

# Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant Hydro-Québec

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Subject Application to Renew the Gentilly-2 Nuclear  
Generating Station Operating Licence

Dates of Hearing August 16, 2006 and November 7, 2006

## RECORD OF PROCEEDINGS

Applicant: Hydro-Québec

Address: 4900 Bécancour Blvd., Gentilly, Bécancour, Quebec G9H 3X3

Purpose: Application to Renew the Gentilly-2 Nuclear Generating Station Operating Licence

Application received: April 10, 2006

Date(s) of hearing: August 16, 2006 and November 7, 2006

Location: Auberge Godefroy, 17575, Bécancour Blvd.,  
Secteur St-Grégoire, Bécancour, Quebec

Members present: L.J. Keen, Chair  
A. Harvey  
J.G. Paquet

Counsel: Jacques Lavoie  
Secretary: M.A. Leblanc  
Recording Secretary: P. Bourassa

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**Date of Decision:** November 8, 2006

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## **Introduction**

1. Hydro-Québec has applied to the Canadian Nuclear Safety Commission (CNSC<sup>1</sup>) to renew its Operating Licence for Gentilly-2 Nuclear Generating Station (NGS) for a period of four years until December 31, 2010. The current nuclear power reactor operating licence PROL 10.07/2006 expires on December 31, 2006.
2. Gentilly-2 NGS is located on the south shore of the St. Lawrence River about 15 km east of the town of Trois-Rivières, Quebec. The reactor is a CANDU<sup>2</sup> PHW (pressurized heavy water) reactor with a nominal capacity of 675 MW(e) (megawatt electric). The plant began commercial operation on October 1, 1983.
3. The activities that would be carried on under the new licence are the same as those carried on under the current licence. Since the applicant has not proposed any activities related to the possible refurbishment of the plant, the Commission is not required to consider that issue during the hearing.

## Issues

4. In considering the application, the Canadian Nuclear Safety Commission (the Commission) was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*<sup>3</sup> (NSCA) whether:
  - (a) Hydro-Québec is qualified to carry on the activities that the licence would authorize; and
  - (b) whether, in carrying on those activities, Hydro-Québec 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.

## Public hearing

5. In making its decision, the Commission considered information presented in the course of a two-day public hearing held on August 16, 2006, in Ottawa, Ontario, and November 7, 2006, in Bécancour, Quebec. The hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*.<sup>4</sup> The Commission received written submissions and heard oral presentations from Hydro-Québec (CMD 06-H15.1, 06-H15.1A, 06-H15.1B, 06-H15.1C and 06-H15.1D), CNSC staff (CMD 06-H15,

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<sup>1</sup>The Canadian Nuclear Safety Commission is designated as the “CNSC” when reference is to the organization and its staff in general, and as the “Commission” when reference is to the tribunal component.

<sup>2</sup> Canadian Deuterium Uranium.

<sup>3</sup> S.C. 1997, c. 9.

<sup>4</sup> SOR/2000-211.

06-H15.A and 06-H15.B) and 14 intervenors (see the Appendix for a list of intervenors and documents). The Commission notes that, in the context of the licence renewal hearing, it also considered the relevant interventions filed in the hearing on the Environmental Assessment Screening Report for the Proposed Modifications to the Gentilly Radioactive Waste Management Facilities and the Refurbishment and Continued Operation of the Gentilly-2 Nuclear Generating Station until 2035.

### **Decision**

6. Based on its consideration of the matter, as described in greater detail in the following sections of this *Record of Proceeding*, the Commission concludes that Hydro-Québec is qualified to carry on the activity that the licence will authorize and that Hydro-Québec, 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, pursuant to section 24 of the *Nuclear Safety and Control Act*, the Commission issues Nuclear Power Reactor Operating Licence PROL 10.00/2010 to Hydro-Québec, of Montreal, Quebec, for Gentilly-2 NGS. The licence is valid from January 1, 2007, to December 31, 2010.

7. On the recommendation of CNSC staff, the Commission includes in the licence the conditions set out in the draft licence attached to CMD 06-H15.
8. With this decision, the Commission requests that CNSC staff provide the Commission with an annual report on safety performance of the facility at a public proceeding. This interim report will be part of the *Annual CNSC Staff Report on the Safety Performance of the Canadian Nuclear Power Industry*. Having noted a possible space shortage in the waste storage area during the licence period, the Commission expects that the Annual Report will also cover waste storage capacity.

### **Issues and Commission Findings**

9. In making its licensing decision under section 24 of the NSCA, the Commission considered a number of issues relating to Hydro-Québec's qualifications to carry out the proposed activities and the adequacy of the proposed measures for protecting 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.
10. The Commission notes that many of the issues examined are interdependent. As such, the findings of the Commission are based on its consideration of all of the information and submissions placed on record for the hearing.

## **Radiation Protection**

### *Worker Protection*

11. With respect to the protection of workers from radiation, Hydro-Québec identified various examples of improvements made since 2005, building on the experience of top-performing plants. It added resources, set up a workers' committee and reviewed a number of practices. Hydro-Québec also noted that, over the last four years, no worker exceeded the regulatory dose limit.
12. In terms of the ALARA (As Low As Reasonably Achievable) principle, Hydro-Québec reported that the dose reduction program was improved to reduce the annual radiation dose, in particular, internal doses from tritium. Doses are monitored in the daily production meeting, thus ensuring a proactive, rather than reactive, approach.
13. CNSC staff reported that Hydro-Québec's radiation protection program and its implementation at the plant meet CNSC requirements. Hydro-Québec manages its return on operating experience program adequately and monitors doses to personnel under its radiation protection program.
14. The Commission asked how radiation doses to employees are measured and monitored. Hydro-Québec answered that each employee wears a dosimeter that is checked each month. As well, individuals working in the area of the plant subject to radiation also wear a direct-read dosimeter to monitor dose levels on a daily basis.
15. In response to the Commission's request for additional information on the nature of the reportable radiation protection events referred to in CMD 06-H15.1, Hydro-Québec stated that, although unanticipated doses of internal contamination exceeding internal limits for the NGS had occurred in the past, further to investigation, provision was made to prevent a recurrence.
16. In his intervention, Marcel Jetté expressed concern about disclosure by Hydro-Québec to workers concerning all risks related to radiation. Mr. Jetté also referred to the BEIR-VII report published by the U.S. National Academy of Sciences concerning low doses of ionizing radiation, which states that any dose produces a risk.
17. In response to the Commission's request for its viewpoint on BEIR-VII, CNSC staff indicated that the risks of ionizing radiation to workers' lives and health have been the subject of many large-scale studies. CNSC staff explained that various radiation protection committees had considered recent results mentioned by the intervenor and concluded that the risk posed by exposure to ionizing radiation is appropriate and is not underestimated. Based on recent information, the linear dose-response relation used by the International Radiation Protection Commission to set dose limits for workers and the public is considered appropriate. CNSC staff also noted that the documentation shows that the incidence of cancer and other diseases associated with ionizing radiation is no greater in workers exposed to radiation than in the population not involved in those occupational activities.

18. For other viewpoints on this issue, the Commission asked the Direction de Santé publique du Québec whether it could provide additional information. The Direction de santé publique, Agence de la santé et des services sociaux du Québec, reported that a follow-up was currently under way to assess the incidence of cancers and birth defects since 1990. No increase in the incidence of cancers or birth defects was noted within a 20-km radius of Gentilly-2 NGS.
19. The Commission is satisfied that the dose limits for workers and the public are appropriate, based on recent information.

#### *Public Protection*

20. With respect to protection of the public from radiation, Hydro-Québec reported that its environmental monitoring program enables certain ecological receptors entering the human food chain, such as milk, vegetables and fish, to be monitored. The results of the radiological monitoring program also make it possible to assess exposure of the surrounding population to atmospheric emissions and liquid discharges from Gentilly-2 NGS. Estimated doses to the public from liquid and airborne effluents for the years 2003 through 2005 remained less than 1% of the regulatory dose limit of 1 millisievert (mSv) per year, as defined in the *Radiation Protection Regulations*.<sup>5</sup>
21. CNSC staff concurs with Hydro-Québec's environmental monitoring data and noted that the estimated dose to an individual of the critical group was 4.0 microsieverts ( $\mu\text{Sv}$ ). This represents a small fraction of the dose limit to the public, which is 1,000  $\mu\text{Sv}$  (equivalent to 1 mSv) per year.

#### *Conclusions on Radiation Protection*

22. The Commission concludes that, during the current licence period, Hydro-Québec made, and will continue to make, adequate provision for the protection of persons from radiation at Gentilly-2 NGS. The sections of this record dealing with environmental protection and personnel training also cover related areas.

#### **Conventional Health and Safety**

23. With respect to the protection of persons from non-radiological hazards at the plant, Hydro-Québec reported that it continues to improve its industrial safety, as shown by its industrial accident frequency indicator. Hydro-Québec recently reached a milestone: one million hours worked without lost time due to industrial accidents.

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<sup>5</sup> SOR/2000-203.

24. CNSC staff reported that the accident severity rate performance indicator rose in 2002 but subsequently reverted to normal levels, revealing no particular trend. CNSC staff noted continued improvement in the wearing of personal protective equipment.
25. CNSC staff reported that Hydro-Québec had initiated measures to correct a number of issues and concerns raised in inspections carried out during shutdowns. CNSC staff also indicated that it would continue to monitor the non-radiological health and safety program and its implementation. Such measures include auditing the implementation of its respiratory protection program.
26. The intervention by the Canadian Union of Public Employees, locals 957, 1500, 2000 and 4250, stated that one aspect of its mandate is to ensure a healthy, safe environment for Gentilly-2 employees. The intervenor also noted the contribution of its members to the safe, rigorous operation of Gentilly-2 NGS from the outset.
27. Based on this information, the Commission is satisfied that Hydro-Québec made, and will continue to make, adequate provision for the protection of persons from conventional (non-radiological) hazards at Gentilly-2 NGS. The sections of this record dealing with safety culture and personnel training also cover related areas.

### **Environmental Protection**

28. In order to determine whether Hydro-Québec will make adequate provision to protect the environment while carrying out proposed activities at the plant, the Commission considered Hydro-Québec's environmental protection programs and performance.
29. According to Hydro-Québec, the environmental monitoring program currently implemented by management enables the monitoring of various environmental components of the Gentilly site, including air, water, soil and sediments. Program results show that releases are within prescribed limits and that the impacts of operations at Gentilly-2 were not significant for the environment or nearby population.
30. Hydro-Québec noted that Gentilly-2 NGS has been ISO 14001-certified since 2001 and is part of the environmental management system (EMS) of the Office of the Vice-president, Equipment Operation, Hydro-Québec Production and that no record of non-compliance was found in the external registry.
31. From information provided in the assessments, CNSC staff concluded that Gentilly-2's environmental protection program meets the requirements. Following an EMS audit in March 2006, the preliminary report shows that Gentilly-2's EMS covers the key elements of Regulatory Standard S-296.<sup>6</sup> However, the program's implementation reveals deficiencies in terms of policy, planning, resources, surveillance and measurement. Nevertheless, CNSC staff is satisfied that sufficient indicators are in place—including introduction of corrective measures, desire to comply with best practices and

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<sup>6</sup>CNSC Regulatory Standard S-296, *Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills*, March 2006.



strengthening of infrastructures—to lead to better environmental management and performance.

32. CNSC staff also stated that, as part of the physicochemical environmental monitoring program, the results of measured parameters met the standards of the Ministère du Développement Durable, de l'Environnement et des Parcs (MDDEP), except in the case of morpholine. CNSC staff stated that, while five unplanned releases containing excessive levels of morpholine were reported, they had no significant environmental impact.
33. CNSC staff stated that follow-up meetings on the environmental monitoring program, attended by CNSC and MDDEP, show that Gentilly-2 NGS is working to protect the environment and are evidence of its availability and cooperation for the purpose of continually improving the process.
34. In its intervention, Université Laval reported its contribution to the independent environmental monitoring performed for Gentilly-2 NGS. The intervenor also gave evidence of the expertise demonstrated by Hydro-Québec in ensuring rigorous environmental monitoring.
35. The Canadian Union of Public Employees noted the work of members employed at Gentilly-2 NGS to ensure that releases are rigorously tracked, reduced at source and screened to reduce the volume of solid waste produced.
36. Some intervenors, including Mouvement Vert Mauricie and Mr. Jetté, expressed concern over releases of tritium, carbon-14 and other radionuclides which, in their opinion, pose a risk not only under normal operations but even more so in the case of accidents or releases. They also stated that NGS operations compromised the integrity of vital ecosystems for future generations.
37. Owing to its concern over the potential impact of tritium on the environment, the Commission requested additional information on the current situation at Gentilly-2 NGS. Hydro-Québec explained that the layer of tritiated water is due to incineration activities carried out by Atomic Energy of Canada Limited (AECL) in 1970. Hydro-Québec stated that the radioactivity of the layer decreases according to the tritium decay period, that the behaviour of tritium at the site is well understood and that normal monitoring is maintained.
38. In this respect, CNSC staff expressed satisfaction with the annual release report that it receives, the results of which show that releases, including tritium, represent only a small percentage of the regulatory limits.

*Waste Management*

39. Hydro-Québec reported that specific activities to reduce waste volumes were first incorporated into the waste management program in 2002 and enabled the volume of waste transferred to the radioactive waste management area (RWMA) to be reduced. CNSC staff also reported that the program at Gentilly-2 NGS met regulatory requirements.
40. In its intervention, Greenspirit Strategies expressed the opinion that a nuclear plant provides a cleaner, healthier environment than does a similar-scale coal-fired power plant because its operation does not produce the waste associated with the latter.
41. Several intervenors, including Greenpeace, ENvironnement JEUnesse, Mouvement Vert Mauricie and Health Professionals for Global Survival expressed regret that there was no plan or policy in place for the long-term management of radioactive waste generated by activities at the nuclear plant. Greenpeace recommended that the licence include a condition requiring that Hydro-Québec prepare a waste management plan within two years, before a decision would be made on the refurbishment project for Gentilly-2 NGS. Further discussion on this subject may be found in the *Decommissioning and Financial Guarantees* section of this record.
42. While the Commission stated that it was aware of the current issues surrounding long-term radioactive waste management, it also noted that studies had been undertaken to resolve the issue, in particular, by the Nuclear Waste Management Organization (NWMO). Furthermore, the Commission is satisfied that the current regulatory framework, under which nuclear waste producers are responsible for the safe management of their waste, is sufficient for environmental protection purposes. Thus, radioactive waste management is subject to the NSCA and its Regulations, a CNSC Regulatory Standard and the Policy Framework for Radioactive Waste in Canada.
43. Although the Commission is satisfied that Hydro-Québec is fulfilling its responsibility in terms of waste management for the protection of the environment, the Commission is concerned about the possibility that the RWMA used to store radioactive waste from Gentilly-2 NGS does not have the necessary capacity to store all the waste that will be produced during the proposed licence period. On this point, the Commission requires that the annual performance report for Gentilly-2 NGS include a report on the RWMA. The Commission notes that the necessary measures will be implemented to ensure continuing adequate management should the RWMA become unable to store the radioactive waste during the proposed licence period.
44. Based on this information, the Commission is satisfied that Hydro-Québec made, and will continue to make, adequate provision to protect the environment at Gentilly-2 NGS during the proposed licence period.

## **Operating Performance**

45. The Commission studied operating performance at Gentilly-2 NGS as a further indication of Hydro-Québec's qualification to continue operating the plant and, in so doing, provide for the protection of the environment and of the health and safety of persons. The areas of operating performance that the Commission examined are described in the following sections.

### *Organization and Plant Management*

46. Hydro-Québec described its organizational structure by referring to the organization charts of Hydro-Québec's senior management, Hydro-Québec Production and Nuclear Development and Production Projects and then explaining the relationships and communications between the structures. Hydro-Québec also noted that, based on a diagnosis by organization specialists, organizational changes had been made to improve the environmental protection management processes at Gentilly-2. As a result, a new unit dedicated solely to the environment will be put in place.
47. CNSC staff reported that it finds the organization and management structure at the plant to be acceptable, administrative unit duties to be defined and the division of responsibilities among units, as well as personnel responsibilities and authorities, to be documented.
48. Based on this information, the Commission is satisfied that Hydro-Québec has appropriate organization and management structures in place.

### *Conduct of Operations*

49. Hydro-Québec indicated that Gentilly-2 NGS operations ran well in terms of production, owing to quality operations, adequate maintenance and optimal technical surveillance of systems and components.
50. CNSC staff indicated that inspections in the field and in the control room demonstrated that Hydro-Québec met the regulatory requirements. However, CNSC staff noted that a number of remedial or correctives measures proved necessary. While several such measures were performed satisfactorily, others have yet to be implemented. CNSC staff indicated that it is arranging for their follow-up in order to ensure that they are implemented properly. CNSC staff concluded that operations at the plant were conducted safely and adequately during the licence period.
51. The Commission expressed concern that nearly half the events reported to the CNSC related to operations and that a more detailed review of the processes involved in the measures taken by Hydro-Québec was still required. Hydro-Québec responded that CNSC staff had found no serious issues during their special mandate to monitor those activities

in 2005 because Hydro-Québec had made adequate corrective provision. CNSC staff noted that Hydro-Québec had taken adequate measures and arranged for follow-up to ensure that any deficiencies identified would be corrected.

52. With respect to outage management, Hydro-Québec conducted one planned outage in 2003 and another in 2005. In its outage planning, Hydro-Québec noted the high priority given to safety and thus, pre-outage briefing sessions covering aspects of human performance, radiation protection, safety, fire protection and outage work planning were held with all plant personnel. Hydro-Québec noted that special attention was paid to reactor pressure tube and feeder pipe inspection. Thus, in 2003 and 2005, over 97% and 95% respectively of the planned work was performed.
53. CNSC staff reported that the implementation of the shutdown management program meets requirements. However, a follow-up was initiated to examine compliance with procedures related to conventional and radiological safety of workers, as well as to configuration management and operating practices during shutdowns. CNSC staff concluded that Hydro-Québec took measures concerning radiation protection and configuration management, which remain to be verified.
54. The Commission requested explanations of deficiencies that were identified in shutdown inspections and are still unresolved. CNSC staff explained that such deficiencies cannot always be corrected immediately. However, CNSC staff noted that the licensee is required to introduce additional special measures to ensure that the risk posed by such deficiencies does not translate into an undue risk for the NGS operation. CNSC staff notes the progress achieved to date and expresses its overall satisfaction with Hydro-Québec's performance in this area.
55. Since a number of items remain to be corrected, the Commission wondered whether a plan had been developed to ensure that appropriate action would be taken to resolve those deficiencies. CNSC staff then indicated that an adequate implementation plan existed but that the deficiencies did not pose undue risk for NGS operations.
56. In its intervention, Greenpeace noted that the rules governing operability conditions have yet to be defined for Gentilly-2 NGS, which is nearing the end of its operating life. Greenpeace went on to note that, according to the precautionary principle, the Commission should renew the licence for a two-year period only.
57. In this regard, the Commission considered the statement by CNSC staff to the effect that a plant must comply with certain standards and directives in order to operate safely. This matter is discussed in greater detail in the *Structural Integrity* section of this record.
58. The Commission is therefore satisfied that the current regulatory system, which includes the NSCA, related regulations, licences and regulatory documents, is adequate in order to authorize and oversee the activities of a plant nearing the end of its operating life. The Commission notes that, pursuant to section 24 of the NSCA, such activities are authorized only if the applicant possesses the necessary qualifications and makes 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.

59. Based on the above information, the Commission concludes that the conduct of operations at Gentilly-2 NGS was satisfactory during the licence period and will continue to be satisfactory during the proposed licence period.

*Technical Surveillance*

60. With respect to the technical surveillance program, Hydro-Québec noted, among other things, that surveillance of pressure tube and feeder pipe integrity in the Gentilly-2 reactor had, for a number of years, been ensured through a detailed follow-up program. Hydro-Québec stated that it had established an independent major activity review committee to review outage activities deemed at risk and to make recommendations to management on work to be done.
61. Although CNSC staff considers the overall quality management program acceptable, it noted that no inspection specifically targeting the surveillance program was performed during the current licence period. However, regular system inspections include a number of “outputs” from the technical surveillance program.
62. Based on the result of system inspections conducted by Hydro-Québec in 2003 and 2004, CNSC staff noted that deadlines for submitting event reports stipulated in Regulatory Standard S-99<sup>7</sup> were not always met and that deadlines set for resolving recommendations and subsequent follow-up were also missed. CNSC staff concluded that the situation had gradually improved in 2005 and 2006 over that of 2003 and 2004.
63. Hydro-Québec indicated that it always reported the information required pursuant to Standard S-99 and that only 24 information items were reported in 2005.
64. The Commission accordingly asked what the reduction in reportable information might mean. Hydro-Québec responded that the number of reportable events had decreased not because fewer events were reported but because, in fact, fewer had occurred. Furthermore, Hydro-Québec noted the presence of CNSC staff at Gentilly-2 NGS, who also follow up in the matter, thereby confirming reportable events.
65. Based on this information, the Commission concludes that technical surveillance at Gentilly-2 NGS was, and will continue to be, satisfactory during the proposed licence period.

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<sup>7</sup> CNSC Regulatory Standard S-99, *Reporting Requirements for Operating Nuclear Power Plants*, March 2003.

*Conclusions on Operating Performance*

66. Based on the above information and considerations, the Commission concludes that the operating performance at Gentilly-2 NGS provides a positive indication of Hydro-Québec's ability to adequately carry out the proposed activities.

**Performance Assurance**

67. As further indication of Hydro-Québec's qualifications and the adequacy of its protection measures, the Commission examined performance assurance, including quality management, human performance, personnel training and safety culture.

*Quality Management*

68. Hydro-Québec reported that the quality management system for Gentilly-2's operations was reviewed and amended. Also, the Gentilly-2 quality management system was ISO 9001-2000-certified in 2004. Following inspections by CNSC staff in which implementation problems were identified, measures were introduced to resolve the situation. In January 2006, a more regular audit and inspection program was put in place to ensure implementation and ownership of coaching by personnel. In addition, all plant personnel were reminded of the importance of Canadian Standards Association (CSA) standards and of the operating quality management program in fall of 2005.
69. CNSC staff reported that Hydro-Québec's quality assurance program and its implementation met the CNSC's expectations and the CSA N286 series of standards and clause 3.4 of the operating licence. CNSC staff also noted some discrepancies in the program during 2005, specifically in the area of management self-assessment, procedural compliance, document control and preservation of essential files. CNSC staff also noted that the components of the non-compliance process and corrective measures met CSA Standard N286.5-95.
70. In response to the Commission's question about Hydro-Québec's self-assessment capability, CNSC staff noted that this was being followed up and that improvements were proceeding in an acceptable manner. Hydro-Québec mentioned that it had undertaken a review of the self-assessment program in order to improve its quality management coaching in this respect.
71. On the subject of return on operating experience (REX), this program by Hydro-Québec is firmly implemented. Hydro-Québec noted that the internal REX program is based on event analysis, observations on the job and the corrective action program. Management of the external REX program is associated with the CANDU Owners' Group (COG) and the World Association of Nuclear Operators (WANO). Thus, Hydro-Québec continuously provides and receives a return on experience from events, lessons learned and best practices from the world nuclear industry as a whole. According to CNSC staff, Hydro-Québec is managing its REX program well.

72. Because it was concerned with certain quality management deficiencies that were identified but not resolved, as well as other deficiencies discussed under *Shutdown Management* and *Technical Surveillance* in this record, the Commission asked for assurances that Hydro-Québec is adequately managing the deficiencies that were identified and making provision to address them. Hydro-Québec indicated that it had an action plan for this matter and that its quality management system also included continuous quality improvement. Hydro-Québec also noted that, based on its corrective action program, it analyzes events, examines negative trends and, if necessary, introduces an improvement program to remedy them. It also expressed confidence that the measures introduced would correct the deficiencies identified.
73. The Canadian Nuclear Workers Council acknowledged Hydro-Québec's work to ensure continuous improvement, stating that workers at Gentilly-2 NGS are involved in implementing new solutions and locating expertise, in terms of regulations, coaching or work methods, all for the purpose of continuous improvement.
74. The Commission concludes that Hydro-Québec is taking appropriate action to meet CNSC's quality assurance expectations at Gentilly-2 NGS.

#### *Human Performance*

75. As part of its human performance program, Hydro-Québec stated that a number of measures were taken to improve human factors, including the introduction of a documented operations decision-making process, the review and deployment of error-prevention tools, an observation program focusing on improving attitudes and behaviour, the management of control room hours worked and quality assurance inspections. Also, all plant personnel received additional training in human performance, focusing on the importance of communication, leadership and teamwork when performing any activity at the plant. Hydro-Québec also developed and implemented training and an individual approach to minimize the risk of human error.
76. CNSC staff reported that Hydro-Québec's human performance program and its implementation at the Hydro-Québec plant meet expectations. In support of this claim, CNSC staff noted the establishment of an acceptable process for integration of human factors during technical modifications to Gentilly-2 NGS and generally satisfactory results from inspection of the process used to monitor the hours worked by control room personnel.
77. The Commission concludes that Hydro-Québec is taking appropriate measures to meet CNSC expectations concerning human performance at Gentilly-2 NGS.

*Safety Culture*

78. The Commission examined Hydro-Québec's safety culture as an additional factor affecting quality assurance and human performance at Gentilly-2 NGS.
79. Hydro-Québec reported that, some years ago, the Nuclear Production Directorate developed a nuclear safety policy that was revised in 2004. Once these principles were established, the Directorate introduced different key processes over the years to support the concept of a safety culture, including a corrective action program, self-assessments, a REX program, an observation program, peer assessments and benchmarking exercises with the nuclear industry. Hydro-Québec also stated that it watches for trends in practices worldwide to improve operational safety in nuclear plants and pays attention to training programs offered by agencies such as the International Atomic Energy Agency (IAEA) and WANO.
80. CNSC staff found that Hydro-Québec demonstrates a good attitude toward safety and introduces corrective measures for deficiencies identified during inspections. In the opinion of CNSC staff, concrete, clear illustrations of the acceptability of a safety culture may be found at Gentilly-2 NGS.
81. The Canadian Nuclear Workers Council noted that it supports the concept of a safety culture introduced by Hydro-Québec at Gentilly-2 NGS and that that culture has improved considerably over the last 20 years.
82. In response to the Commission's question on its self-assessment of its safety culture, Hydro-Québec indicated that this was based on a standardized methodology developed by the United Service Alliance, which involves checking a number of points in terms of assessing the safety of a nuclear plant. Outside representatives interview employees at every level of the chain of command and prepare a safety assessment report based on those criteria. Hydro-Québec then develops an action plan to implement corrective measures, as required.
83. The Commission is satisfied that Hydro-Québec encourages a positive safety culture at Gentilly-2 NGS.

*Training, Certification and Staffing*

84. The Commission examined personnel training programs and staffing initiatives by Hydro-Québec, which are key factors in the company's qualification to carry out the proposed activities and to maintain its qualifications.
85. Hydro-Québec noted that a systematic approach to training had been applied at Gentilly-2 NGS, in accordance with the requirements.



86. CNSC staff noted that Hydro-Québec had made progress in training. However, training programs under CNSC's "examination transfer" project do not meet regulatory requirements. CNSC staff also reported on training programs for certified and non-certified personnel.
87. With respect to personnel certification, CNSC staff noted that, since the last licence renewal for Gentilly-2, eight new personnel certifications were issued under its operating licence. In 2005, CNSC staff renewed 15 personnel certifications issued in 2000 for a five-year period.
88. The intervention by the Canadian Union of Public Employees referred to the fact that its members working at Gentilly-2 NGS design, distribute and participate in a number of training activities for the purpose of maintaining an adequate worker qualification level at the plant. The intervenor indicated that continuing training is a reality at the plant and includes radiation protection qualification or re-qualification for operating personnel, to which its members are subjected at defined intervals.
89. With respect to staffing, Hydro-Québec noted that, between 2003 and the present, the number of permanent employees remained stable, despite an average retirement of 25 persons per year. Therefore, a strategy was proposed with the corporate support of Hydro-Québec to maintain human resources renewal. The management also has partnership agreements with a number of Quebec universities, including the École Polytechnique of the Université de Montréal, which set up a scholarship program for a Master's of Nuclear Engineering studies a number of years ago. As well, a five-year agreement was signed with the Engineering Department of the Université du Québec à Trois-Rivières regarding reliability studies and, finally, an agreement with Université Laval to maintain expertise in radioecology was extended.
90. In response to a question by the Commission concerning the personnel turnover rate, Hydro-Québec stated that the rate is very low at Gentilly-2 NGS, adding that employees on the latter team are highly motivated.
91. The Commission is satisfied that Hydro-Québec has adequate training programs in place to maintain qualifications and has made adequate efforts to retain and replace employees at Gentilly-2 NGS, during the proposed licence period.

*Conclusions on Performance Assurance*

92. Based on the above information and considerations, the Commission concludes that Hydro-Québec has in place the necessary programs to assure continued acceptable performance at Gentilly-2 NGS.

### **Design Adequacy**

93. Many aspects of safety performance at a nuclear facility are inherent in its design and the ability of its systems to continue to meet the design intent in light of new information, operating experience, revised safety analyses and continuing research on safety issues. In this regard, the Commission examined issues related to safety and to safety analyses.

### *Safety Issues*

94. With respect to standing safety issues that are generic to the CANDU reactor designs, i.e., Generic Action Items (GAIs), CNSC staff noted its satisfaction with the progress made to address those relating to Gentilly-2 NGS. CNSC staff stated that Hydro-Québec completed work on a GAI relating to computer program validation during the current licence period and that the file was closed. Also, Hydro-Québec requested that two GAIs relating to the impact of fuel condition on both safety and uncertainties related to void reactivity positive coefficient predictions during a major loss-of-coolant accident (LOCA) be closed. A review of all GAIs by CNSC staff is under way.
95. Based on this information, the Commission is satisfied that the remaining GAIs do not represent an impediment to granting the proposed licence renewal.

### *Safety Analysis*

96. With respect to Safety Analysis, CNSC staff reported that the comprehensive safety analysis programs and their performance meet CNSC requirements. This conclusion is based on an assessment of various elements, including the effectiveness of the local overpower detection system (LODS), reactor physics practices and computer programs. In February 2005, CNSC staff inspected the safety analysis process and the computer programs used in safety analyses. The inspection team concluded that a quality assurance process was in place for safety analyses and that Hydro-Québec was making satisfactory progress in resolving the problems raised.
97. Hydro-Québec noted that it had continued to provide analyses in response to concerns expressed by CNSC staff in terms of specific actions at the plant and industry-wide generic actions. In 2005, Hydro-Québec issued a new revision of the Safety Report for Gentilly-2 NGS.
98. Some intervenors expressed both concern that Gentilly-2 NGS was nearing the end of its operating life and doubt that it could operate safely during the proposed four-year licence period. More detailed concerns about plant aging were also discussed in the *Structural Integrity* section of this *Record*.

99. The Commission considered the intervenors' concerns, as well as statements by CNSC staff that, in order to compensate for the effect of plant aging, Hydro-Québec monitors its condition and takes corrective action by adjusting the LODS trigger thresholds. CNSC staff noted that Hydro-Québec is proactive in monitoring aging problems by ensuring adherence to safety margins.
100. Based on the above information, the Commission concludes that the Safety Analysis for Gentilly-2 NGS is acceptable for the purpose of licence renewal and that the processes for maintaining the safety analysis are acceptable.

#### *Conclusions on Design Adequacy*

101. Based on the above information, the Commission concludes that the design of Gentilly-2 NGS is adequate for the proposed licence period.

#### **Fitness for Service**

102. The Commission considered whether Hydro-Québec is maintaining critical components fit for service so that key safety structures, systems and components remain effective for the entire duration of the plant's service life. This section includes an examination of Hydro-Québec's maintenance program, the monitoring and maintenance of the structural integrity of key components and the reliability of special safety systems.
103. CNSC staff reported that the physical condition of the components of Gentilly-2 NGS meets the requirements. Based on information from assessments and reviews, CNSC staff states that, overall, Hydro-Québec meets the requirements for program content and implementation for this safety area.

#### *Maintenance*

104. Hydro-Québec reported that, in continuity with its performance improvement program, new elements were put in place to improve the effectiveness of its maintenance programs. It created a multidisciplinary team to prioritize remediation work in accordance with industry standards and created a committee to review the preventive maintenance program on a continuous basis. As well, all instrumentation and control work was brought under a single special safety systems group. Its analyses of the rare cases of unperformed maintenance showed that, over the last few years, these had no impact on equipment availability, thereby maintaining a high level of reliability for the plant.
105. CNSC staff reported that Hydro-Québec has processes and procedures in place at Gentilly-2 for planning and implementing maintenance work. Information on testing and preventive maintenance demonstrated that this work is performed satisfactorily.

*Structural Integrity*

106. CNSC staff noted that Hydro-Québec conducted inspections to ensure that important safety-related equipment operates properly. Whenever an inspection reveals degradation, Hydro-Québec develops strategies to mitigate or resolve the problem. CNSC staff also noted that the program covering repair, replacement or modification work was accepted by the Régie du bâtiment du Québec. The final implementation audit was conducted in June 2006 and the audit report is now being written up.
107. In order to ensure that the pressure boundary of a CANDU NGS is capable of performing its functions, a licensee must, within a 10-year cycle, conduct both regular, periodic inspections and special inspections of pressure boundary components, to determine the state of degradation, aging and wear on pressurized components. For this reason, CNSC staff stated that the operating licence requires that periodic inspection programs be conducted in compliance with CSA Standard N285.4-94. Although the last program review met the requirements of the above standard, significant deficiencies were identified in terms of meeting inspection schedules. As a result, CNSC staff noted that many inspections are delayed and that Hydro-Québec must make a serious attempt to complete them.
108. The Canadian Coalition for Nuclear Responsibility raised the point that pressure tubes, feeder pipes and other pipes in the main cooling circuit of the reactor are damaged, noting that a rapid, progressive, accelerated deterioration process is under way.
109. Following the Commission's request for additional information on the possibility of coolant leakage, Hydro-Québec explained that, in order to ensure that the plant is operated within its boundary, extensive inspection programs were put in place at the reactor face to ensure that feeder pipes are of the required thickness and crack-free.
110. Following the intervention by the Canadian Coalition for Nuclear Responsibility, the Commission asked Hydro-Québec what measures would be taken and what the reaction time would be in the event of a loss of coolant. Hydro-Québec noted that a procedure for this type of event had been established and practised many times. The reactor building would be isolated, the emergency shut-down systems would start up to stop the reaction and an emergency cooling system for the reactor core would ensure fuel cooling at all times.
111. Greenpeace also raised the point that, according to follow-up correspondence, neither Hydro-Québec nor CNSC staff appeared to understand the aging process at Gentilly-2 or its impacts on reactor safety. Greenpeace also expressed deep concern about the condition and safety of the plant's pressure tubes, rapid thinning of the feeder pipes and the fact that the CNSC did not define safety standards for aging pressure tubes or feeder pipes.

112. In response to a question by the Commission, CNSC staff stated that the CNSC has a standards program in place, notably CNSC regulatory documents, IAEA international standards and CSA standards. CNSC staff also noted that the licence refers to a number of standards and requirements.
113. Hydro-Québec noted that all the inspections carried out to date show that the aging process is in line with the conceptual estimates. An inspection program was put in place when cracks and cracking were discovered at Point Lepreau NGS. Also, although the cracking mechanism was not unknown, it was not anticipated for the initial operating cycle of the plant. As a result, Hydro-Québec would not agree to operate the plant in the presence of known significant cracks.
114. Following a number of inspections and special work on the reactor components as part of the refurbishment pre-project, Hydro-Québec noted that the spring tension measurements on the guide tubes of the reactivity mechanism were not as anticipated in the technical specifications. However, an analysis of the results demonstrated that the tubes were fit for service.
115. The Commission requested additional information on the unanticipated measurements in order to ascertain whether the plant's performance was compromised. Hydro-Québec responded that, although the springs had been tensioned during installation, upon checking, no tension remained. Hydro-Québec noted that its demonstration confirmed that the facility's performance is not compromised in this situation, either in terms of regular operation or under an accident scenario.
116. CNSC staff raised the fact that the periodic inspection programs for pressure tubes, steam generator tubes and reactor feeder pipes exceeded the acceptance limits of the construction code originally accepted under CSA Standard N285.4-94. Therefore, they were replaced by fitness-for-service guidelines and aging management programs. The following paragraphs deal with relevant tests in this regard.

#### Pressure Tubes

117. Hydro-Québec noted that, for a number of years, the integrity of pressure tubes from the Gentilly-2 reactor has been monitored via a detailed follow-up program. The position of spacer springs, their repositioning and their stability are continuously checked. In addition, special attention was paid over the last few years to two situations in which the structural integrity of pressure tubes became an issue. In the opinion of CNSC staff, this attention illustrates an acceptable safety culture at Gentilly-2, with the recognition of factors that could compromise pressure tube integrity and the taking of appropriate measures in a timely manner.
118. CNSC staff is satisfied that Hydro-Québec has implemented a management process for fuel channel aging and that a solid technical basis exists for assessing pressure tube fitness for service. Hydro-Québec conducted two planned inspections of the Gentilly-2 channels

and CNSC staff was satisfied that the inspections were adequate and that both the assessments and the documentation of Hydro-Québec's findings were comprehensive.

#### Reactor Feeder Pipes

119. As with the pressure tubes, Hydro-Québec noted that the reactor feeder pipes were extensively monitored, through a thickness measurement program conducted during planned outages, in order to assess more accurately the extent of thinning and future action to be taken, and through a crack detection program, which will continue to be monitored in the next planned outages.
120. CNSC staff noted the thickness measurements taken on the pipes and the crack detection inspections on the pipe elbows and on the Grayloc joint welds at the pipe elbows. Hydro-Québec submitted a fatigue and crack stability analysis prepared by AECL. In testing conducted in preparation for the spring 2006 outage, a number of small cracks were identified on the feeder pipe bend. Based on these data and in order to arrange for preparation of the necessary resources for conducting an extensive inspection operation, Hydro-Québec rescheduled the outage for fall of 2006.
121. Hydro-Québec stated that, further to recent inspections in the fall of 2006, the feeder pipes at Gentilly-2 NGS are adequate and in compliance with industry standards.

#### Steam Generator

122. CNSC staff noted that the steam generators at Gentilly-2 NGS functioned well during the current licence period. Overall, CNSC staff was satisfied that Hydro-Québec's life-cycle management and steam generator assessment strategy, as well as its approach to degradation management, meet the requirements of CSA Standard N285.4-94.

#### *Reliability of Special Safety-related Systems*

123. CNSC staff explained that a licensee operating a nuclear plant must develop and put in place a reliability program to ensure that key safety systems for the plant satisfy design and performance specifications with acceptable reliability at all times. CNSC staff noted that a reliability program focusing primarily on special safety systems is in place at Gentilly-2.
124. CNSC staff indicated that annual reliability reports for 2003, 2004 and 2005 were submitted to the CNSC on March 30, 2004, March 31, 2005, and March 30, 2006, respectively, in accordance with the requirements of Regulatory Standard S-99. CNSC staff also noted that the reliability of key safety systems is detailed in the reports and reflects an acceptable reliability profile. The prescribed tests were conducted properly.

*Equipment Environmental Qualification*

125. The Commission noted that it is important to continually assess and verify that important safety equipment installed in the plant will function as designed in the harsh environments that could arise during accident conditions.
126. In this respect, Hydro-Québec noted that its environmental qualification improvement program was completed in accordance with the closure criteria defined by CNSC staff in the operating licence for Gentilly-2. For this purpose, a safety statement was sent to the CNSC establishing that special safety systems, as well as their support systems, equipment, components, protection barriers and structures can perform their safety roles in defined environmental conditions.
127. CNSC staff was satisfied that Hydro-Québec's environmental qualification program and its implementation meet requirements. CNSC staff also noted that Hydro-Québec has, under its environmental qualification program, developed procedures and instructions closely following current industry standards and practices.
128. The Canadian Coalition for Nuclear Responsibility also expressed concern over the fact that Gentilly-2 NGS is located in an area susceptible to earthquakes and that, should the pipes be weakened, the consequences of an earthquake would be particularly severe. The intervenor pointed out that CANDU plants are not designed for simultaneous breaks at feeder pipe entry and exit points and that the potential for such breaks would increase during an earthquake, given the aging equipment involved.
129. The Commission then asked a Natural Resources Canada seismologist to elaborate on this scenario for Gentilly-2 NGS. Natural Resources Canada identified a recent report by Mr. Galex of Carleton University as being a reliable foundation on which to base engineering specifications concerning seismological events defined for a CANDU reactor. CNSC staff maintained that there was no risk that would require modifications to the plant for the proposed licence period. However, on the issue of refurbishment, Hydro-Québec will have to take additional measures in consideration of new data from those studies.
130. Hydro-Québec noted that, since the scenario described by the intervenor is not considered possible, it is not included in the overall design. Hydro-Québec operates with adequate safety margins to ensure that, both from a seismic point of view and in case of a design accident, a simultaneous break at both the entry and exit points is not a possibility. CNSC staff also stated that the guidelines on assessing equipment fitness for service include undue stress and strain caused by earthquakes.
131. The Commission is satisfied with the environmental qualification process at Gentilly-2 NGS.

*Conclusions on Fitness for Service*

132. Based on the above information, the Commission concludes that Gentilly-2 NGS is fit for service. The Commission notes that fitness for service will be continually reassessed during each maintenance shutdown. It is satisfied with Hydro-Québec's programs for the inspection and life-cycle management of safety-critical systems.

**Emergency Preparedness and Fire Protection**

133. The CNSC requires that licensees, as part of their provisions for protection of persons in the conduct of operations, be prepared to deal effectively with emergencies that may arise.
134. Hydro-Québec noted that emergency measures are in place both at Gentilly-2 NGS and outside it with civil protection and the town of Bécancour. The latter have put in place an external emergency measures plan. Hydro-Québec also noted the relations existing between Hydro-Québec, the municipality of Bécancour and civil protection for the purpose of regularly testing plans via annual exercises held by Hydro-Québec. Also, Hydro-Québec's management actively participates in activities under the nuclear emergency measures plan outside Gentilly-2 NGS, and in activities under the civil protection plan of the municipality of Bécancour. It also supports the municipalities of Bécancour and Champlain in the review of their respective emergency plans.
135. CNSC staff found that the emergency preparedness program at Gentilly-2 NGS exceeded, and that its implementation met, expectations. CNSC staff reported the results of exercises and tests conducted at Gentilly-2 NGS from 2003 to 2006 and the measures and initiatives taken by Hydro-Québec. CNSC staff noted that Hydro-Québec takes the necessary measures to correct issues raised in CNSC inspections and in its own program to manage the emergency measures plan. As a result of its effectiveness and emergency response capability, the program remains one of Gentilly-2's success stories.
136. Mr. Jetté's intervention expressed the view that no adequate public information or evacuation plan exists. Similarly, the Canadian Coalition for Nuclear Responsibility noted in its intervention a need to improve the program in order to ensure that the public was adequately informed and that first responders were prepared. This intervenor was also concerned by the scale of the distribution of potassium iodide pills and their appropriate use.
137. In this respect, Hydro-Québec noted that it participates with the Government of Quebec in emergency measures information campaigns, which cover the use of the iodide pills.
138. The Commission contacted the Ministère de la Sécurité publique to ensure that the emergency measures were generally understood, since the success of such a program is also dependent on outside parties. The Ministère de la Sécurité publique noted that the nuclear emergency measures plan outside Gentilly-2 NGS has been in place for some time



now. The plan is evolving and covers an 8-km radius around the nuclear plant. The Ministère also indicated that various responses were planned in case of a nuclear event, depending on the radiation level.

### *Fire Protection*

139. CNSC staff noted that performance in terms of fire protection is assessed by CNSC staff on the basis of a number of safety aspects, including operating performance, design and analysis, performance assurance, equipment fitness for service and emergency preparedness. Based on inspections conducted by CNSC staff, event reviews and assessments of documents submitted by the licensee, CNSC staff is satisfied that Hydro-Québec's fire protection program meets the requirements.
140. However, CNSC staff also noted a number of deficiencies discovered in inspections during planned NGS outages. CNSC staff expects Hydro-Québec to complete those actions in order to plan and conduct a full program assessment. Although CNSC staff is satisfied that the licensee is qualified to implement, and capable of implementing, the corrective measures required, it will maintain a high level of surveillance over the next licence period.
141. The Commission concludes that emergency preparedness and fire protection at Gentilly-2 NGS are adequate for the purpose of the proposed licence renewal.

### **Security**

142. CNSC staff reported that it actively supervises the physical protection program at Gentilly-2 NGS.
143. CNSC staff concluded that Hydro-Québec has made and will make adequate provision for the protection of the safety of persons and the maintenance of national security.
144. In their interventions, Mouvement Vert Mauricie and Mr. Jetté wondered whether the NGS is well protected and whether the security provisions in place can prevent terrorist attacks.
145. In response to those concerns, the Commission noted that, as a result of the terrorist attacks in the United States on September 11, 2001, it reviewed the need to strengthen security measures at all major nuclear facilities within Canada. These requirements are set out in CNSC Order Number 01-1<sup>8</sup>. The Commission is satisfied that Hydro-Québec has met those requirements and that adequate security arrangements have been made at Gentilly-2 NGS.

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<sup>8</sup> The Commission notes that the *Regulations Amending the Nuclear Security Regulations* entered into force on November 27, 2006. The Regulations were recently amended to include earlier requirements issued under CNSC Order Number 01-1.

146. It is not appropriate for the Commission to discuss security matters in greater detail in a Record of Proceedings such as this, since national and nuclear security information is confidential.
147. The Commission concludes that Hydro-Québec has made and will continue to make adequate provision for ensuring the physical security of Gently-2 NGS.

### **Non-proliferation and Safeguards**

148. Hydro-Québec stated that management respects the commitments signed by Canada concerning the *Treaty on the Non-Proliferation of Nuclear Weapons* nuclear and the enforcement of safeguards. Also, management cooperates fully with the IAEA in achieving its mandate in this area.
149. CNSC staff reported that Hydro-Québec's program for the safeguarding of nuclear material and non-proliferation, as well as its implementation, meets CNSC expectations.
150. Based on this information, the Commission is satisfied that Hydro-Québec has made, and will continue to make, adequate provisions in the areas of safeguards and non-proliferation at Gently-2 NGS to maintain national security and implement the international obligations to which Canada has agreed.

### **Decommissioning and Financial Guarantees**

151. In order to ensure that adequate resources will be available to meet regulatory requirements for safety, environmental protection and security during the future decommissioning of Gently-2 NGS, the Commission requires that adequate plans and financial guarantees for decommissioning and long-term management of waste be put in place and maintained acceptable to the CNSC.
152. Hydro-Québec noted that it ensured that it met its financial obligations with respect to decommissioning costs. For this purpose, Hydro-Québec sent the Government of Quebec a request to review the financial guarantee covering plant decommissioning and long-term irradiated fuel management activities.
153. CNSC staff stated that Hydro-Québec examined and revised preliminary decommissioning plans for the plant and also submitted a written report confirming the validity of the financial guarantees. CNSC staff is currently reviewing the report.
154. In its intervention, Greenpeace expressed the opinion that the financial guarantee was inadequate, as it did not contain a proposal to manage long-term non-fuel waste. In support of its position, Greenpeace cited Regulatory Guide G-206<sup>9</sup> on how to estimate the

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<sup>9</sup> CNSC Regulatory Guide G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*, June 2000.

cost of implementing proposed decommissioning plans, which should take into consideration any decommissioning activities required during operation and after closure.

155. When questioned by the Commission concerning the point raised by Greenpeace, Hydro-Québec explained that it is working with the NWMO to find a long-term radioactive waste management solution. The nuclear plants have therefore made a proposal to the federal government via the Nuclear Waste Management Organization and are currently awaiting a response from the government, ruling on whether the proposed waste management approach is adequate. In the case of non-fuel waste, Hydro-Québec reported that it is working with other facilities to develop solutions that will effectively and safely manage the disposal of that waste.
156. In response to the concerns raised by Greenpeace, CNSC staff noted that the plan submitted by Hydro-Québec for the Gentilly-2 NGS decommissioning pre-project shows that Hydro-Québec would put all waste in short-term storage until 2057. CNSC staff noted that that plan is still under review and that it expects Hydro-Québec to submit an achievable, acceptable, long-term waste management plan. In the meantime, CNSC staff is satisfied with current progress.
157. The Commission requested further details on the current status of the financial guarantee, in terms of safety in the event of plant closure. Hydro-Québec explained that the Government of Quebec guarantees to the CNSC that, in the event of problems with Hydro-Québec, it will take responsibility for the closure or decommissioning of its plant. Also, if Hydro-Québec decides not to undertake the refurbishment of Gentilly-2 NGS, sufficient funds are already provided for to make it possible to meet its commitments and responsibilities and to carry on in a normal manner all activities required to decommission and dismantle the plant.
158. Based on the information received, the Commission concludes that the financial guarantee is adequate but expects CNSC staff to appear before the Commission to make recommendations on the revised financial guarantee. The Commission also expects that the financial guarantee will be reviewed again after a long-term waste management plan is put in place.
159. The Commission concludes that the decommissioning financial guarantee for Gentilly-2 NGS is acceptable for the purpose of the proposed licence renewal.

### **Nuclear Liability Insurance**

160. CNSC staff reported that the insurance coverage of \$75 million, provided to Gentilly-2 by the *Nuclear Insurance Association of Canada* (NIAC), meets the requirements of the *Nuclear Liability Act*.<sup>10</sup> The \$75 million limit, covered by NIAC and its two co-insurers, is set out in policy OF-18, referred to as an operator's form. It remains in effect until cancelled.

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<sup>10</sup> R.S., 1985, c. N-28.

### ***Canadian Environmental Assessment Act***

161. Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act*<sup>11</sup> (CEAA) have been fulfilled.
162. CNSC staff indicated that the application for renewal of the operating licence for Gentilly-2 NGS, pursuant to 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*.<sup>12</sup> In the absence of other triggers that would make the CNSC a concerned authority, CNSC staff asserted that an environmental assessment under the CEAA was not required.
163. The Commission accepts this interpretation of the CEAA by CNSC staff and is satisfied that the requirements of the CEAA with respect to an environmental assessment of the application for licence renewal have been fulfilled.
164. The Commission concludes that no environmental assessment under the CEAA is required for renewal of the operating licence for Gentilly-2 NGS before the Commission may consider and make a decision on the licence renewal application under the NSCA.

### **Public Information Program**

165. Hydro-Québec outlined various aspects of its public information program, allowing it to inform and consult with the public, by meeting with focus groups, holding public meetings with local populations and holding periodic meetings with community representatives.
166. According to CNSC staff, Hydro-Québec's public information program meets the applicable requirements of the *Class I Nuclear Facilities Regulations*<sup>13</sup> and is consistent with CNSC Regulatory Guide G-217, *Licensee Public Information Programs*.
167. The Commission asked Hydro-Québec whether it was satisfied with its communication activities in general. Hydro-Québec noted that it had been disseminating information on operations at Gentilly-2 NGS for quite some time and that the community was generally well informed of the work done there. It undertook to continually inform the public in a number of ways, for example, through its annual report, its information and exchange tables and its information campaigns relating to specific programs and projects, such as the expansion of the storage area, refurbishment and emergency measures.

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<sup>11</sup> S.C. 1992, c. 37.

<sup>12</sup> SOR/94-636.

<sup>13</sup> SOR/2000-204.

168. The intervention from ENvironnement JEUnesse noted the quality of information distributed by Hydro-Québec but also suggested a greater need for discussions on the ethics of nuclear energy, as well as a process allowing face-to-face rather than written communication.
169. The Commission expressed its concern that risk management and understanding needed to be communicated. On this point, the Commission asked ENvironnement JEUnesse for its position on the need for a better understanding of the risk of certain activities. The latter answered that there was a need for science outreach on the topic of nuclear energy and that its agency was working to raise public awareness of environmental, social and economic issues.
170. In its intervention, Greenpeace suggested that, since Gentilly-2 NGS was approaching the end of its operating life, more information should be disclosed on the condition of the reactor.
171. Greenpeace also criticized the absence of a radioactive waste classification system in Canada, which, in its view, poses an obstacle to transparent communication concerning risk in order to measure what might be socially acceptable. Although this subject does not directly relate to the application for renewal of the operating licence for Gentilly-2 NGS, the Commission is of the opinion that a clearer classification system would be useful.
172. The Canadian Coalition for Nuclear Responsibility suggested in its intervention that the Commission has a duty under the NSCA to inform the public on the health and environmental consequences of a loss-of-coolant event. On this point, the Commission stated that discussions during the hearing on the emergency measures program and statements by a number of intervenors from the area highlighted the fact that the populations affected are well informed in the subject.
173. In his intervention, G. Vandal vouched for the openness of Hydro-Québec's communication and information program. A number of intervenors who participated in the Commission hearing on the Environmental Assessment Screening Report for the Proposed Modifications to the Gentilly Radioactive Waste Management Facilities and the Refurbishment and Continued Operation of the Gentilly-2 Nuclear Generating Station until 2035, also expressed satisfaction with Hydro-Québec's public information program.
174. Based on this information, the Commission is satisfied that the public information program operated by Hydro-Québec meets the regulatory requirements and is effective in keeping the public in the vicinity informed of the effects of operations at Gentilly-2 NGS.

### **Licence Duration and Interim Reporting**

175. Hydro-Québec has applied to the CNSC for a four-year renewal of its licence, which would cover normal plant operations before undertaking the refurbishment project planned for 2010.

176. With reference to its criteria for recommending licence duration (as described in CMD 02-M12), CNSC staff recommended that the Commission accept and grant the proposed four-year term.
177. Several intervenors, including Université Laval, G. Vandal, MDS Nordion, the Canadian Union of Public Employees, the Canadian Nuclear Workers Council, the International Federation of Professional & Tech. Engineers, Greenspirit Strategies and the Ordre des ingénieurs du Québec, supported the application by Hydro-Québec and the recommendation by CNSC staff.
178. Other intervenors asked that the licence renewal term be reduced to 12 to 24 months in order to ensure rigorous monitoring of Hydro-Québec's safety performance and in consideration of Gentilly-2 NGS' advanced age.
179. On this point, CNSC staff noted that a compliance program is in place that includes audits and inspections throughout the licence period. These monitoring activities make it possible to identify deficiencies, including those in the quality assurance program, which are documented and followed up until they are corrected satisfactorily. The Commission also noted that CNSC staff is required to report any significant event to the Commission, which then takes regulatory measures to ensure that any remaining deficiency is corrected as quickly as possible.
180. Greenpeace expressed concern over an apparent lack of communication between CNSC staff and the Commission, offering the example of decisions made by staff without the involvement of the Commission. Thus, Greenpeace considers licence renewals good forums in which to obtain information and clarification on certain subjects. On this point, the Commission notes that the public has numerous opportunities to obtain information on a licensee's performance, in the form of interim reports, annual reports and highlight reports, all presented at public meetings of the Commission. The Commission also notes that, while the role of CNSC staff is to make recommendations to the Commission, the latter makes the final decision.
181. The Canadian Coalition for Nuclear Responsibility recommended, in addition to a shorter licence period, that the Commission not license operation at full power, in order to ensure a certain safety level, given the aging of Gentilly-2 NGS.
182. As a result, the Commission asked whether operation at less-than-full power would affect plant safety. Hydro-Québec replied that it would not because the same procedures are applied, regardless of the power level.
183. Certain intervenors recommended that the licence not be renewed. The Commission notes that, pursuant to the NSCA, all nuclear facilities in Canada must be licensed. The Commission's role is to ensure that those facilities are operated safely. The Commission has no mandate concerning nuclear energy policy. Its mandate is to regulate the use of nuclear energy and nuclear substances in order to protect health, safety, security and the

environment and to fulfil Canada's international commitments concerning the peaceful use of nuclear energy.

184. Since NGS licences may be renewed for a period of up to five years, the Commission requested additional information on this shorter four-year period. CNSC staff assured the Commission that a shorter licence period was not based on Hydro-Québec's performance, since CNSC staff is satisfied that the plant's operation is safe for the proposed period. Rather, the recommendation was based on Hydro-Québec's own application and medium-term plans.
185. Because of this, Hydro-Québec reiterated that a four-year period would enable it to reappear before the Commission for licence renewal on a date when it would be in a position to submit a detailed application for approval of the Gentilly-2 NGS refurbishment project.
186. With respect to the interim report, CNSC staff noted that it is preparing every year an *Annual CNSC Staff Report on the Safety Performance of the Canadian Nuclear Power Industry*, which includes Gentilly-2. The report will provide details on ongoing activities that would be authorized under the proposed licence. The report is discussed in a public meeting held each spring.
187. Based on the above information and considerations, the Commission grants a four-year licence. With respect to interim reporting, the Commission requests that CNSC staff present to it an annual safety performance report on Gentilly-2 NGS at a public proceeding. The report shall be part of the *Annual CNSC Staff Report on the Safety Performance of the Canadian Nuclear Power Industry* and shall contain a report on RWMA activities, in order for the Commission to be informed of the facility's capacity to receive radioactive waste generated by operations at Gentilly-2 NGS during the licence period.

## **Conclusion**

188. The Commission has considered the information and submissions of the applicant, CNSC staff and the intervenors, as placed on the record for the hearing.
189. The Commission concludes that Hydro-Québec is qualified to carry out the activities that will be permitted and that, in carrying out those activities, Hydro-Québec 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 the international obligations to which Canada has agreed.
190. Therefore, pursuant to section 24 of the Nuclear Safety and Control Act, the Commission issues Nuclear Power Reactor Operating Licence PROL 10.00/2010 to Hydro-Québec for Gentilly-2 NGS. The licence is valid from January 1, 2007, to December 31, 2010, unless suspended, amended, revoked or replaced.

191. The Commission includes in the licence the conditions recommended by CNSC staff in the draft licence attached to CMD 06-H15.
192. With this decision, the Commission requests that CNSC staff provide the Commission with an annual report on the safety performance of the facility at a public proceeding. This interim report will be part of the Annual CNSC Staff Report on the Safety Performance of the Canadian Nuclear Power Industry and will include detailed information on the capacity of the waste storage area.

Linda J. Keen  
Chair  
Canadian Nuclear Safety Commission

Date of decision: November 8, 2006

Date of release of Reasons for Decision: December 22, 2006



## Appendix – Intervenors

Intervenors	Documents
Department of Chemistry, Université Laval, represented by N. Voyer	CMD 06-H15.2
Grégoire Vandal	CMD 06-H15.3
MDS Nordion, represented by D. McInnes	CMD 06-H15.4 CMD 06-H15.4A
Canadian Union of Public Employees, Locals 957, 1500, 2000 and 4250, represented by S. Bousquet, C. Mailhot, G. Isabelle, G. Manseau and M. Lupien	CMD 06-H15.5
Canadian Nuclear Workers Council, represented by S. Bousquet and C. Mailhot	CMD 06-H15.6 CMD 06-H15.6A
International Federation of Professional & Tech. Engineers, AFL-CIO, CLC, UNI, represented by B. Lawson	CMD 06-H15.7
ENvironnement JEUnesse, represented by S. Bourdon	CMD 06-H15.8
Greenpeace Canada, represented by S.P. Stensil	CMD 06-H15.9 CMD 06-H15.9A
Marcel Jetté	CMD 06-H15.10
Mouvement Vert Mauricie, represented by M. Fugère	CMD 06-H15.11
Canadian Coalition for Nuclear Responsibility, represented by G. Edwards	CMD 06-H15.12 CMD 06-H15.12A
Greenspirit Strategies Ltd.	CMD 06-H15.13
Ordre des ingénieurs du Québec	CMD 06-H15.14
Health Professionals for Global Survival	CMD 06-H15.15