



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

**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  
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## Introduction

1. New Brunswick Power Nuclear Corporation (NBPN) has applied to the Canadian Nuclear Safety Commission<sup>1</sup> (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*<sup>2</sup> (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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<sup>1</sup> 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.

<sup>2</sup> 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*<sup>3</sup>. 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.

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<sup>3</sup> 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*<sup>4</sup> 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.

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<sup>4</sup> 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*<sup>5</sup> 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.

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<sup>5</sup> 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<sup>6</sup>.
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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<sup>6</sup> 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*<sup>7</sup> 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.

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<sup>7</sup> 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<sup>8</sup> 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

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<sup>8</sup> 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<sup>9</sup> 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*

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<sup>9</sup> Hydrofracking refers to the hydraulic fracturing method of extracting natural gas from rock layers below the surface.

*Task Force Report* recommendations<sup>10</sup>. 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

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<sup>10</sup> 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 change.

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<sup>11</sup> 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

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<sup>11</sup> 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*<sup>12</sup> and *N286.5-95*<sup>13</sup> 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

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<sup>12</sup> CSA N286.2-00, Design Quality Assurance for Nuclear Power Plants, Canadian Standards Association, 2000.

<sup>13</sup> 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*<sup>14</sup>.
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*<sup>15</sup>, *N285.5*<sup>16</sup>, and *N287.7*<sup>17</sup>. 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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<sup>14</sup> CNSC Regulatory Standard S-98, "Reliability Programs for Nuclear Power Plants", 2005.

<sup>15</sup> N285.4: Periodic Inspection of CANDU Nuclear Power Plant Components, Canadian Standards Association.

<sup>16</sup> N285.5: Periodic Inspection of CANDU Nuclear Power Plant Containment Components, Canadian Standards Association.

<sup>17</sup> 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*<sup>18</sup>.

#### *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

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<sup>18</sup> 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<sup>19</sup> 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.

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<sup>19</sup> 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*<sup>20</sup>, the *Workers' Compensation Act of New Brunswick*<sup>21</sup>, and the *Workplace Health, Safety and Compensation Commission Act of New Brunswick*<sup>22</sup>. 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.

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<sup>20</sup> CHAPTER O-0.2

<sup>21</sup> CHAPTER W-13

<sup>22</sup> 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*<sup>23</sup> 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.

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<sup>23</sup> 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<sup>24</sup> 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.

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<sup>24</sup> 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*<sup>25</sup>, the *National Building Code of Canada*<sup>26</sup> and the *National Fire Code of Canada*<sup>27</sup>. 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.

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<sup>25</sup> N293-2007, Fire Protection for CANDU Nuclear Power Plants, Canadian Standards Association, 2007.

<sup>26</sup> National Building Code of Canada 2010.

<sup>27</sup> 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<sup>28</sup>.
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.

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<sup>28</sup> 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*<sup>29</sup> and Transport Canada's *Transportation of Dangerous Goods Regulations*<sup>30</sup> 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.

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<sup>29</sup> SOR/2000-208.

<sup>30</sup> 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*<sup>31</sup>. 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<sup>32</sup>.
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

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<sup>31</sup> Regulations for the safe transport of radioactive material : safety requirements — 2005 ed. — Vienna : International Atomic Energy Agency, 2005

<sup>32</sup> 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*<sup>33</sup>. 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.

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<sup>33</sup> 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*<sup>34</sup> and the guidance of CNSC Regulatory Guide *G-219*<sup>35</sup>. Furthermore, the financial guarantee must meet the criteria of CNSC Regulatory Guide

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<sup>34</sup> N294: Decommissioning of Facilities Containing Nuclear Substances, Canadian Standards Association, 2009.

<sup>35</sup> CNSC Regulatory Guide G-219, "Decommissioning Planning for Licensed Activities", 2000.

*G-206*<sup>36</sup>. 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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<sup>36</sup> 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*<sup>37</sup> (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*<sup>38</sup> 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

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<sup>37</sup> S.C. 1992, c. 37

<sup>38</sup> 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*.<sup>39</sup>
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.

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<sup>39</sup> *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*<sup>40</sup>, 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.

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<sup>40</sup> R.S.C., 1985, c. I-5.

232. The Commission asked for more information regarding public access to the PLNGS site. A NBP representative responded that NBP 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 NBP representative further stated that NBP 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. NBP 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.<sup>41</sup> 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<sup>42</sup>, it is of the view that, for a proposed activity such as the one proposed by NBP, 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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<sup>41</sup> *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.

<sup>42</sup> 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<sup>43</sup>. 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<sup>44</sup>. 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.

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<sup>43</sup> CNSC Regulatory Guide C-006 Revision 1, "Safety Analysis of CANDU Nuclear Power Plants", 1999.

<sup>44</sup>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*<sup>45</sup> 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.

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<sup>45</sup> 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<sup>46,47</sup>. 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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<sup>46</sup> 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.

<sup>47</sup> 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  $\mu\text{Sv/h}$ ) 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*<sup>48</sup> (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.

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<sup>48</sup> 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<sup>49</sup> and RD-361<sup>50</sup>, 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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<sup>49</sup> CNSC Regulatory Document RD-321, "Criteria for Physical Protection Systems and Devices at High-Security Sites", 2010.

<sup>50</sup> 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.



Michael Binder  
President,  
Canadian Nuclear Safety Commission

FEB 16 2012

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. Tippet	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, Carleton Place 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