Once again myself and many others are very appreciative of you doing that, and the professionalism that you demonstrated in your review. That review was integral to the regulator ordering NB Power to undergo an up to date seismic hazard assessment in 2012.

As part of that seismic hazard assessment NB Power had a paleoseismic study undertaken. The assessment found evidence of 3 historical earthquakes in the vicinity of Lepreau in the range of magnitude 6.5 to 7.0 since the last ice age. The final results of the seismic hazard assessment showed that an earthquake with a return period of 1 in 10,000 years was .58g. This is considerably higher than the .3g HCLPF core damage and .4g large release safety objective used in the previous PSA based SMA from 2008. As a result NB Power committed to redoing to the PSA based SMA and performing a full

seismic PSA, which they just release a summary of the results this Friday, which I have attached.

There are licencing hearings coming up in 2017 for Point Lepreau, and there is $75,000 of participant funding available for public groups to hire expertise that will provide valuable information to the commission members. I would like to apply for some of this money to have you do a technical review of the seismic margin assessment and seismic PSA for the hearings. I think it would be reasonable to get $15 to $20 thousand (Canadian) of that fund for your expert review services, and possibly more. The review would include looking at the attached PSA summary and other documents relating to the seismic PSA and SMA, and generating a written report. Specifically we are concerned if proper methodology has been followed in the selection of the new safety objective (FIRS) and the results of the assessments. You would also be expected to come to Saint John New Brunswick for two or three days in May 2017 to attend the hearings and take questions from the commission members on your report.

Is this something that you would be interested in?

Regards

Chris Rouse"[7]

PEACE NB and New Clear Free Solutions have no interest in wasting Dr. Kennedys time and or participant funding money. We feel it inappropriate to accept any money for a third-party review of a document that the expert has already stated has i*nsufficient information to enable any meaningful review.* As such Sharon from PEACE NB has informed the CNSC participant funding group that she does not wish to proceed with the funding agreement.

New Clear Free Solutions requests the commission obtain the services of Dr. Kennedy to perform the third-party review originally requested by PEACE NB and New Clear Free Solutions in our funding application. We request that he be given all the documents he needs to do the review, and we request to have him answer a list of questions that we provide to him. We request that his review be made public and we request that this review receive public written and oral comments at this years annual public meeting.

[7] Email Correspondence between Chris Rouse and Robert Kennedy

3.3 PSA Based SMA Methodology

One of the documents we requested from NB Power was the new PSA Based SMA methodology, in which we were not able to get. While the methodology for Gentilly II and the original 2008 Lepreau PSA Based SMA methodology have been released publicly by AECL/Candu Energy, we were denied this version. NB Power stated the following:

> *"Action #1 - Follow up if we could provide a copy of the new seismic methodology*
>
> *Our follow up indicates that this is the intellectual property of CANDU. The releasable information on the seismic methodology is provided in the PSA section 6.4 and more specifically 6.4.4 of the public summary that is posted on the website. CANDU conducted a thorough review of the public PSA summary prior to publication. "*[8]

It is the methodology where the CNSC staff are supposed to approve the definition of the safety goals. We strongly object to safety limits being defined in documents that are not accessible to the public. This is a licence renewal not a new licence, and therefore the CNSC staff do not get to change the safety limits as they have already been approved and form part of the licencing basis. This is not transparent or objective. Once the safety goals have already been approved by the CNSC staff and then defined in the licencing basis the power of the CNSC staff to approve a reduction in a safety goal limit is not within their powers. Once defined the limit can only be changed downward by written permission from the commission.

We would also like to complain that the above response came almost 1 week after the deadline for submissions. We were granted an extension but we did not inform NB Power that we received the extension. It seems they must have been notified through the cozy relationship they have with the CNSC staff.

We request that the methodology be made publicly available for public comments for the annual public meeting.

[8] Email From Kathleen Duguay from NB Power

3.4 Letter to Minister Carr

On July 28, 2016, we submitted a letter to the Federal Department of Natural Resources Minister Jim Carr detailing 5 similar cases at Point Lepreau to the 5 cases presented in the alleged whistleblower letter. This letter has never been publicly discussed in front of the commission members. We are submitting this letter as Appendix A and is part of this submission.

The nature of the whistle blower letter and our letter to Minister Carr was about transparency and if the commission members are being given all the required information to make informed decisions. We are very concerned about the review of the whistleblower letter by Peter Elder. We challenge the commission members to re-read Mr Elders review and the whistleblower letter and look for evidence of Mr. Elders claims about the whistleblower letter in the actual letter. You will find Mr. Elder accuses the writers of doing things they did not do such as overstating the importance of the PSA which they did not do.

You will also find the record shows the CNSC staff very politely disagree with him at the public meeting on such things as the requirement of the inclusion of refurbishment configuration in the PSA. It is very concerning that Mr. Elder did not review the reporting requirements around the whistle-blower letter. The core concerns in the letter were not technical in nature but about transparency, reporting, and process.

New Clear Free Solutions requests that an independent outside audit be performed on the reporting requirements around the issues identified by the whistleblower letter and our letter to the Minister. We request that this audit be made public and discussed at the annual public meeting with written and oral comments.