



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant Ontario Power Generation Inc.

Subject Application to Renew the Power Reactor
Operating Licence for the Darlington Nuclear
Generating Station

Public Hearing
Dates December 3 to December 6, 2012

Canada

RECORD OF PROCEEDINGS

Applicant: Ontario Power Generation Inc.

Address/Location: P.O. Box 4000, Bowmanville, Ontario L1C 3Z8

Purpose: Application to renew the Power Reactor Operating Licence for the Darlington Nuclear Generating Station

Application received: June 28, 2011

Dates of public hearing: December 3 to December 6, 2012

Location: Hope Fellowship Church, 1685 Bloor Street, Courtice, Ontario

Members present: M. Binder, Chair R. Velshi
R. J. Barriault M. J. McDill
A. Harvey D.D. Tolgyesi

Secretary: M.A. Leblanc
Recording Secretary: M. Young
Senior General Counsel: J. Lavoie

Applicant Represented By			Document Number
<ul style="list-style-type: none"> • P. Tremblay, Deputy Chief Nuclear Officer • D. Reiner, Senior Vice President, Nuclear Refurbishment • B. Duncan, Senior Vice President, Darlington Nuclear • T. Doran, Vice-President, Nuclear Waste Management Division • L. Swami, Vice President, Nuclear Services • M. Elliott, Chief Nuclear Engineer • J. Peters, Manager, Environmental Assessment, Nuclear Services • K. Powers, Director, Public Affairs • C. Lorencez, Director, Nuclear Safety, Nuclear Engineering • D. Pawlowski, Manager, Social Aspects- Environmental Assessment • J. Coles, Director, Emergency Management & Fire Protection 			CMD 12-H15.1 CMD 12-H13.1A
CNSC staff			Document Number
<ul style="list-style-type: none"> • R. Jammal • G. Rzentkowski • P. Elder • P. Thompson • A. McAllister • L. Sigouin 	<ul style="list-style-type: none"> • P. Elder • P. Webster • R. Lane • P. Jones • D. Howard • P. Adams 	<ul style="list-style-type: none"> • K. Heppell-Masys • M. Rinker • M. Couture • R. Kameswaran • D. Saumure 	CMD 12-H15 CMD 12-H15.A

<ul style="list-style-type: none"> • G. Frappier • D. Newland • D. Wismer 	<ul style="list-style-type: none"> • Y. Akl • A. Blahoianu • B. Barker 		
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Other Representatives
<ul style="list-style-type: none"> • Fisheries and Oceans Canada: T. Hoggarth • Environment Canada : N. Ali and S. Leonardelli • Emergency Management Ontario: A. Stuart, T. Kontra and D. Nodwell • Health Canada: J.-P. Auclair • Durham Nuclear Health Commission Committee: R. Kyle and M.-A. Pietrusiak • Durham Emergency Management Office: I. Ciuciura • Natural Resources Canada: J. Adams • Nuclear Waste Management Organization: S. Russell • Natural Resources Canada : J. Hénault and D. McCauley
Intervenors
See appendix A

Licence: Renewed

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INTRODUCTION

1. This *Record of Proceedings, Including Reasons for Decision* deals specifically with the application by Ontario Power Generation Inc. (OPG) to the Canadian Nuclear Safety Commission¹ for the renewal of the Power Reactor Operating Licence (PROL) for its Darlington Nuclear Generating Station (NGS) located in the Municipality of Clarington, Ontario. Separate *Record of Proceedings, Including Reasons for Decision* documents addressing OPG's application for a Waste Facility Operating Licence renewal for its Darlington Waste Management Facility and the environmental assessment for OPG's proposed refurbishment and continued operation of the Darlington NGS will be published at a later date.
2. The current operating licence for the Darlington NGS, PROL 13.18.2013, expires on February 28, 2013. OPG has applied for the renewal of this licence for a period of 22 months, until December 31, 2014, with the objective of continuing its ongoing operations while preparing the station for refurbishment.
3. The Darlington NGS is located on the north shore of Lake Ontario, east of Toronto. The nuclear facility consists of four CANDU pressurized heavy water reactors and a Tritium Removal Facility.
4. It was requested that the Commission adopt the new licence format and Licence Conditions Handbook (LCH) for the Darlington NGS. The proposed PROL aligns with the CNSC safety and control areas and reflects the new regulatory approach of having an accompanying LCH which describes the compliance verification criteria for each licence condition.

Issue

5. In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*² (NSCA):
 - a) if OPG is qualified to carry on the activity that the licence would authorize; and
 - b) if, in carrying on that activity, OPG 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.

¹ The *Canadian Nuclear Safety Commission* is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.

² Statutes of Canada (S.C.) 1997, chapter (c.) 9.

Public Hearing

6. The Commission, in making its decision, considered information presented at a public hearing held on December 3-6, 2012 in Courtice, Ontario. The public hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*³. During the public hearing, the Commission heard evidence and considered the three applications filed by OPG for the renewal of the PROL for its Darlington NGS, for the renewal of the Waste Facility Operating Licence for its Darlington Waste Management Facility and for the environmental assessment for the proposed refurbishment of the Darlington NGS. The Commission received written submissions and heard oral presentations from CNSC staff and OPG, as well as oral and written submissions from 690 intervenors (see Appendix A for a detailed list of interventions), on all three matters. Written submissions from CNSC staff (CMD 12-H15 and 12-H15.A) and OPG (CMD 12-H15.1) specifically addressed the Darlington NGS licence renewal. Information that was also considered during this hearing pertaining to the licence renewal for the Darlington Waste Management Facility and the environmental assessment for the proposed refurbishment of the Darlington NGS is dealt with in separate *Record of Proceedings, Including Reasons for Decision*.
7. One member of the public requested before the hearing that Commission Member Rumina Velshi recuse herself from the hearing on the basis of her previous association with OPG. During the hearing, the Toledo Coalition for Safe Energy also made such a request. Member Velshi duly considered this request and decided not to recuse herself from these hearings based on the fact that three years had passed since her retirement from OPG and that her activities after the retirement have demonstrated a clear change in professional focus. Member Velshi is satisfied that she has no conflict of interest and that she approached this matter with a fair, impartial and open mind.
8. In its intervention, CCNB Action requested a ruling from the Commission that each Commissioner's decision on the environmental assessment and Darlington NGS operating licence be made public and all requests for ruling be made public. The Commission notes that all of its decisions are made public, and that the *Record of Proceedings, including Reasons for Decision* provides the reasoning behind the Commission's decisions. The Commission notes that, should there be dissent from one or more Commission members from the decision taken by the majority of Commission Members, this would be noted in the *Record of Proceedings*. The Commission also notes that it answered all of CCNB Action's requests and made them public through this *Record of Proceedings*.

Mandate of the Commission

9. The Commission states that it has the independence necessary to fulfill its mandate and that the process in place to obtain the information necessary for making informed decisions is open and transparent. The Commission, as a quasi-judicial administrative

³ Statutory Orders and Regulations (SOR)/2000-211.

tribunal, considers itself independent of all political, governmental or private sector influence in its decision-making.

10. Several intervenors raised questions on the future of nuclear energy in Ontario. In particular, they asked why more consideration is not given to alternatives forms of energy, such as solar or wind power. Others, such as the Canadian Coalition for Nuclear Responsibility, CCNB Action and United Church of Canada, have asked the CNSC to recommend a national public inquiry on the use of nuclear power. The Commission notes that, as the regulatory authority over nuclear matters in Canada, its mandate is not to evaluate alternative energy sources or make energy policy decisions, but to ensure, in accordance with the NSCA, the regulation of the development, production and use of nuclear energy to prevent unreasonable risk to the environment and to the health and safety of persons. The choice of a source of energy or the consideration of economic benefits of a project is not within the Commission's authority. These decisions fall under the purview of other governmental authorities.

DECISION

11. 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 OPG is qualified to carry on the activity that the licence will authorize. The Commission is of the opinion that OPG, 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 the Power Reactor Operating Licence issued to Ontario Power Generation Inc. for its Darlington Nuclear Generating Station located in the Municipality of Clarington, Ontario. The renewed licence, PROL 13.00/2014, is valid from March 1, 2013 to December 31, 2014.

12. The Commission includes in the licence the conditions as recommended by CNSC staff and set out in the draft licence attached to CMD 12-H15 and modified in the supplemental CMD 12-H15.A.
13. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority in the Licence Conditions Handbook (LCH). 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 LCH.
14. The Commission notes that CNSC staff will provide annual reports on the performance of the Darlington NGS as part of the annual safety performance reports on nuclear

power reactors in Canada. CNSC staff shall present these reports at public proceedings of the Commission. Furthermore, the Commission directs OPG to file with the Commission a report detailing all the emergency plans that would be deployed in case of a nuclear emergency, both on and off the Darlington Nuclear site, identifying the authority responsible for its application and describing how the various plans are integrated. OPG shall present this information to CNSC staff in sufficient time as to be part of the next annual progress update on the CNSC Fukushima Action Plan, which is planned for August 2013, at the same time as the annual performance report on nuclear power reactors in Canada.

ISSUES AND COMMISSION FINDINGS

15. In making its licensing decision, the Commission considered a number of issues relating to OPG'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.

Fukushima Action Plan and OPG Follow-up

16. CNSC staff described the Action Plan introduced by the CNSC to further improve the safety of the Canadian nuclear power plants, taking into consideration all lessons learned from the Fukushima Daiichi nuclear accident in Japan that occurred in March 2011. CNSC staff explained that the CNSC Action Plan addresses the findings and recommendations of the CNSC Fukushima Task Force Report published in October 2011 and discharges each within the prescribed timeframe set out in the management response to the Task Force Report. CNSC staff noted that the plan describes the action items to strengthen reactor defence-in-depth, enhance emergency response, improve the regulatory framework and processes, and enhance international collaboration.
17. CNSC staff further explained that, based on the CNSC Action Plan, thirty-six Fukushima Action Items and a timeline for completion were issued to licensees of nuclear power plants to strengthen defence-in-depth and to enhance emergency response. CNSC staff noted that all long-term actions placed on the licensees are to be addressed by December 2015. The Commission notes that the first annual progress update describing the status of the Fukushima Action Items applicable to all the nuclear power plant licensees was presented by CNSC staff to the Commission on August 15, 2012⁴ and that a further update was presented to the Commission at the October 24 and 25, 2012 Commission meeting⁵.
18. To further reduce risk and improve safety as a result of the 2011 Fukushima nuclear accident, OPG is required to take specific measures to confirm and, where necessary, strengthen the ability of the Darlington NGS to withstand accidents that are beyond its

⁴ Refer to the Minutes of the CNSC Meeting held Tuesday and Wednesday, August 14 and 15, 2012.

⁵ Refer to the Minutes of the CNSC Meeting held Wednesday, October 24 and Thursday, October 25, 2012.

design basis.

19. OPG described its response to the Fukushima accident and the CNSC Action Plan. OPG explained that it confirmed that the Darlington NGS is safe and robust, and made improvements and upgrades based on the lessons learned in order to improve safety margins. OPG noted that these improvements included the following:
 - installation of flood barriers to handle excessive rainfall to ensure low-lying safety equipment does not get disabled;
 - installation of passive autocatalytic hydrogen recombiners to mitigate hydrogen build-up and prevent an explosion;
 - implementation of guidelines for managing a severe accident which goes well beyond design-basis, including operator training; and
 - procurement of emergency mitigation equipment to prepare for a potential black-out: portable and flexible diesel-powered pumps with onboard fuel that lasts for 24 hours and diesel generators with onboard fuel to monitor power to the control room.
20. CNSC staff reported that, as of July 31, 2012, out of the 36 action items from the CNSC Action Plan applicable to nuclear power plants, OPG had completed 19 for the Darlington NGS, with seven action items closed, 12 under review by CNSC staff, and 2 not applicable. CNSC staff stated that it is satisfied with the measures undertaken by OPG in responding to the Fukushima accident to date.
21. The Commission is satisfied that OPG has taken measures to confirm and, where necessary, strengthen the safety case of the Darlington NGS to further reduce risk and improve safety, in accordance with the timeline established by CNSC staff. The Commission notes that it expects OPG to complete all of the required actions by the end of December 2015.

Management System

22. The Commission examined OPG's Management System which covers the framework that establishes the processes and programs required to ensure the organization achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.
23. OPG provided information concerning its management system. OPG stated that its Management System fulfills the requirements of Canadian Standards Association (CSA) standards N285.0, *General Requirements for Pressure Retaining Systems and Components in CANDU Nuclear Power Plants* and N286-05, *Management System Requirements for Nuclear Power Plants*, as well as the International Organization for Standardization (ISO) 14000 series of standards, among others.

Quality Management

24. OPG's quality program consists of quality assurance program reviews, internal audits, and management self-assessment. CNSC staff stated that it is satisfied that OPG has an adequate self-assessment program and conducts regular self-assessments of staff performance and activities.

Organization and Change Management

25. 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. OPG is required to submit to the CNSC an annual summary of all organizational changes carried out during the year. CNSC staff reported that OPG complied with this licence condition throughout the licence period and kept the CNSC up to date on specific organizational changes. CNSC staff stated that it is satisfied that OPG has a well-documented and implemented process for change management.

Safety Culture

26. Safety culture is important for creating a safe environment and reducing the likelihood of nuclear events. OPG stated that it has a program in place to promote a healthy safety culture at the Darlington NGS and to maintain the safety of workers, the public and the environment. CNSC staff stated that it is satisfied with the engagement and commitment of OPG in promoting a healthy safety culture at the Darlington NGS.
27. Several intervenors, including the Power Workers' Union, a group of engineering students studying at the University of Ontario Institute of Technology, and the North American Young Generation in Nuclear, Durham Chapter, expressed the view that there is a strong safety culture at the Darlington NGS.
28. CCNB Action, in its intervention, requested a ruling from the Commission that an independent, open to the public, study be done to assess OPG's safety culture before the next licensing hearing for the Darlington NGS. The Commission notes that CNSC staff already evaluates OPG's safety culture as part of its assessment of OPG's management system, and that in CMD 12-H15, CNSC staff indicated that they are satisfied with the engagement and commitment of OPG in promoting a healthy safety culture at the Darlington NGS. The Commission is of the view that this assessment is sufficient to provide the Commission with a proper review of OPG's safety culture. Therefore, no further assessment is necessary.

Conclusion on Management System

29. Based on its consideration of the presented information, the Commission concludes

that OPG has appropriate organization and management structures in place and that the operating performance at the facility provides a positive indication of OPG's ability to adequately carry out the activities under the proposed licence. The Commission is satisfied that OPG's management system meets regulatory requirements.

Human Performance Management

30. Human performance management encompasses activities that enable effective human performance through the development and implementation of processes that ensure the licensee's staff have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

Training

31. A systematic approach to training (SAT) program is necessary to assure personnel are trained and qualified to perform their job. A SAT-based program consists of identification of the knowledge and skills required for a position, development of training objectives, production of a training plan, preparation of training material, and evaluation of the effectiveness of training. OPG stated that it has a well-documented and robust SAT.
32. CNSC staff stated that it was satisfied that OPG's training programs have been designed, developed and managed in accordance with a SAT-based training system. CNSC staff noted that OPG adequately addressed minor deficiencies identified in inspections during the licence period.

Examination and Certification

33. 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. OPG stated that the certified positions at the Darlington NGS include responsible health physicist, authorized nuclear operator, shift manager, and control room shift supervisor. OPG noted that it has approved roles and responsibilities documents for each of the positions requiring certification.
34. CNSC staff stated that its compliance activities provide assurances that the administration of certification examinations, which support initial certification and renewal of certification of plant personnel, meet regulatory requirements and that shift personnel requiring certification have the knowledge and skills to operate the nuclear power plant safely in normal, abnormal and emergency operating conditions. CNSC staff further stated that OPG demonstrated that its certification examination processes and requalification testing for the Darlington NGS met CNSC requirements.

Human Factors

35. OPG stated that it has a documented human performance program at the Darlington NGS. OPG noted that, since 2008, it has carried out a number of initiatives to improve human performance including the provision of links to the corrective action program, and improvements to the investigation and trending of human performance events.
36. Fitness for duty is one factor that affects human performance. OPG stated that it has a fitness for duty program and provides training for supervisors and workers to assist them in identifying behaviours that are inconsistent with being fit for duty. CNSC staff stated that it reviewed OPG's fitness for duty program and found that it meets requirements.
37. Regarding the minimum shift complement, CNSC staff stated that OPG has demonstrated compliance regarding the minimum number of certified staff required in the main control room and in the nuclear facility. CNSC staff noted that OPG has processes in place to ensure compliance with their station shift complement document, and OPG has adhered to the regulatory reporting requirements for staff relating to minimum shift complement. Further, OPG stated that it has several initiatives to recruit engineering, operations and maintenance staff. OPG further stated that it has strategies to retain, develop and plan the succession of employees.
38. Some intervenors, including Provincial Council of Women in Ontario and individuals, expressed concerns regarding the possibility of human error affecting the safe operation of the Darlington NGS. The Commission asked for more information regarding OPG's means of addressing this issue. A representative from OPG described the programs in place for the prevention of human error, including the corrective action and operating experience programs, internal audits, and external third-party reviews. CNSC staff noted that all licensees are required to have a human factors program in place in order to prevent human errors.

Conclusion on Human Performance Management

39. Based on its consideration of the presented information, the Commission concludes that OPG has appropriate programs in place and that current efforts related to human performance management provide a positive indication of OPG's ability to adequately carry out the activities under the proposed licence.

Operating Performance

40. Operating performance includes operating policies, reporting and trending, and application of operating experience that enable the licensee's effective performance, as well as improvement plans and significant future activities.

Conduct of Operations

41. OPG stated that its operational activities are established by its Operating Policies and Principles. OPG explained that the Operating Policies and Principles govern how OPG will safely operate, maintain and modify station systems. CNSC staff reported that, over the licence period, OPG operated the Darlington NGS in conformance with its Operating Policies and Principles and within the reactor power limits prescribed by the current Darlington NGS operating licence.
42. OPG provided information about its outage management. OPG explained that, over the licence period, it undertook planned maintenance outages for each reactor unit as well as for the vacuum building. OPG noted that it informed the CNSC in the event of forced (unplanned) outages, and that the events were of low safety significance. CNSC staff stated that it was satisfied that OPG conducted appropriate follow-up actions for these events, including root-cause analyses and the implementation of corrective actions, and that all outage-related undertakings at the Darlington NGS were performed safely by OPG.
43. CNSC staff reported that OPG had operated the Darlington NGS and Tritium Removal Facility in compliance with the NSCA, regulations and conditions of the operating licence during the licence period.
44. The Commission asked for more information regarding the issue of the accumulation of zebra mussels affecting the operation of certain cooling systems. An OPG representative responded that OPG was using chlorination in order to manage the zebra mussel issue and maintain the flow of water in its cooling system. The OPG representative noted that OPG continues to monitor this area, and that it works with the Ontario Ministry of the Environment to ensure that it meets the applicable requirements and regulations.
45. The Commission, noting that OPG had identified an issue regarding fuel reliability in its submission, asked for more information in this regard. An OPG representative responded that OPG had identified issues with one particular batch of fuel from its fuel manufacturer. The OPG representative explained that, while post-irradiation examinations had not yet been completed, OPG's in-bay examination had led to the conclusion that foreign material was likely the cause of the issue. The OPG representative noted that OPG was working with the fuel manufacturer to look at the manufacturing processes, and noted that it had been operating all four Darlington NGS reactors for the past several months with no issues.
46. The Commission also enquired about the chemistry performance issues identified by OPG. The OPG representative explained that OPG had identified issues with feedwater hydrazine control and corrosion product transport after outages. The OPG representative stated that OPG had addressed the feedwater hydrazine control issue and that it had identified possible solutions for the corrosion issue. The OPG representative

noted that OPG's current overall chemistry performance was excellent.

47. The Commission sought confirmation from CNSC staff that OPG had satisfactorily addressed the identified issues. CNSC staff responded that it was satisfied that OPG had satisfactorily addressed the identified issues.

Event Reporting

48. OPG stated that it has continued to submit reports for the Darlington NGS in accordance with CNSC regulatory standard *S-99, Reporting Requirements for Operating Nuclear Power Plants*⁶. OPG noted that it followed up events with corrective actions and root cause analyses, when appropriate.
49. CNSC staff noted that regulatory document *RD-99.1, Reporting Requirements for Operating Nuclear Power Plants*, is expected to replace S-99 in 2013.
50. The International Institute for Concern for Public Health expressed concerns regarding S-99 reports. The intervenor expressed the view that S-99 reports do not provide clear information to the public and do not explain the safety significance of the events. The Commission asked for clarification on this matter. CNSC staff responded that the overall objective of S-99 reports is for the licensee to report to the CNSC any kind of non-compliance that may occur during normal operation. CNSC staff added that any risk-significant non compliance must be reported within 24 hours. CNSC staff noted that while an S-99 report is not intended as a public communication tool, the Commission and the public would be informed of more significant events in public meetings of the Commission. A representative from OPG noted that OPG presents information for the public on its Web site. The OPG representative further noted that OPG encourages its workers to report events as part of its continuous improvement process.
51. The Commission asked the Power Workers' Union, an intervenor, for its views regarding the reporting culture at the Darlington NGS. A representative of the Power Workers' Union stated that it strongly encourages a reporting culture so that concerns are investigated before they become real incidents. The Power Workers' Union representative noted that workers can go to their supervisors, the joint health and safety committee and their stewards to express any concerns about the safety of the work.

Operating Experience

52. The objective of the OPerating EXperience (OPEX) program is to prevent the recurrence of station and industry events through the effective sharing and use of industry operating experience. OPEX requires the licensee to identify safety significant events, to analyze them and develop corrective actions to prevent recurrence. OPG noted that the CANDU Owner's Group (COG) is the main external interface for OPG

⁶ CNSC Regulatory Standard S-99, *Reporting Requirements for Operating Nuclear Power Plants*, March 2003.

to obtain and submit OPEX information. CNSC staff reported that the OPEX program implemented at the Darlington NGS is acceptable.

Conclusion on Operating Performance

53. Based on the above information, the Commission concludes that the operating performance at the facility provides a positive indication of OPG's ability to carry out the activities under the proposed licence.

Safety Analysis

54. The Commission examined issues related to the program areas of Safety Analysis in order to assess the adequacy of the safety margins provided by the design of the facility. 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.
55. OPG stated that its Nuclear Safety Analysis is comprised of two complementary programs, the Reactor Safety Program and the Risk and Reliability Program. OPG explained that the Reactor Safety Program defines organizational responsibilities and key program elements for the management of issues related to Nuclear Safety Analysis. OPG further explained that the Risk and Reliability Program provides organizational accountabilities, interfaces, and key program elements to ensure risks from nuclear accidents are identified, monitored, and controlled. OPG noted that Probabilistic Risk Assessment (PRA) is used to assess the magnitude of radiological risks to the public from accidents.
56. CNSC staff stated that the Darlington NGS has effective safety analyses that demonstrate the acceptability of the consequences and/or frequency of a wide range of internal and external events. CNSC staff noted that for design basis accidents, OPG's safety analysis has demonstrated the capability of protective systems to adequately control power, cool the fuel and contain the radioactivity that could be released from the plant. CNSC staff further noted that, for beyond design basis accidents, OPG's safety analysis has demonstrated that overall plant risk is acceptably low.

Probabilistic Safety Assessment

57. Probabilistic Safety Assessment (PSA) for a nuclear power plant is a comprehensive and integrated assessment of its safety. The assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a measure of the safety of the plant or reactor.

58. OPG is required to conduct PSAs at the Darlington NGS in accordance with CNSC regulatory standard S-294, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*⁷. OPG is required to develop, periodically review and update their probabilistic safety analysis for the Darlington NGS. The analysis, methodologies and updates are reviewed by CNSC staff against well-accepted international guidance, to ensure compliance with the requirements in S-294.
59. CNSC staff stated that it accepted the PSA methodologies for the Darlington NGS submitted by OPG. CNSC staff noted that it was reviewing the updated assessment results and that it was satisfied with what it had reviewed to date. CNSC staff further noted that it expected to complete its review by the end of 2013.
60. CNSC staff further stated that, under the proposed licence, OPG would be required to implement requirements for a deterministic safety analysis, in addition to probabilistic safety analysis, in accordance with CNSC Regulatory Document RD-310, *Safety Analysis for Nuclear Power Plants*⁸. CNSC staff noted that the implementation strategy is outlined in the licence condition handbook, and that work required to begin the transition to safety analysis compliance with RD-310 is expected to be completed by the end of 2013.
61. Intervenors, including individuals, Greenpeace and the International Institute for Concern for Public Health, expressed concerns regarding the probability of a severe accident under the PSA. CNSC staff cautioned against the intervenors' interpretation of the PSA being used to 'predict' when an accident may occur. CNSC staff explained that, while the PSA includes likelihood of initiating events and the consequences, the PSA is used as a tool to determine design vulnerabilities. CNSC staff noted that OPG is required to mitigate severe accident and malfunction scenarios, considered beyond design-basis, no matter how low the probability of occurrence. CNSC staff explained that the design and emergency response improvements made to the Darlington NGS as part of the response to the Fukushima Action Plan would further enhance the safety of the Darlington NGS under these scenarios.
62. The Canadian Coalition for Nuclear Responsibility, in its intervention, suggested that OPG should use low-void fuel to avoid risk rather than rely on the independent safety systems. The Commission asked whether using the low-void fuel would result in safer operations. CNSC staff responded that while the fuel would reduce a power surge in certain conditions, the overall safety case for using the fuel had not yet been assessed. CNSC staff noted that at a minimum, the low-void fuel would have to meet the existing safety case, which currently meets requirements.
63. Some intervenors, including individuals and the Provincial Council of Women in Ontario, expressed concerns regarding human error as a factor contributing to accidents. The Commission enquired about how this issue is addressed in the safety analysis. A representative from OPG responded that the PSA includes a human

⁷ CNSC regulatory standard S-294, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*, April 2005.

⁸ CNSC Regulatory Document RD-310, *Safety Analysis for Nuclear Power Plants*, February 2008.

reliability assessment, which covers human error, including actions not performed or performed incorrectly. CNSC staff concurred with OPG, noting that the PSA includes maintenance errors, calibration errors and post-accident errors where an operator may not have taken a particular action.

64. Some intervenors expressed concerns regarding seismicity and the impact of an earthquake on the Darlington NGS. The Commission sought further information in this regard. A representative from Natural Resources Canada (NRCAN) provided an overview of seismicity in the region around the Darlington NGS, noting that there is a low seismic hazard in the area. The NRCAN representative explained that the largest possible magnitude of earthquake in the vicinity of the Darlington site would be on the order of a magnitude-6 earthquake approximately 15 kilometres from the site, although an equivalent shaking level could be produced by smaller earthquakes closer to the site or by larger earthquakes further from the site. The NRCAN representative also noted that, based on the seismic hazard analysis, a larger earthquake would only occur further from the site. A representative from OPG confirmed that the Darlington NGS is seismically qualified to withstand the maximum shaking levels described by the NRCAN representative. CNSC staff stated that the seismic hazard in the area is well-understood and noted that recent design improvements would further ensure that the reactor would safely shut down in the event of a severe earthquake.
65. Some intervenors, including Williams Treaties First Nations and individuals, also had concerns regarding induced seismicity from fracking and blasting at the St Marys Cement (St Marys) quarry that neighbours the Darlington Nuclear site. The Commission asked for more information on this matter. The representative from NRCAN stated that, in general, while induced seismicity may increase the frequency of small seismic events, it would not increase the severity. Regarding fracking, CNSC staff stated that the seismic events would be less than a magnitude-2 earthquake. CNSC staff noted that, unlike other provinces such as New Brunswick, there were no known resources along Lake Ontario that would result in the development of such an industry in Ontario.
66. The Commission asked for more information concerning the operation of the St Marys quarry. A representative from OPG responded that OPG has a formal agreement in place with St Marys to ensure that St Marys operations do not result in ground movement greater than three millimetres per second, and noted that St Marys' current operations do not approach that level. The OPG representative further noted that the ground movement would have to be 10 times, or more, greater than three millimetres per second before it could have any effect on the operation of the Darlington NGS.
67. Based on the above information, the Commission is satisfied that the safety systems currently in place, including the improvements implemented in accordance with the CNSC Fukushima Action Plan, would safely shut down the reactor in the event of the worst possible earthquake in the region.
68. In its intervention, CCNB Action requested a ruling from the Commission that it

require all of the PSAs, their methodologies, and screening criteria for the Darlington NGS be independently and publicly peer reviewed during the next licensing period. CCNB Action also requested a ruling from the Commission that probabilistic safety goals be clearly defined and that the licensee be required to be compliant with these safety goals. CCNB Action also requested a ruling from the Commission that it ensure that Darlington PSAs, the PSA methodologies, PSA screening criteria, and CNSC staff's review of the PSAs be made available to the public via the licensee's public information program.

69. The Commission asked OPG for comments on this topic. The OPG representative responded that peer reviews are an extensive part of OPG's operations, as well as self-assessments of various elements of their managed systems, as part of an overall evaluation of plant performance against standards of excellence. OPG also noted that, since security-related information is part of the PSA document, this document cannot be made public. CNSC staff commented that requirements regarding PSAs are part of CNSC regulatory standard S-294, which has been publicly reviewed and is considered a modern, world-class standard and approaches. CNSC staff added that it reviews all of the licensees' detailed models and approach, using external reviewers as needed. For example, NRCan independently reviewed information in PSAs related to seismicity.
70. The Commission notes that the PSAs are already independently reviewed by CNSC staff and other specialists in this area. The Commission also notes that requirements for PSAs are already included in the proposed licence. For these reasons, the Commission is of the view that it has adequately addressed the requests from CCNB Action related to the PSA.
71. CCNB Action also requested a ruling from the Commission on whether or not OPG's 10-year compliance commitment for RD-310, and CNSC staff's acceptance of this commitment, is acceptable. CCNB Action also requested a ruling on whether the Darlington NGS has to be compliant with RD-310 before any of the reactors return to service post-refurbishment.
72. The Commission asked for comments from CNSC staff on this topic. CNSC staff responded that RD-310 is a document pertaining to safety analysis requirements that was issued in 2008. CNSC staff explained that this document was intended to be applied to operating facilities in a gradual fashion because the licensees would have to review and update their safety analysis. CNSC staff further noted that OPG is currently compliant with the current requirements regarding safety analysis, and that RD-310 would provide enhanced safety analysis. CNSC staff stated that it expects the work required to begin the transition to safety analysis compliance with RD-310 is expected to be completed by the end of 2013.
73. The Commission notes that OPG is already compliant with the current safety analysis requirements, that CNSC staff considers the Darlington NGS to be safe, and work required to begin the transition to safety analysis compliance with RD-310 is expected to be completed by the end of 2013. With this information, the Commission therefore

is of the view that the safety analysis requirements have been met for the purpose of this licence renewal. The Commission expects to be provided with an update on this matter during the licensing hearing in 2014.

Safe Operating Envelope

74. The safe operating envelope is a comprehensive set of operational limits and conditions within which the facility must be operated to ensure conformance with the safety analysis.
75. OPG indicated that it was working towards alignment with the requirements of CSA standard N290.15-10, *Requirements for the Safe Operating Envelope of Nuclear Power Plants*⁹. OPG noted that it was implementing its safe operating envelope program in accordance with the scheduled agreed to by CNSC staff. CNSC staff stated that, to date, all required operational safety requirements, instrument uncertainty calculations and compliance tables had been completed, and that all gaps had been identified and prioritized.

Robustness Analysis

76. Robustness analysis covers the adequacy of the analysis and consequence assessments related to a malevolent aircraft crash at a nuclear facility. CNSC staff discussed the new aircraft impact loading functions it had developed in 2011 and its request that OPG carry out a reassessment to resolve residual issues identified at the Darlington NGS. CNSC staff explained that OPG was also to assess beyond-design basis events, which may be bounded by aircraft impact scenarios. CNSC staff stated that OPG had responded that the severe accident management guidelines would address the management and mitigation of large commercial aircraft crash consequences and noted that OPG's submission was under review by CNSC staff.
77. The Commission asked for more information concerning the CNSC review. CNSC staff responded that its review was still ongoing, noting that the analysis would incorporate lessons learned from Fukushima and include modern reactor design information. CNSC staff stated that its overall assessment was expected to be finalized by December 2013.
78. One intervenor suggested that an accident involving a cargo aircraft carrying a large, heavy load should be used as the basis for the robustness analysis. The Commission enquired about this suggestion. CNSC staff responded that its review included the scenario suggested by the intervenor. CNSC staff stated that it was in the process of reviewing larger aircraft and noted that the important factors in this type of analysis include the size, mass and velocity of the aircraft. CNSC staff further stated that the

⁹ Canadian Standards Association, N290.15-10 - Requirements for the safe operating envelope of nuclear power plants, 2010.

existing measures for managing a severe accident would mitigate such an accident.

79. The Commission is satisfied that the measures for managing a severe accident would mitigate an accident involving a large aircraft. The Commission directs CNSC staff to complete its analysis and present its findings at the time of the expected licensing hearing in 2014.

Conclusion on Safety Analysis

80. On the basis of the information presented, the Commission concludes that the systematic evaluation of the potential hazards and the preparedness for reducing the effects of such hazards is adequate for the operation of the Darlington NGS and the activities under the proposed licence.

Physical Design

81. 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.

Plant Design

82. OPG provided information concerning its design programs, including engineering change control, configuration management, design management, fuel, and software programs. OPG explained that the purpose of these programs is to ensure that the Darlington NGS continues to operate within its design basis and safe operating envelope, as well as in compliance with regulatory requirements. OPG further explained that its programs ensure that any changes are planned and designed in accordance with these requirements.
83. OPG outlined a number of design and safety improvements that it had made to the Darlington NGS as a result of its follow-up to the CNSC Fukushima Action Plan, including passive autocatalytic hydrogen recombiners, which can prevent a hydrogen explosion, and additional back-up equipment, such as emergency generators, both on and off-site. CNSC staff stated that it was satisfied with OPG's performance in this regard. CNSC staff also presented a video simulation of the progression of an accident at a CANDU reactor¹⁰, which outlined the operation of the multiple safety systems in place for mitigation in the event of an accident.
84. Several intervenors questioned the use of a single vacuum building as a shared safety

¹⁰ The CNSC video is available to the public via the Internet on the CNSC's YouTube channel at <http://www.youtube.com/cnscccsn>

system for the four reactors at the Darlington NGS. The Commission asked for more information on this subject. A representative from OPG responded that the design of the vacuum building is sufficiently large to contain releases from a multiple-reactor accident. The OPG representative also noted that there are other mitigation measures in place, including independent safety systems for each reactor, as well as the new improvements following the CNSC Fukushima Action Plan, that would prevent the release of radionuclides in the event of a severe accident. CNSC staff stated that redundant, independent safety systems are in place for each reactor and that the use of a single vacuum building in the design of the Darlington NGS was not a safety concern.

85. Some intervenors, including individuals and the Canadian Coalition for Nuclear Responsibility, expressed concerns with the design of the Darlington NGS. Intervenors noted that the CANDU design has a positive void coefficient of reactivity, which was a factor in the Chernobyl nuclear accident in 1986. The Commission asked for more information on this matter and how it had been addressed. CNSC staff responded that the positive void coefficient of reactivity is a well-understood aspect of the CANDU design that does not represent a safety issue because there are independent, engineered safety systems in place to prevent and mitigate the consequences of an accident. CNSC staff stated that there are many differences between the CANDU reactor design and the design of the Chernobyl reactor, and that CANDU reactors are significantly safer due to the design and safety systems. CNSC staff added that there are sufficient safety margins in CANDU reactors to assure safe operation and that the CNSC, through its regulatory oversight, would not allow any operations beyond the design basis of the Darlington NGS. The Commission is satisfied that, with the regulatory and safety measures in place to mitigate and prevent accidents, the positive void coefficient of reactivity in CANDU reactors does not represent a safety issue.
86. Some intervenors questioned the machine/user interface in the plant design, noting that such issues could lead to human error. The Commission asked for more information on this subject. A representative from OPG responded that the system design, including component design and the control room interface, takes this into consideration. OPG's representative further noted the importance of training. CNSC staff noted the importance of incorporating human factors into design, and stated that it was satisfied with OPG's programs in this regard.
87. Some intervenors, noting the important role that control and monitoring software would play in ensuring the safe operation of the facility, questioned whether the software was properly designed and tested. Intervenors suggested that a software glitch or failure to properly respond to reactor conditions could affect safety. The Commission enquired about this matter. A representative from OPG responded that the control and monitoring software used in OPG's nuclear plants must undergo a thorough software quality assurance process in accordance with CSA standards before being implemented. The OPG representative noted that this quality assurance process ensures that the software meets the operating requirements for the reactors.

Pressure Boundary

88. OPG stated that its pressure boundary program provides a managed process for performing repairs, replacements and modifications on pressure retaining systems and components. OPG noted that it complies with CSA N285.0-08, *General Requirements for Pressure Retaining Systems and Components in CANDU Nuclear Power Plants*¹¹. CNSC staff stated that it is satisfied that the Darlington NGS pressure boundary program meets the requirements of CSA standard N285.0 and that OPG's pressure boundary program at the Darlington NGS is acceptable.
89. Some intervenors expressed concerns regarding the thickness of the pressure tubes in the CANDU design compared to other reactor designs. The Commission enquired about this issue. A representative from OPG responded that the pressure tubes and feeder tubes meet all the codes and standards for operation at high temperature and pressure. The OPG representative further noted the tubes are routinely monitored and inspected to ensure that they remain above the minimum thickness required by the design.
90. Some intervenors, including the United Church of Canada, expressed concerns regarding the possibility of a pressure tube pipe cracking or failing. The Commission asked OPG to explain how it addresses this type of issue. An OPG representative stated that the pressure tube pipes and welds were inspected when the pipes were first installed to ensure that they met the proper design specifications. The OPG representative further stated that OPG conducts periodic inspections under its Periodic Inspection Program in accordance with CSA standards and that OPG has a monitoring program to detect leaks. CNSC staff concurred with OPG's description of its programs and noted that pressure tubes are designed to leak before they would break, as the leaks could be detected and action would be taken to address the situation. CNSC staff further noted that samples are taken on an ongoing basis to verify the integrity of the pipes, and that the pipes are currently not near a point at which they may leak or break. CNSC staff further noted that there are safety systems in place to ensure that there would be no impacts on the environment or the public in the event of an unexpected failure.

Conclusion on Physical Design

91. On the basis of the information presented, the Commission concludes that the design of the facility is adequate for the operation period included in the proposed licence.

¹¹ Canadian Standards Association, N285.0, *General Requirements for Pressure Retaining Systems and Components in CANDU Nuclear Power Plants*, 2008.

Fitness for Service

92. Fitness for service covers activities that are performed to ensure the systems, components and structures at the Darlington NGS continue to effectively fulfill their intended purpose. OPG is required to implement periodic inspection programs, in accordance with applicable CSA standards, to monitor the continued fitness for service of nuclear pressure boundary components, containment components and containment structures.

Maintenance

93. OPG stated that its Conduct of Maintenance Program, which includes preventative maintenance, establishes processes to ensure the safety of the public and site personnel, the protection of the environment, and availability of plant equipment for safe and reliable operation through effective implementation and control of maintenance activities. OPG noted that it successfully and safely completed six planned maintenance outages over the licence period, including a full station Vacuum Building Outage in 2009. OPG further noted that it has three maintenance outages planned for the next two years, two in 2013 and one in 2014.
94. CNSC staff stated that it is satisfied that OPG has a well-defined and mature maintenance program at the Darlington NGS. CNSC staff reported that OPG's preventive maintenance completion ratio has been maintained at a satisfactory level over the past four years, and is currently around 92 percent. CNSC staff noted that OPG's performance regarding maintenance backlogs at the Darlington NGS is in the top quartile within the power reactor industry.

Reliability

95. CNSC staff stated that, in order to comply with the requirements of CNSC regulatory document RD/GD-98, *Reliability Programs for Nuclear Power Plants*¹², licensees must develop and implement a reliability program which confirms that the systems important to safety at the plant can and will meet their defined design and performance specifications at an acceptable level of reliability. CNSC staff reported that OPG is in compliance with the requirements of RD/GD-98 at the Darlington NGS. CNSC staff further reported that OPG is in full compliance with the reliability reporting requirements of CNSC regulatory document S-99.
96. The Canadian Coalition for Nuclear Responsibility, in its intervention, raised concerns regarding the availability of shutdown systems. The Commission asked for more information on this matter. A representative from OPG stated that the shutdown

¹² CNSC Regulatory Document, RD/GD-98, *Reliability Programs for Nuclear Power Plants*, June 2012.

systems are routinely tested every day. CNSC staff noted that the statistical availability of the shutdown systems is factored into the PSA and stated that OPG would not be allowed to operate the Darlington NGS if the safety systems were not available.

Environmental Qualification

97. Environmental qualification ensures that all required equipment in a nuclear facility is qualified to perform their safety functions if exposed to harsh environmental conditions resulting from credited Design Basis Accidents and that this capability is preserved for the life of the plant. CNSC staff reported that although OPG's equipment qualification program at the Darlington NGS was below expectations in 2008 and 2009, it became satisfactory in 2010 and has remained satisfactory for the remainder of the licence period. CNSC staff noted that it is satisfied that OPG is compliant with CSA standard *N290.13, Environmental Qualification of Equipment for CANDU Nuclear Power Plants*¹³.

Life Cycle and Aging Management

98. CNSC staff stated that lifecycle management plans are developed for selected systems, structures and components to ensure reliable operation throughout their intended operating lifetime. CNSC staff explained that, when integrated into an overall plant program, lifecycle management plans can be considered to fulfill systems, structures and components specific requirements of the integrated aging management program described by CNSC regulatory document RD-334, *Aging Management for Nuclear Power Plants*¹⁴.
99. OPG stated that it has lifecycle management plans for feeders, pressure tubes, steam generators and all critical power plant systems. CNSC staff reported that OPG's lifecycle management meet the requirements of CNSC regulatory document RD-334.
100. Some intervenors, including individuals and Sierra Club Canada, expressed concerns regarding the possible degradation of concrete in the reactor structures, particularly due to an alkaline silica reaction. The Commission asked for more information on this matter. OPG stated that the alkaline silica reaction was known at the time of the construction of the Darlington NGS, and as such, the silica that could cause this reaction was not used. OPG noted that it regularly inspects the concrete and stated that no degradation has been detected to date.
101. CNSC staff stated that the alkaline silica reaction is a well-known degradation mechanism, which was observed in Hydro-Québec's Gentilly-II NGS, and noted that the CNSC currently has an ongoing research project further examining its effects.

¹³ Canadian Standards Association, *N290.13, Environmental Qualification of Equipment for CANDU Nuclear Power Plants*, 2005.

¹⁴ CNSC Regulatory Document RD-334, *Aging Management for Nuclear Power Plants*, June 2011.

CNSC staff explained that this is one of the reasons that licensees must be compliant with RD-344, concerning aging management for nuclear power plants, and CSA N287.7, *In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants*¹⁵, concerning testing concrete structures for nuclear power plants. CNSC staff added that it is satisfied that OPG conducts regular inspections and testing of concrete and that it is confident that the Darlington NGS does not exhibit any symptoms or any signs of degradation.

102. The Commission asked for more information concerning aging management for containment structures, including the vacuum building. An OPG representative responded that OPG conducts ongoing inspections and tests to ensure that containment structures, components, equipment, seals are not deteriorating. OPG's representative noted that if any degradation were identified, OPG would conduct further investigation to determine what actions would be needed to address the issue.
103. The Commission also asked for more information concerning the neutron overpower methodology. An OPG representative responded that OPG was operating at 100% full power using the methodology that had been accepted by the CNSC for interim use in November 2009. The OPG representative noted that CNSC staff was expected to complete its review of the methodology in 2013¹⁶. The OPG representative further noted that OPG was planning to use a new fuel design to address aging and that OPG would be making a submission to the Commission on this matter in the future.

Conclusion on Fitness for Service

104. The Commission is satisfied with OPG's programs for the inspection and life-cycle management of key safety systems. Based on the above information, the Commission concludes that the equipment as installed at the Darlington NGS is fit for service.

Radiation Protection

105. 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 the Darlington NGS in the area of radiation protection, in accordance with the *Radiation Protection Regulations*¹⁷. The Commission also considered OPG's program to ensure that both radiation doses to persons and contamination are monitored, controlled, and kept as low as reasonably achievable (ALARA), with social and economic factors taken into consideration.

¹⁵ Canadian Standards Association, N287.7-08 - *In-service examination and testing requirements for concrete containment structures for CANDU nuclear power plants*, 2008.

¹⁶ An update on this matter was provided to the Commission in August 2012. Refer to the Minutes of the CNSC Meeting held Tuesday and Wednesday, August 14 and 15, 2012.

¹⁷ SOR/2000-203.

Public Radiation Exposure

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. OPG stated that, over the licence period, the highest estimated radiation dose to the public from all detectable site-related nuclear substances was 0.0013, 0.0007, 0.0006 and 0.0006 millisieverts per year (mSv/y) for the years 2008 to 2011, respectively, which are well below the public dose limit of 1 mSv/y. CNSC staff noted that background dose around the Darlington NGS from natural radiation sources is about 1.400 mSv/y.
107. Many intervenors, including individuals, the International Institute of Concern for Public Health, and Families Against Radiation Exposure, expressed concerns about radiation risks, including the potential health effects associated with exposure to radiation. Some intervenors were of the opinion that the existing regulatory limits were too high and others 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 Darlington NGS 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 an 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. Some intervenors, including Sierra Club Canada and Ontario Chapter, and the Canadian Association of Physicians for the Environment, cited studies, such as the German KiKK¹⁸ study, suggesting that there is an increased risk of leukemia in children living around nuclear power plants. The Commission asked for more information regarding this matter. CNSC staff explained that an expert committee had reviewed the study and determined that there was no relationship between the cluster of

¹⁸ Epidemiological Study of Childhood Cancer and Nuclear Power Plants (KiKK Study), 2007.

childhood leukemia near the Krümmel power plant and radiation exposure, noting that other childhood leukemia clusters were identified in areas that were not near nuclear power plants. CNSC staff referred to other studies, including ones from Finland, Switzerland, France and the UK, that found that there was no relationship between childhood leukemia and radiation exposure near nuclear power plants.

110. The Commission asked if health information was available for the Region of Durham. The Medical Officer of Health for the Region of Durham provided an overview of several studies that had been conducted in the Region of Durham, noting that they did not find any significantly elevated rates of childhood cancers or childhood leukemia. The Medical Officer of Health for the Region of Durham provided information on a 2007 ecological study of the Region of Durham that looked at 18 types of cancer, five types of congenital anomalies and still births at certain time periods around the start-up of the Pickering NGS and Darlington NGS. A public health epidemiologist from the Region of Durham stated that the results of the 2007 study did not indicate any significantly elevated rates of cancer, specifically childhood cancers, including leukaemia. The Medical Officer of Health for the Region of Durham commented that there are many factors within a population, such as socioeconomic status, that can affect health.
111. Based on the information provided during the hearing, and the Commission's understanding of studies conducted by the United Nations Scientific Committee on the Effects of Atomic Radiation and other international and peer-reviewed scientific publications and research, the Commission is satisfied that the existing regulatory limits are protective of all members of the public, including infants. The Commission is satisfied that there is no increased risk to a member of the public from radiation exposure resulting from the operation of the Darlington NGS.

Worker Radiation Exposure

112. OPG described the radiation protection program at the Darlington NGS and provided a summary of the doses to workers over the licence period. OPG 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. OPG stated that the maximum individual annual dose over the licence period was 15.74 mSv. OPG noted that it implemented several improvements over the licence period, such as improved shielding, work equipment, and real-time monitoring, in line with the ALARA (As Low As Reasonably Achievable) principle.
113. OPG stated that it operates external and internal dosimetry services which are licensed from the CNSC separately from the Darlington NGS PROL. OPG noted that these services are used to monitor, assess, record and report doses of ionizing radiation received by employees, visitors and contractors as a result of activities at the Darlington NGS. CNSC staff stated that it is satisfied that the radiation protection

program at the Darlington NGS employs a CNSC-licensed dosimetry service that provides dosimetry commensurate with the hazards faced by workers.

114. CNSC staff stated that OPG has an effective radiation protection program that protects the health and safety of persons inside the facility and that ensures that occupational exposures are below regulatory dose limits and are maintained ALARA.
115. The International Institute for Concern for Public Health noted an event that occurred during the refurbishment of Bruce Power's Bruce A NGS where workers were unexpectedly exposed to alpha radiation, and questioned whether the lessons learned from this event had been applied at other nuclear generating stations. The Commission asked for more information concerning the protection of workers for outage work and the implementation of lessons learned from this event. An OPG representative responded that OPG uses planning, as well as training plans and procedures, to ensure that the workers have that operating experience for maintenance outages or any significant work. An OPG representative noted that one key lesson learned was to rehearse the work in advance of working on the unit. Regarding the alpha event in particular, CNSC staff stated that the CNSC developed requirements that were implemented by each power reactor licensee.
116. The Commission also asked for more information regarding the tracking of dose information for workers. CNSC staff responded that the dose is monitored and tracked for every individual worker of nuclear facilities in Canada, including contract workers, and sent to Health Canada's (HC) National Dose Registry. CNSC staff noted that the long-term monitoring data is also analyzed and used for health studies.

Conclusion on Radiation Protection

117. 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, OPG will provide adequate protection to the health and safety of persons, the environment and national security.

Conventional Health and Safety

118. Conventional health and safety covers the implementation of a program to manage workplace safety hazards. The conventional health and safety program is mandated by provincial statutes for all employers and employees to minimize risk to the health and safety of workers posed by conventional (non-radiological) hazards in the workplace. This program includes compliance with the applicable labour codes and conventional safety training.
119. OPG stated that the goal of its conventional safety program is to ensure that workers work safely in a healthy and injury-free workplace by managing the risks associated

with the activities, products and services of OPG's operations. OPG noted that it reduces risks by following operational controls that were developed using risk assessment and safe work planning. OPG further stated that it has two Joint Health and Safety Committees that work to identify and recommend solutions to health and safety problems in the workplace. OPG explained that it evaluates all conventional safety-related events through its corrective action process to identify potential trends and areas for improvement. OPG also provided information regarding its occupational health and safety performance over the licence period, noting that it had two lost-time injuries during the licence period, in May 2008 and March 2012.

120. The Commission notes that the employees involved in the nuclear aspect of energy production employed by Ontario Hydro (OPG) fall under federal jurisdiction, and the jurisdiction over Occupational Health and Safety (OHS) for these employees will therefore be federal. The OHS of OPG workers that are not involved in the nuclear aspect of energy production will fall under provincial jurisdiction¹⁹. In some provinces, however, federal legislation has incorporated by reference provincial labour laws, and it is therefore the provincial requirements that apply to employees at nuclear works and undertakings. It is necessary to look at the individual instances of nuclear energy workers to determine whether federal or provincial OHS laws will apply. In Ontario, the Ontario Hydro Nuclear Facilities Exclusion from Part II of the Canada Labour Code Regulations (Occupational Health and Safety), made pursuant to s. 159 of the *Canada Labour Code*²⁰, has incorporated by reference the provincial legislation respecting OHS. This regulation was made by the Governor in Council, on the recommendation of the Minister of Labour after consultation with the CNSC²¹.
121. It is therefore the provincial requirements that apply to these facilities, but only because the federal legislation has incorporated them by reference for these facilities. It is the federal legislation (i.e., Part II of the *Canada Labour Code*) that remains the governing legislation. In 1998, Human Resources and Skills Development Canada (HRSDC) entered into a Memorandum of Agreement with the Ontario Ministry of Labour (MOL) by which the latter exercises regulatory oversight over OHS matters at nuclear power plants on behalf of HRSDC. The jurisdiction over OHS at power plants in Ontario remains federal. It is however governed by the provincial requirements as a result of their incorporation into federal legislation and administered by the province because of the administrative arrangement between HRSDC and the MOL.
122. CNSC staff reported that OPG's conventional health and safety program, as well as its implementation, were compliant with the *Canada Labour Code*. CNSC staff noted that the CNSC and the MOL signed a Memorandum of Understanding in July 2011 to

¹⁹ SOR/98-180. The labour relations and working conditions (labour standards) at power reactors in Ontario are also subject to the provincial regime pursuant to Ontario Hydro Nuclear Facilities Exclusion from Part I of the Canada Labour Code Regulations (Industrial Relations) (SOR/98-179) and Ontario Hydro Nuclear Facilities Exclusion from Part III of the Canada Labour Code Regulations (Labour Standards) (SOR/98-181).

²⁰ R.S.C., 1985, c. L-2.

²¹ Section 123 of the *Canada Labour Code* provides that it applies to and in respect of employment "on or in connection with the operation of any federal work undertaking or business..." This legislation comes under the responsibility of the Labour Program of Human Resources and Skills Development Canada (HRSDC).

establish a formal mechanism for cooperation and for the exchange of information and technical expertise related to their respective areas of jurisdiction, such as occupational health and safety practices at nuclear facilities. CNSC staff further stated that OPG's performance regarding occupational health and safety has exceeded regulatory requirements.

123. The MOL, in its intervention, described its role in the oversight of workers at nuclear facilities in Ontario, noting that it conducted 22 field visits at the Darlington NGS during the licence period. The MOL reported that no work refusal had taken place at the Darlington NGS, and that there were no non-compliance issues with respect to the *Occupational Health and Safety Act*²², or to the NSCA. The MOL further stated that six critical injuries were reported to the MOL during the licence period, which is low compared to the general workforce.
124. The Commission asked for clarification regarding the difference between critical injuries and lost-time injuries. The representative from the MOL responded that critical injuries are defined²³ under the *Occupational Health and Safety Act*. An OPG representative noted a critical injury may not necessarily result in time lost for an employee.
125. The Commission asked if OPG could make the results of its third-party safety reviews available to the public. A representative from OPG responded that OPG could present this information through forums such as the Darlington Nuclear Community Advisory Council, as well as through its presentations to Municipality of Clarington council. The OPG representative also noted that it could provide more information through its public information program.
126. The Commission is of the opinion that the health and safety of workers and the public were 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

127. Environmental protection covers OPG's programs to identify, control and monitor all releases of nuclear substances and to minimize the effects on the environment which may result from the licensed activities. It includes effluent and emissions control, environmental monitoring, and estimated doses to the public.
128. OPG stated that it has an established Environmental Management Program (EMP) to assess environmental aspects and impacts associated with its nuclear activities, and to ensure that these activities are conducted such that adverse environmental effects are

²² R.S.O. 1990, c. O.1.

²³ R.R.O. 1990, Regulation 834.

prevented or mitigated. OPG explained that its EMP provides it with a systematic approach to comply with environmental regulatory and other requirements, including the International Organization for Standardization (ISO) 14001: 2004 *Environmental management systems-requirements with guidance for use*.

129. CNSC staff reported that OPG has an effective program to protect the environment and the health and safety of persons, including identifying, controlling and monitoring the release of radioactive substances and hazardous substances to the environment.
130. The Commission enquired about OPG's implementation of the updated CSA standard N288.4, *Environmental Monitoring Programs at Class I nuclear facilities and uranium mines and mills*²⁴. CNSC staff responded that while OPG currently has an acceptable radiological monitoring program in place at the Darlington NGS, OPG had to conduct a review and gap analysis of the requirements for the updated N288.4 before it could be implemented. CNSC staff noted that it accepted OPG's implementation plan and that OPG is expected to have its first EMP report compliant with N288.4 in 2014.

Effluent and Emissions Control

131. OPG stated that, during the licence period, gaseous and aqueous releases of nuclear substances were significantly below the Action Levels²⁵ and Derived Release Limits²⁶ for the Darlington NGS. OPG noted that these limits are established based on the legal dose limit to the public of 1 mSv/year, which is below environmental background dose levels. OPG reported that the dose to the public from the site over the licence period was well below the legal dose limit, with a maximum of 0.0013 mSv/y in 2008 and the most recent dose being 0.0006 mSv/y in 2011.
132. OPG stated that it also maintains non-radiological releases at low levels, noting a reduction in sulphur dioxide (SO₂) releases due to a general reduction in the sulphur content of diesel fuel used in the Standby Generators and Emergency Power Generators, and improved chemistry management control of Active Liquid Waste and other discharges. OPG noted that no Municipal/Industrial Strategy for Abatement (MISA) toxic discharges occurred from the site in 2011.
133. CNSC staff noted that OPG's derived release limits were established in accordance with CSA standard N288.1, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of*

²⁴ Canadian Standards Association, N288.4-10 - *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*, 2010.

²⁵ 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.

²⁶ The derived release limit for a given radionuclide is the release rate that would cause the most highly exposed individual to receive an annual dose equal to the regulatory annual dose limit for a member of the public, 1 mSv/y, due to the release of the radionuclide to air or surface water during normal operation of a nuclear facility over the period of a calendar year.

*Nuclear Facilities*²⁷. CNSC staff stated that it was satisfied that the public dose from the Darlington NGS remained well below the regulatory limit of 1 mSv/year during the current licence period.

134. Several intervenors, including individuals and the Williams Treaties First Nations, expressed concerns regarding the tritium releases associated with the operation of the Darlington NGS. Some intervenors were concerned that tritium could contaminate the groundwater on the site and be discharged into Lake Ontario. The Commission asked for more information on this matter. OPG described the measures it has in place for the management and containment of tritium. OPG explained that, over time, tritium builds up in the reactor's heavy water moderator and that OPG uses its Tritium Removal Facility to remove the tritium for storage. OPG stated that it stores most of its tritium on site, and noted that it sells small amounts to licensed facilities for commercial use. OPG explained that it extracts 1.5 kilograms of tritium per year and sells 100 grams annually.
135. Some intervenors, including individuals and Citizens for a Safe Environment and the Committee for Safe Sewage, noted that the limit for tritium in drinking water in Ontario is set at 7,000 Becquerels per litre (Bq/L), which is higher than in some countries in Europe and the United States. Intervenors also noted the 2009 Ontario Drinking Water Advisory Council recommendation that Ontario reduce the limit for tritium in drinking water from 7,000 Bq/L to 20 Bq/L. The Commission sought further information on this matter. CNSC staff responded that the 7,000 Bq/L limit was set by HC, based on a recommendation from the World Health Organization, and corresponds to a dose of 0.1 mSv/y, which is 10% of the annual dose limit, for an average consumption of two litres per day. CNSC staff further noted that many of the lower limits cited by intervenors were design objectives or screening values used to indicate the possible presence of other radionuclides, rather than regulatory limits. The Commission enquired about the levels of tritium in drinking water around the Darlington NGS. OPG responded that the levels are below 10 Bq/L, on the order of 5-6 Bq/L.

Environmental Monitoring

136. OPG stated that its radiological environmental monitoring program includes both radiological and hazardous substances monitoring. OPG explained that its program is designed to measure environmental radioactivity and radiation in the vicinity of the Darlington NGS. OPG explained that environmental samples for air and liquids are collected from various onsite and offsite locations and tested, and that data from the program are used to assess public doses.

²⁷ Canadian Standards Association, N288.1, Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities, 2008.

137. CNSC staff stated that, based on compliance inspections conducted during the licence period, it was satisfied that OPG's radiological environmental monitoring program meets requirements.
138. An individual enquired about levels of organically bound tritium in biota in Lake Ontario. The Commission asked for more information in this regard. OPG responded that it monitors biota, including fish, as part of its radiological environmental monitoring program and uses this information in its public dose calculations. OPG stated that, based on its monitoring results, there is no impact on fisheries as a result of the operation of the Darlington NGS. OPG noted that its annual environmental reports are on its Web site. CNSC staff noted that, in 2009, the levels of organically bound tritium in fish ranged from 19 Bq/L to 37 Bq/L, and added that no adverse effects are expected at these levels.
139. The Darlington Nuclear Community Advisory Council, in its intervention, stated that OPG monitors produce from local gardens as part of its radiological environmental monitoring program. The Commission asked if the community receives the data from this program. The Darlington Nuclear Community Advisory Council confirmed that it receives the environmental reports from OPG.
140. Several intervenors, including individuals and Durham Nuclear Awareness, questioned the validity of OPG's monitoring results and expressed the need for independent, third-party monitoring. The Commission enquired about this issue. Representatives from HC and the MOL confirmed that their organizations do conduct independent monitoring in the environment around the Darlington NGS site, and that the information is published on an annual basis. The Commission asked if the information, including real-time monitoring results, could be made more readily available. Representatives from HC and the MOL responded that they would be looking into the possibility of making the information more readily available. CNSC staff noted that the CNSC has started an independent monitoring program and plans to put monitoring information on the CNSC Web site. CNSC staff noted that it would work with the MOL and HC.
141. The Commission directs CNSC staff to continue to work with HC and the MOL on its independent monitoring program in order to make real-time monitoring data available to members of the public.

Fish Impingement and Entrainment, and Thermal Effects

142. OPG stated that the once-through cooling water system used at the Darlington NGS was designed to minimize impingement, entrainment and thermal effects. OPG stated that its monitoring programs have shown that the current performance of this system is consistent with its original design expectation and that it is effective at protecting fish populations. CNSC staff reported that OPG is adequately managing the effects of its operational activities on aquatic biota.

143. Several intervenors, including Lake Ontario Waterkeeper, Williams Treaties First Nations and individuals, expressed concerns regarding the impact on fish caused by the operation of the cooling system used at the Darlington NGS, including impingement, entrainment and thermal effects. Some intervenors suggested that OPG should use cooling towers to mitigate these issues. The Commission asked for Fisheries and Oceans Canada (DFO) to comment on the performance of OPG's once-through cooling system. A representative from DFO concurred with CNSC staff and stated that there was no lake-wide impact associated with the operation of the existing cooling system. CNSC staff noted that the existing cooling system meets international standards for intake fish loss.
144. Lake Ontario Waterkeeper, in its intervention, discussed new regulations in the United States (US) regarding closed-cycle cooling. The Commission asked whether the once-through cooling system at the Darlington NGS would be considered acceptable by the US Environmental Protection Agency (US EPA) in light of new requirements and regulations in the US *Clean Water Act*²⁸. CNSC staff responded that the new requirements require performance equivalent to cooling towers for new power plants, but do not specifically require that cooling towers be used. CNSC staff noted that the requirements for existing plants will not be finalized until the summer of 2014, but that they are proposed to be an 88% reduction in impingement relative to an onshore surface intake system. CNSC staff added that the Darlington NGS has an offshore submerged intake system with a velocity cap that reduces intake velocity to below the swimming speed of most fish. CNSC staff stated that, based on this information, the once-through cooling system at the Darlington NGS meets the proposed US EPA requirements for existing plants. CNSC staff further stated that a New York State policy similarly requires performance equivalent to cooling towers, but does not specifically require cooling towers themselves.

Conclusion on Environmental Protection

145. Based on the above information, the Commission is satisfied that, given the mitigation measures and safety programs that are in place to control hazards, OPG will provide adequate protection to the health and safety of persons and the environment. The Commission is satisfied that, for the purpose of the proposed licence renewal, there is no lake-wide impact to fish associated with the operation of the existing once-through cooling system at the Darlington NGS.

Emergency Management and Fire Protection

146. Emergency management and fire protection covers the provisions for preparedness and response capabilities which exist for emergencies and for non-routine conditions at the Darlington NGS. This includes nuclear emergency management, conventional emergency response, and fire protection and response.

²⁸ 86 Stat. 816 (1972).

Emergency Management

147. OPG described its emergency management program. OPG noted that it conducts regular emergency drills, which provide an opportunity for its emergency response crews to improve and sustain their emergency response capability, in accordance with the emergency procedures established at the Darlington NGS. OPG stated that it is in full compliance with CNSC regulatory document RD-353, *Testing the Implementation of Emergency Measures*. OPG further noted that its emergency preparedness procedures were revised to incorporate Severe Accident Management Guidelines (SAMG) requirements and that it would continue to review the adequacy of its emergency management program on an ongoing basis, including the incorporation of lessons learned from the Fukushima Daiichi nuclear accident.
148. CNSC staff stated that it is satisfied that OPG has an effective emergency management program that provides for preparedness and response capability to mitigate the effects of accidental release of nuclear substances and hazardous substances. CNSC staff noted that OPG's emergency response plan meets the expectations detailed in CNSC regulatory guide G-225, *Emergency Planning at Class I Facilities and Uranium Mines and Mills*.
149. The Commission sought information regarding the preparedness of workers to respond in an accident scenario. A representative from OPG responded that there are processes and procedures that are in place to address this issue, and noted that OPG conducts drills to ensure that the workers are able to execute the procedures. The OPG representative also noted that workers train with and test the emergency response equipment. A representative from the Power Workers' Union stated that the workers are trained to respond to an accident, including drills, and noted the documentation in place for response to a severe accident.
150. OPG also described off-site emergency management measures in the Durham Region. OPG explained that it had purchased indoor tone alert radios for the Durham Emergency Management Office (DEMO) as part of DEMO's requirement to meet indoor alerting responsibilities within the Contiguous Zone (0 to 3 kilometres (km)) under the Provincial Nuclear Emergency Response Plan (PNERP). OPG further explained that the Legends Centre in the City of Oshawa was made operational for use as a Reception Centre, including equipment and procedures for monitoring and decontamination, during a nuclear emergency.
151. Several intervenors, including individuals, Greenpeace and the Canadian Environmental Law Association, expressed concerns regarding the emergency response in the event of a severe accident that may necessitate an evacuation beyond the 10-km Primary Zone. The Commission asked for more information on this subject from DEMO and Emergency Management Ontario (EMO). A representative from DEMO stated that the plan that is in place for the 10-km zone could be expanded as necessary, noting that the structure in place to respond to emergencies includes response centres, police services and traffic management. A representative from EMO

noted that the existing PNERP is flexible and includes plans for sheltering, evacuation and the distribution of potassium iodide (KI) pills. The EMO representative stated that it would be reviewing the lessons learned from the Fukushima accident to ensure that any changes are made to the PNERP, if necessary. CNSC staff confirmed that, in addition to the formal plans for an evacuation in a defined emergency planning zone of 10 km, the PNERP also explicitly considers provisions for a 20-km evacuation, if necessary.

152. The Commission asked for more information concerning the integration of the different emergency plans, including OPG, the municipality and the EMO. The EMO representative responded that under the existing plan, EMO would receive notification from OPG within 15 minutes of a reportable event, at which time the province would provide off-site response. The EMO representative noted that the community would also be informed within 15 minutes. The EMO representative further stated that EMO has redundancies in emergency management throughout its organization to ensure that it can respond as quickly as possible. The DEMO representative concurred, noting that the notification process and 15-minute timeframe have been well- practiced.
153. The Municipality of Clarington, in its intervention, expressed support for OPG's emergency planning. The Commission asked the Municipality representatives to elaborate on this position. The representative for the Municipality of Clarington responded that information is available to the community, including public education events, and noted that a public alerting system is in place and tested regularly. The representative for the Municipality of Clarington also noted the importance of training. The Regional Municipality of Durham expressed similar views, noting its support for OPG and the existing emergency response plans for the region. The representative for the Regional Municipality of Durham explained that the existing plans in place include measures for evacuation and public alerting.
154. Several intervenors expressed the view that they had not received sufficient information from the Regional Municipality of Durham regarding emergency preparedness in the event of a nuclear emergency. Intervenors noted a recent pamphlet distributed by the Regional Municipality of Durham did not include any mention of a nuclear emergency. The Commission acknowledged these concerns and agreed that the Regional Municipality of Durham must improve its public communications regarding nuclear emergency preparedness. A representative from DEMO explained that the pamphlet was intended to be general information on what the public should do prepare for any emergency. The DEMO representative noted that it does have a specific information pamphlet for nuclear emergencies that had not been widely distributed but was available on the DEMO Web site. The DEMO representative stated that DEMO was open to receiving input from the CNSC.
155. The Commission asked for more information concerning the ways to improve the communication of emergency planning with the public. A representative from OPG stated that OPG has regular working meetings, at least on a quarterly basis, with the Municipality, DEMO and EMO, to discuss the integration of their emergency plans.

The OPG representative stated that they would use those meetings as a means to develop and implement any necessary improvements. A representative from EMO stated that the Provincial Nuclear Emergency Management Coordinating Committee, which includes various designated municipalities, host municipalities, and the licensees of nuclear facilities, would look into ensuring that more information is made available to the communities around nuclear facilities in Ontario.

156. The Commission asked if the CNSC had a mechanism through which it could ensure that the municipalities and the province would continue to implement the required measures for emergency planning. CNSC staff responded that while it does not have legal authority over EMO, both the CNSC and OPG have a positive working relationship with EMO. CNSC staff stated that it would make arrangements with EMO if additional oversight were required and ensure that the emergency plans are integrated in a manner satisfactory to the CNSC. CNSC staff noted that it would continue to report to the Commission on this matter as part of the follow-up to the CNSC Fukushima Action Plan.

Fire Protection

157. Regarding fire protection, OPG stated that it has implemented a comprehensive fire protection program to minimize the risk to the health and safety of persons and to the environment from fire, through appropriate fire protection system design, fire safety analysis, fire safe operation and fire prevention. OPG noted that it has a training facility that provides training to its emergency response crews, as well as industry peer fire responders and fire fighters from municipal fire departments.
158. CNSC staff stated that it is satisfied that OPG has a comprehensive fire protection program at the Darlington NGS that is compliant with the fire protection provisions of CSA standard N293-07, *Fire Protection for CANDU Nuclear Power Plants*.

Conclusion on Emergency Management and Fire Protection

159. Based on the above information, the Commission concludes that the fire protection measures and emergency management preparedness programs in place, and that will be in place, at the facility are adequate to protect the health and safety of persons and the environment.
160. The Commission is satisfied that the emergency response measures in place are acceptable to respond in the event of an accident at the Darlington NGS. The Commission stresses the importance of the various levels of government working well in an integrated fashion. As such, the Commission directs OPG to file with the Commission a report detailing all the emergency plans that would be deployed in case of a nuclear emergency, both on and off the Darlington Nuclear site, identifying the authority responsible for its application and describing how the various plans are

integrated. OPG shall present this information to CNSC staff in sufficient time as to be part of the next annual progress update on the CNSC Fukushima Action Plan, which is planned for August 2013, at the same time as the annual performance report on nuclear power reactors in Canada. Furthermore, the Commission encourages DEMO and EMO to improve their public communication regarding the nuclear emergency plans in place, particularly within the 10-kilometre zone around the Darlington NGS.

Waste Management

161. Waste management covers the licensee's site-wide waste management program. CNSC staff evaluated OPG's performance with regards to waste minimization, segregation, characterization, and storage.
162. OPG stated that it limits the production of low and intermediate level radioactive waste at the Darlington NGS to minimum practical levels. OPG explained that it ships the waste to its Western Waste Management Facility (WWMF), located in the Municipality of Kincardine, Ontario, for further processing, such as incineration or compaction, and storage. OPG noted that it introduces new waste reduction initiatives whenever feasible to further reduce produced and stored volumes.
163. With regards to chemical waste, OPG stated that it tracks the number of chemical waste drums stored in its Chemical Waste Transfer Facility to ensure that the Darlington NGS remains in compliance with provincial regulations regarding the storage and disposal of conventional chemical wastes.
164. CNSC staff stated that it is satisfied that OPG takes the necessary steps to minimize, segregate and characterize the radioactive wastes generated as a result of operating the Darlington NGS, and that OPG complies with provincial waste regulations for conventional solid waste. CNSC staff further stated that OPG has demonstrated consistent and compliance management and control of waste storage throughout its operations.
165. The Commission asked for more information concerning the handling of used fuel waste, including the dry storage containers. A representative from OPG responded that the used fuel is placed in pools for a minimum of ten years in order to dissipate heat before they are placed in the dry storage containers. The OPG representative described the dry storage containers, explaining that they are robust concrete containers that meet CNSC requirements for shielding radionuclides. The OPG representative noted that the containers are designed to last 100 years.
166. Intervenors, including Northwatch and County Sustainable Group, Prince Edward County, raised concerns regarding the design of the fuel bays and the possibility of the fuel becoming uncovered in an accident due to a loss of water, similar to circumstances during the Fukushima accident. The Commission asked for more information in this regard. CNSC staff explained the difference between the fuel storage at the Fukushima

Daiichi nuclear plant, a boiling water reactor, and the Darlington NGS, a CANDU reactor, noting that there is no risk of criticality in the fuel bay at the Darlington NGS because the CANDU fuel uses natural uranium, rather than enriched uranium, and the fact that the fuel is much cooler. An OPG representative responded that the fuel bays are seismically qualified and designed to withstand high temperatures, and that OPG has improved its accident response capabilities, including diesel pumps, for adding water to the fuel bays should a loss of cooling occur.

167. Based on the above information and considerations, the Commission is satisfied that OPG is safely managing waste at the Darlington NGS.

Security

168. OPG stated that the objective of its security program is to ensure safe and secure operation of the station, by maximizing protection through use of equipment, personnel, and procedures. OPG further stated that the site security program at the Darlington NGS has continued to evolve in order to meet all regulatory requirements. OPG noted that it conducts training to enhance and sustain improved performance in its Security Division, and that the training program ensures that security officers maintain the current status of their training.
169. CNSC staff stated that OPG's security program is subject to annual inspections and biennial security exercises, and reported that OPG's implementation of the security program at the Darlington NGS meets regulatory requirements and makes adequate provision for the maintenance of national security.
170. Some intervenors, including Northwatch, expressed concerns regarding the security of the Darlington NGS. The Commission asked CNSC staff to explain its oversight in this regard. CNSC staff responded that threat risk analyses are undertaken under the *Nuclear Security Regulations*²⁹ to confirm the adequacy of the security. CNSC staff noted that it has a robust inspection and oversight program to ensure that OPG maintains its security program.
171. Some intervenors raised concerns regarding cyber-security. The Commission asked OPG to discuss the measures it has taken to address this issue. A representative from OPG responded that OPG takes the issue very seriously. The OPG representative explained that OPG follows the industry standards for its systems, including separation of its business systems and its safety systems, as well as having quality assurance programs for its software. CNSC staff concurred with OPG, noting that OPG meets requirements in this regard.
172. The Commission is satisfied that OPG's performance with respect to maintaining security at the facility has been acceptable. The Commission concludes that OPG has made and will continue to make adequate provision for the physical security of the

²⁹ SOR/2000-209.

facility and the maintenance of national security.

Safeguards and Non-Proliferation

173. 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, non-explosive uses and that there is no undeclared nuclear material or activities in this country.
174. OPG stated that it has established and implemented a safeguards program to support compliance with the safeguards agreements with the IAEA. OPG noted that it is fully compliant with CNSC Regulatory Document RD-336, *Accounting and Reporting of Nuclear Material*³⁰, requirements for foreign origin and foreign obligations tracking and reporting. OPG also described the compliance activities carried out during the licence period, including verification inspections by the IAEA and CNSC staff, noting that no compliance issues were identified.
175. CNSC staff stated that OPG has an effective safeguards program at the Darlington NGS that conforms to measures required by the CNSC to meet Canada's international safeguards obligations.
176. CNSC staff stated that the Darlington NGS PROL does not authorize the import or export of controlled nuclear substances, controlled nuclear equipment and controlled nuclear information, noting that any such proposals by OPG for such activities would require specific application to the CNSC pursuant to the *Nuclear Non-proliferation Import and Export Control Regulations*³¹. CNSC staff further noted that the CNSC is also responsible for the implementation of Canada's bilateral Nuclear Cooperation Agreements with other countries. CNSC staff reported that, during the licence period, OPG provided regular and accurate information to CNSC staff on the status of foreign obligated nuclear material at the Darlington NGS. CNSC staff further stated that it is satisfied with the measures OPG has implemented to conform with international obligations on export and import controls to which Canada has agreed.
177. Based on the above information, the Commission is satisfied that OPG has made and will continue to make adequate provisions in the areas of safeguards and non-proliferation at the Darlington NGS that are necessary for maintaining national security and measures necessary for implementing international agreements to which Canada has agreed.

³⁰ CNSC Regulatory Document RD-336, *Accounting and Reporting of Nuclear Material*, June 2010.

³¹ SOR/2000-210.

Packaging and Transport

178. Packaging and transport covers the safe packaging and transport of nuclear substances to and from the Darlington NGS. OPG must adhere to the *Packaging and Transport of Nuclear Substances Regulations*³² and Transport Canada's *Transportation of Dangerous Goods Regulations*³³ 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 containing nuclear substances.
179. OPG described its radioactive material transportation program, which establishes the necessary controls for safe and efficient transportation of radioactive material. OPG explained that the program includes the handling, packaging, shipment, carriage and receipt of radioactive materials, and ensures safe transportation, including emergency response.
180. OPG stated that it transports radioactive materials on a daily basis and that it conducts regular emergency response drills to ensure that it can respond in the case of an actual accident. OPG noted that it had no dangerous occurrences reportable under the *Packaging and Transport of Nuclear Substances Regulations* for consignments shipped from the Darlington NGS during the licence period.
181. CNSC staff reported that OPG's packaging and transport program adheres to the *Packaging and Transport of Nuclear Substances Regulations* and the *Transportation of Dangerous Goods Regulations*. CNSC staff further stated that it is satisfied that the implementation of the packaging and transport program meets regulatory requirements.
182. The Commission asked for more information concerning the safety of packages certified under the *Packaging and Transport of Nuclear Substances Regulations*. CNSC staff responded that the certified packages are inherently safe by design. CNSC staff noted that certified packages have dose limits that are protective of the environment, workers and members of the public.
183. Some intervenors expressed concerns regarding the transport of used nuclear fuel. The Commission asked for more information on this subject. An OPG representative responded that OPG performs a limited number of used fuel transfers each year to facilities operated by Atomic Energy of Canada Limited (AECL). The OPG representative stated that each transport is performed safely, in accordance with regulatory requirements.
184. Based on the above information, the Commission is satisfied that OPG is meeting regulatory requirements regarding packaging and transport.

³² SOR/2000-208.

³³ SOR/2001-286.

Application of the *Canadian Environmental Assessment Act*

185. Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act, 2012*³⁴ (CEAA 2012), if applicable, have been fulfilled.
186. OPG has applied for the renewal of its operating licence for the Darlington NGS until December 31, 2014. OPG is not applying for any new physical works or activities in this licence renewal application, and there are no proposed changes to the licensed activities at the Darlington NGS.
187. CNSC staff reported that it had completed an Environmental Assessment (EA) determination under the CEAA 2012. CNSC staff stated that while an EA is required for the construction, operation, decommissioning and abandonment, or an expansion that would result in an increase in production capacity of more than 35%, of a Class IA nuclear facility that is a nuclear fission reactor that has a production capacity of more than 25 MW (thermal), a licence renewal is not classified as a “designated project” pursuant to the *Regulations Designating Physical Activities*³⁵ made under paragraph 84(a) of the CEAA 2012. Therefore, the CNSC is not considered a responsible authority pursuant to paragraph 15(a) of the CEAA 2012 and no federal EA is required for the licence renewal application.
188. Based upon the above assessment, the Commission is satisfied that an environmental assessment under the CEAA is not required for OPG’s application for licence renewal. The Commission notes, however, that an EA was completed and is being considered by the Commission as part of the proposed refurbishment of the Darlington NGS.

Aboriginal Consultation

189. The common law Duty to Consult with Aboriginal communities and organizations applies when the Crown contemplates actions that may adversely affect established or potential Aboriginal or treaty rights.
190. CNSC staff provided information concerning the Aboriginal consultation activities it conducted in conjunction with OPG’s licence renewal application, as well as OPG’s concurrent environmental assessment for the Darlington Refurbishment and Continued Operation and the licence application for the Darlington Waste Management Facility. CNSC staff explained that, upon receipt of the licence applications from OPG, CNSC staff conducted research that led to a preliminary list of Aboriginal groups that may have interest in the environmental assessment and licensing decisions.
191. CNSC staff explained that the identified Aboriginal groups and organizations were mailed information regarding OPG’s applications, including a timeline of coordinated

³⁴ S.C. 2012, c. 19, s.52.

³⁵ SOR /2012-147.

activities, instructions on how to receive announcements, contact information, and an overview of the CNSC public hearings process. CNSC staff provided information concerning the CNSC's Participant Funding Program, noting that the Williams Treaties First Nations applied for and were granted funding under the program.

192. CNSC staff stated that no adverse impacts to established or potential Aboriginal and treaty rights associated with the proposed licence renewal were identified. CNSC staff explained that the licence application made no request for changes to operational activities. CNSC staff further noted that it would continue to engage with and provide all the identified Aboriginal groups with project information.
193. The Williams Treaties First Nations, in their intervention, provided information about their participation in the review of OPG's licence renewal application, noting that they had received participant funding from the CNSC. The Commission enquired about the level of consultation held to-date. The Williams Treaties First Nations stated that they felt that the consultation activities with CNSC staff and OPG for the current licensing application and concurrent refurbishment environmental assessment had begun to be more meaningful and noted that they wanted them to continue. The Williams Treaties First Nations noted that they would be active in the future CNSC licensing processes for the Darlington NGS.
194. The Mississaugas of the New Credit First Nation, in their intervention, expressed the desire to further build its relationship with both the CNSC and OPG and to be engaged in meaningful consultation on future licence applications. The Commission asked about the existing communications between the Mississaugas of the New Credit First Nation and OPG. An OPG representative responded that OPG has met with the Mississaugas of New Credit First Nation a number of times and provided information regarding its projects. The OPG representative noted OPG's commitment to continue to develop their relationship.
195. The Commission enquired about the CNSC's consultation with the Mississaugas of New Credit First Nation. CNSC staff responded that it had interacted with them and provided information on OPG's activities, as well as on the CNSC's Participant Funding Program. The Commission asked the Mississaugas of New Credit First Nation why they did not apply for participant funding. The Mississaugas of New Credit First Nation explained that it has a limited ability to go through all of the paperwork in its office and that it had been occupied with other matters. CNSC staff noted that there would be further opportunities for participation in future hearing processes related to the Darlington NGS, and stated that it would continue to engage Aboriginal groups on these matters. CNSC staff further stated that it would continue to look for ways to improve its consultation activities.
196. The Commission asked if the CNSC has a straightforward way of informing Aboriginal groups and members of the public of its upcoming hearings and the deadlines associated with participation in these hearings, including funding. CNSC staff responded that there is information on the CNSC Web site and noted that all

interested parties can subscribe to receive electronic notices from the CNSC. CNSC staff noted that it would follow-up with the Mississaugas of New Credit First Nation on this matter.

197. The Commission acknowledges the efforts made in relation to the CNSC's obligations regarding Aboriginal consultation and the Legal Duty to Consult. The Commission is satisfied that the proposed licence renewal will not cause any adverse impacts to any potential or established Aboriginal or treaty rights and that the consultation activities undertaken for this licence renewal were adequate, given that there are no changes to the licensed activities at the Darlington NGS.³⁶

Public Information Program

198. A public information program is a regulatory requirement for licence applicants and licensed operators of Class I nuclear facilities, such as the Darlington NGS. Paragraph 3(j) of the *Class I Nuclear Facilities Regulations*³⁷ requires that licence applications include “*the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed.*”
199. OPG provided information regarding its community relations and public information program. OPG stated that it regularly and proactively provides information to the public on its on-going facility activities, effects on the environment and the health and safety of persons, and the transportation program, and consults with key stakeholders and the public on future planned activities. OPG explained that it communicates with community stakeholders and residents through various means, including personal contact, community newsletters, speaking engagements, educational outreach, an information centre, and the Internet. OPG noted that it annually posts a Radiological Environmental Monitoring Program (REMP) report detailing all emissions and spills, as well as quarterly performance reports on facility operations, on its Web site.
200. OPG also provided information regarding its relations with Aboriginal communities. OPG explained that it has a First Nation and Métis Policy, which includes community relations and outreach. OPG noted that it also participates in a number of working groups, including the Aboriginal Relations Steering Committee, the Aboriginal Relations Working Committee, and the Aboriginal Relations Nuclear Working Committee.
201. CNSC staff stated that OPG's public information program for the Darlington NGS meets regulatory requirements. CNSC staff noted that, with the recent publication of CNSC regulatory document RD/GD-99.3, *Public Information and Disclosure*, OPG is required to revise its documentation and meet the new requirements. OPG stated that it

³⁶ Rio Tinto Alcan v. Carrier Sekani Tribal Council, 2010 SCC 43, [2010] 2 S.C.R. 650 at paras 45 and 49.

³⁷ SOR/2000-204.

currently meets many of the expectations described in the RD/GD-99.3 and added that it would be reviewing its public information and disclosure policies to ensure compliance of the requirements by the fourth quarter of 2012. CNSC staff stated that it was satisfied with OPG's implementation strategy to transition to RD/GD-99.3.

202. The East Toronto Youth Nuclear Group, in its intervention, presented the results of a survey it had conducted to gauge youth's awareness of the Darlington NGS. The East Toronto Youth Nuclear Group stated that it found that youth are generally not well-informed about nuclear power and the operations at the Darlington NGS but had a desire to learn more about this subject and other energy issues. The Commission noted the results of the survey and asked for more information regarding OPG's engagement of youth. OPG responded that it has a number of activities to engage with schools in the community, including grade-specific educational programs for the Ontario curriculum. OPG noted that it also has an active Web site and uses social media, and stated that it would continue to look for ways to improve its communication with youth. The Darlington and Pickering Nuclear Advisory Councils, in their interventions, expressed support for OPG's public information program.
203. Based on this information, the Commission is satisfied that OPG's public information program meets regulatory requirements and is effective in keeping the public informed on the facility operations. The Commission encourages OPG to continue to improve its efforts in engaging youth.

Decommissioning Plans and Financial Guarantee

204. The Commission requires OPG to 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 Darlington NGS site, the Commission requires that an adequate financial guarantee for realization of the planned activities is put in place and maintained in a form acceptable to the Commission throughout the licence period.
205. The current operating licence for the Darlington NGS contains a condition relating to decommissioning, which requires that OPG maintain an acceptable decommissioning plan that sets out the manner by which the facility will be decommissioned in the future. The decommissioning plan must be kept current to reflect any changes in the site or facility, and meet the requirements of CSA standard N294-09, *Decommissioning of Facilities Containing Nuclear Substances*, and the guidance of CNSC regulatory guide G-219, *Decommissioning Planning for Licensed Activities*. The decommissioning plan and the associated cost estimate forms the basis of the financial guarantee.
206. OPG stated that the decommissioning plan for the Darlington NGS is revised on a five-year cycle and noted that it had submitted an updated decommissioning plan and proposed financial guarantee for the Commission's approval for a public hearing on

October 24, 2012. The Commission notes that OPG's proposed decommissioning plan and financial guarantee was accepted by the Commission³⁸. CNSC staff stated that it was satisfied that OPG has effectively maintained its decommissioning plan and financial guarantee for the Darlington NGS.

207. Some intervenors, including individuals, the Green Party of Ontario, and FullCircle Energy Solutions Inc., Trillium Power Wind Corporation and Solsmart Energy Solutions Inc., expressed concerns regarding the future costs of decommissioning and waste storage, suggesting that the burden would be borne by future generations. The Commission sought confirmation that the decommissioning funds would also include the long-term storage of wastes. OPG stated that this was the case and that it would fund the full costs associated with decommissioning.
208. Some intervenors, including individuals and the Canadian Coalition for Nuclear Responsibility, were of the view that the costs associated with decommissioning had been underestimated. The Commission enquired about this matter. CNSC staff responded that the decommissioning costs are based on actual decommissioning projects, including international examples, such as in the United States.
209. 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.

Nuclear Liability Insurance and Cost Recovery

210. The *Nuclear Liability Act*³⁹ requires a nuclear power plant to have coverage for nuclear liability insurance. OPG stated that it has a nuclear liability insurance coverage totalling \$75 million for the Darlington NGS, as required under the *Nuclear Liability Act*. CNSC staff stated that it is satisfied with OPG's provision to fulfill its liability obligation with respect to the Darlington NGS under the *Nuclear Liability Act*.
211. Several intervenors, including individuals, Greenpeace, Bruce Peninsula Environment Group, County Sustainability Group, Physicians and Scientists for a Health World, and the Provincial Council of Women in Ontario, expressed the view that the current liability amount of \$75 million in the *Nuclear Liability Act* would not be sufficient to cover the costs of a severe accident. The Commission asked for more information concerning the *Nuclear Liability Act*. A representative from NRCan provided an overview of the *Nuclear Liability Act*, explaining that the purpose of the legislation is to clarify the liability and compensation regime in the event of a nuclear accident. The NRCan representative stated that the *Nuclear Liability Act* establishes that the operator, in this case OPG, would be absolutely liable for any damages associated with the accident. The NRCan representative acknowledged the concerns from intervenors that

³⁸ Refer to the Record of Proceedings and Reasons for Decision on the Financial Guarantee and Licence Amendments for OPG's Class I Nuclear Facility Licences in Ontario, hearing date October 24, 2012.

³⁹ R.S.C., 1985, c. N-28.

the amount of \$75 million was not consistent with the liability limits in other countries, and stated that the legislation was under review. The representative from NRCan noted that although recent attempts to pass new legislation were not successful due to prorogation and the dissolution of Parliament, NRCan was in the process of preparing new recommendations for consideration in Parliament. A representative from OPG expressed support for NRCan's efforts to revise the *Nuclear Liability Act*.

212. The Commission is satisfied that OPG has the coverage required under the *Nuclear Liability Act*. The Commission acknowledges the intervenors' concerns about this issue and notes that it is not the responsibility of the CNSC to administer the *Nuclear Liability Act*, or to make policies in respect of nuclear liability or the *Nuclear Liability Act*.

Licence Length and Conditions

213. OPG has applied for the renewal of its operating licence for the Darlington NGS for a period of 22 months, until December 31, 2014. OPG stated that it provided the CNSC with a two-year business plan for the Darlington NGS for 2012 to 2014. OPG explained that its objective is to continue its ongoing performance while preparing the station for refurbishment. OPG noted that the plan identifies areas requiring improvement, such as outage performance, equipment reliability, supervisory effectiveness and integration/alignment with the refurbishment project.
214. CNSC staff recommended that the Commission accept and grant the proposed 22-month term. CNSC staff stated that OPG is qualified to operate for the proposed licence period, and that there is adequate management and oversight in place for all processes. CNSC staff noted that it expects that OPG will carry out its improvement activities as planned.
215. Many intervenors, including non-governmental organizations and individuals, opposed the licence renewal. 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.
216. Other intervenors, including municipal and regional government representatives, unions and individuals, expressed support for the licence renewal. Intervenors were of the view that OPG has safely operated the Darlington NGS and would continue to do so over the life of the facility.
217. CNSC staff presented a proposed licence in CMD 12-H15, with one minor change in the supplemental CMD 12-H15.A. CNSC staff proposed the adoption of its new licence format for the Darlington NGS 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.

218. 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.
219. 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.
220. CNSC staff also described its proposed delegation of authority. In order to have adequate regulatory oversight of the changes that occur during the licence period but do not require amendment to the licence, CNSC staff recommended that the Commission delegate certain approval authority to the following CNSC staff:
- Director, Darlington Regulatory Program Division;
 - Director General, Directorate of Power Reactor Regulation; and
 - Executive Vice-President and Chief Regulatory Operations Officer.
221. CNSC staff recommended that the delegation of authority for the safety area of safeguards, including nuclear material accounting, be delegated to the following positions:
- Director, International Safeguards Division;
 - Director General, Directorate of Security and Safeguards; and
 - Vice-President, Technical Support Branch.
222. Furthermore, CNSC staff recommended that the Director General, Directorate of Power Reactor Regulation be the sole process owner for modifying the LCH within the licensing basis during the licence period.
223. The Commission enquired about the reason for the proposed 22-month licence period. An OPG representative responded that its requested licence renewal was an extension of its current licence and that the 22-month period would allow OPG to complete the work required to proceed with the proposed refurbishment project, should the environmental assessment be accepted by the Commission. OPG noted that it plans to request a longer-term licence in 2014.
224. Based on the above information and considerations, the Commission is satisfied that a 22-month licence is appropriate. The Commission accepts the licence conditions as recommended by CNSC staff. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority, and notes that it can bring any

matter to the Commission as applicable.

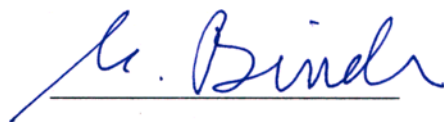
225. The Commission includes in the licence a condition requiring that OPG ensure that the emergency plans of various levels of government, including Provincial and Municipal, are integrated and implemented in a manner satisfactory to the CNSC.
226. In its intervention, CCNB Action requested a ruling from the Commission that the next public hearing for the renewal of the Darlington NGS operating licence be a two-day public hearing. The Commission notes that several criteria are used in determining the type of hearing used on a specific topic. The Commission considered this request and notes that, as is usual for hearings regarding longer-term licence renewals for power reactors, the next licensing hearing is currently planned to be a two-day public hearing.
227. CCNB Action also requested that an independent, public study be done to assess CNSC staff's safety culture, independence and transparency before the next licensing hearing for the Darlington nuclear facility.
228. The Commission recognizes that scientific and professional judgement guides the work of CNSC staff, who have demonstrated that their aim is to ensure that nuclear activities are operated safely. CNSC staff reviews applications for licences according to regulatory requirements, makes recommendations to the Commission, and enforce compliance with the NSCA, its *Regulations*, and any licence conditions imposed by the Commission. CNSC staff also take all necessary measures to ensure licensing and compliance, as well as to make recommendations to the Commission. CNSC staff are independent from industry influence. CNSC staff's recommendations are available to the public, and the Commission hearings are also public, often with public participation allowed. Therefore, the Commission is of the view that there is no need and no justification for a public review.

CONCLUSION

229. 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.
230. 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.
231. The Commission is satisfied that OPG meets the requirements of subsection 24(4) of the *Nuclear Safety and Control Act*. That is, the Commission is of the opinion that OPG is qualified to carry on the activity that the proposed licence will authorize and that OPG 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.

232. Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews the Power Reactor Operating Licence issued to Ontario Power Generation Inc. for its Darlington Nuclear Generating Station located in the Municipality of Clarington, Ontario. The renewed licence, PROL 13.00/2014, is valid from March 1, 2013 to December 31, 2014.
233. The Commission includes in the licence the conditions as recommended by CNSC staff and set out in the draft licence attached to CMD 12-H15 and modified in the supplemental CMD 12-H15.A.
234. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority in the Licence Conditions Handbook (LCH). 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 LCH.
235. The Commission notes that CNSC staff will provide annual reports on the performance of the Darlington NGS as part of the annual safety performance reports on nuclear power reactors in Canada. CNSC staff shall present these reports at public proceedings of the Commission. Furthermore, the Commission directs OPG to file with the Commission a report detailing all the emergency plans that would be deployed in case of a nuclear emergency, both on and off the Darlington Nuclear site, identifying the authority responsible for its application and describing how the various plans are integrated. OPG shall present this information to CNSC staff in sufficient time as to be part of the next annual progress update on the CNSC Fukushima Action Plan, which is planned for August 2013, at the same time as the annual performance report on nuclear power reactors in Canada.



FEB 25 2013

Michael Binder
President,
Canadian Nuclear Safety Commission

Date

Appendix A – Intervenors

Intervenors	Document Number
Sierra Club Ontario, represented by C. Elwell; K. Jackson and B. Cheng	CMD 12-H13.2
Tim Seitz	CMD 12-H13.3
Canadian Environmental Law Association, represented by T. A. McClenaghan	CMD 12-H13.4
Canadian Association of Nuclear Host Communities, represented by L. Thompson, Mayor of the Municipality of Port Hope	CMD 12-H13.5
Canadian Association of Physicians for the Environment, represented by Dr C. Vakil	CMD 12-H13.6 CMD 12-H13.6A
Laura Moyihan	CMD 12-H13.7 CMD 12-H13.7A
Durham Nuclear Health Committee	CMD 12-H13.8
Environmental Earth Angels	CMD 12-H13.9
Marilyn McKim	CMD 12-H13.10
Don and Heather Ross	CMD 12-H13.11
Whitby Chamber of Commerce	CMD 12-H13.12
Carlene Jimenez	CMD 12-H13.13
County Sustainability Group	CMD 12-H13.14
Emilio Antonio Aljure	CMD 12-H13.15
AECL's Port Hope Area Initiative Management Office	CMD 12-H13.16
Rick Norlock, MP, Northumberland-Quinte West	CMD 12-H13.17
Julie Lamb	CMD 12-H13.18
Green Party of Saskatchewan	CMD 12-H13.19
Darlene Buckingham	CMD 12-H13.20
Brenda Thompson	CMD 12-H13.21
Timothy Law	CMD 12-H13.22
Ajax-Pickering Board of trade	CMD 12-H13.23
Municipality of Kincardine, represented by Mayor L. Kraemer	CMD 12-H13.24 CMD 12-H13.24A
The Firehouse Youth Centre	CMD 12-H13.25
Pickering Nuclear Community Advisory Council, represented by J. Vincett, J. Dike, D. Shier, P. Mattson, J. Sarley, J. Earley	CMD 12-H13.26
Michelle Xuereb	CMD 12-H13.27
Joanna Bruszewski and her grandchildren	CMD 12-H13.28
Big Brothers Big Sisters of Clarington	CMD 12-H13.29
Municipality of Clarington Represented by Mayor A. Foster and G. Weir	CMD 12-H13.30 CMD 12-H13.30A
Ysabeault d'Valar-Alba	CMD 12-H13.31
Monica Whalley	CMD 12-H13.32 CMD 12-H13.32A

Dan Rudka	CMD 12-H13.33
Jessica Rowland	CMD 12-H13.34
Jill Lennox	CMD 12-H13.35
Jack Murphy	CMD 12-H13.36
Carrie Lester	CMD 12-H13.37
The Valleys 2000 (Bowmanville) Inc.	CMD 12-H13.38
Nadine Hawkins	CMD 12-H13.39
Melita Fernandes	CMD 12-H13.40
Mike Darmon	CMD 12-H13.41
William and Edith Shore	CMD 12-H13.42
Karen Lock	CMD 12-H13.43
James M. Ker	CMD 12-H13.44
Harry Blundell	CMD 12-H13.45
Lilly Noble	CMD 12-H13.46
Frank Farrell	CMD 12-H13.47
Barbara J. Moore	CMD 12-H13.48
Lorraine Roulston	CMD 12-H13.49
Eryl Court	CMD 12-H13.50
Linda and Gord Hicks and Family	CMD 12-H13.51
Shane Mulligan	CMD 12-H13.52
Tony McQuail	CMD 12-H13.53
Dan Holtl	CMD 12-H13.54
Tania Gill	CMD 12-H13.55
Renee Cotton	CMD 12-H13.56
Andrea Peloso	CMD 12-H13.57
Clarington Board of Trade and Office of Economic Development, represented by S. Hall	CMD 12-H13.58
Bruce Power, represented by F. Saunders	CMD 12-H13.59 CMD 12-H13.59A
University of Ontario Institute of Technology, represented by M. Owen and G. Bereznaï	CMD 12-H13.60
Provincial Council of Women of Ontario, represented by G. Janes	CMD 12-H13.61
Citizens for a Safe Environment and The Committee for Safe Sewage, represented by K. Buck and D. Done	CMD 12-H13.62
Chaitanya Kalevar	CMD 12-H13.63
Raymond Leistner	CMD 12-H13.64
Jo Hayward-Haines	CMD 12-H13.65
Eclipsall Energy Corporation, represented by D. Archer	CMD 12-H13.66
Lake Ontario Waterkeeper, represented by J.Bull and E. Rotenberg	CMD 12-H13.67
Andrei Neacsu	CMD 12-H13.68
Jen Mooney	CMD 12-H13.69
Mary McGillis	CMD 12-H13.70
Rabeya Alam	CMD 12-H13.71
Paul Courey	CMD 12-H13.72
Karen Kwok	CMD 12-H13.73

Erika Tran	CMD 12-H13.74
Port Hope and District Chamber of Commerce	CMD 12-H13.75
Don Chisholm	CMD 12-H13.76
Community Living Oshawa-Clarington	CMD 12-H13.77
Norm and Donna Boychuk	CMD 12-H13.78
Power Workers' Union, represented by B. Walker	CMD 12-H13.79 CMD 12-H13.79A
Canadian Nuclear Workers Council, represented by D. Shier, J. Usher and C. Leavitt	CMD 12-H13.80 CMD 12-H13.80A
Women in Nuclear-Canada, represented by C. Cottrill and J. Donegan	CMD 12-H13.81
Deborah Cherry	CMD 12-H13.82 CMD 12-H13.82A
Organization of CANDU Industries, represented by R. Oberth	CMD 12-H13.83 CMD 12-H13.83A
Robert C. Azzopardi	CMD 12-H13.84
Bhavnita Shah	CMD 12-H13.85
Candu Energy, represented by F. Yee and B. Pilkington	CMD 12-H13.86
Mark Reid	CMD 12-H13.87
The Regional Municipality of Durham, represented by G. Cubitt	CMD 12-H13.88
Ontario Ministry of Labour, represented by W. Ng	CMD 12-H13.89
Durham College	CMD 12-H13.90
Jenny Carter	CMD 12-H13.91
Braven R. Corby	CMD 12-H13.92
Michelle Bode-Simeunovich	CMD 12-H13.93
Robin Penney	CMD 12-H13.94
Peter Tabuns, MPP, Toronto-Danforth	CMD 12-H13.95
Rotary Club of Courtice	CMD 12-H13.96
Rick Maltese	CMD 12-H13.97
Don Weitz	CMD 12-H13.98
Marc Green	CMD 12-H13.99
St. Marys Cement (Canada)	CMD 12-H13.100
Rhea Baluyut	CMD 12-H13.101 CMD 12-H13.101A
Jennifer Deguire	CMD 12-H13.102
John O'Toole, MPP, Durham	CMD 12-H13.103
Marina Moudrak	CMD 12-H13.104 CMD 12-H13.104A
Ontario Clean Air Alliance	CMD 12-H13.105
Michael O'Morrow	CMD 12-H13.106
Kimberly L. Townley-Smith	CMD 12-H13.107
Fred Twilley	CMD 12-H13.108 CMD 12-H13.108A
FullCircle Energy Solutions Inc., represented by C. Young	CMD 12-H13.109 CMD 12-H13.109A

Families Against Radiation Exposure, represented by D. Kelly	CMD 12-H13.110
Hamish Wilson	CMD 12-H13.111
Paul Gasztold	CMD 12-H13.112
Jurgen Schmutz	CMD 12-H13.113
Harold Fassnacht	CMD 12-H13.114
Kelly Carmichael	CMD 12-H13.115
Alison J. Petten	CMD 12-H13.116
Robert Hunter	CMD 12-H13.117
Glen and Margaret Woolner	CMD 12-H13.118
Debra Reed	CMD 12-H13.119
Canadian Unitarians for Social Justice	CMD 12-H13.120
Genevieve Delmas Patterson	CMD 12-H13.121
Environmental Coalition of Prince Edward Island	CMD 12-H13.122
Greater Oshawa Chamber of Commerce	CMD 12-H13.123
Blake Reid	CMD 12-H13.124
Eva Torn Thomas	CMD 12-H13.125
Sheila-Marie Richardson	CMD 12-H13.126
Louissette Lanteigne	CMD 12-H13.127
Dick O'Connor	CMD 12-H13.128
Azreen F. Sikder	CMD 12-H13.129
Vijanthan Thiruchelvarajah	CMD 12-H13.130
Dominique Bruce	CMD 12-H13.131
Robert Kiley	CMD 12-H13.132
Trixie Deveau	CMD 12-H13.133
Anita Nickerson	CMD 12-H13.134
Meghan Robinson	CMD 12-H13.135
Louis Bertrand	CMD 12-H13.136 CMD 12-H13.136A
Canadian Nuclear Association, represented by H. Kleb	CMD 12-H13.137 CMD 12-H13.137A
Alan Guettel	CMD 12-H13.138 CMD 12-H13.138A
Borden Rhodes	CMD 12-H13.139
A. J. Kehoe	CMD 12-H13.140
Clemente Ciamarra	CMD 12-H13.141
E. Grant	CMD 12-H13.142
A. Lukacs	CMD 12-H13.143
S. Pharand and family	CMD 12-H13.144
L. Neilans	CMD 12-H13.145
D. Varga	CMD 12-H13.146
P. Stubbins	CMD 12-H13.147
N. Matoba	CMD 12-H13.148
K. Murtrie	CMD 12-H13.149
Science for Peace	CMD 12-H13.150
B. Blaney	CMD 12-H13.151

	CMD 12-H13.151A
University of Ontario Institute of Technology, represented by T. Price, A. Saberi and N. Menon	CMD 12-H13.152
J. McNeill	CMD 12-H13.153
L. Gasser	CMD 12-H13.154
Canadian Coalition for Nuclear Responsibility, represented by G. Edwards	CMD 12-H13.155
Darlington Nuclear Community Advisory Council, represented by J. Cryderman	CMD 12-H13.156
E. Olmsted	CMD 12-H13.157
North American Young Generation in Nuclear, represented by L. Corkum, S. Khanna and V. Jayasinghe	CMD 12-H13.158 CMD 12-H13.158A
I. Rabinovitch	CMD 12-H13.159
Women's Healthy Environments Network, represented by Dr. G. Rosenberg	CMD 12-H13.160
S. Chowdhury	CMD 12-H13.161
A. Chan	CMD 12-H13.162
Pembina Institute	CMD 12-H13.163
S. Vettese	CMD 12-H13.164
D. Slater and B. Hunter	CMD 12-H13.165
Cameco Corporation	CMD 12-H13.166
M. Hathaway	CMD 12-H13.167
J. Dupont	CMD 12-H13.168
K. Colvin	CMD 12-H13.169
C. Psarrou-Rae	CMD 12-H13.170
J. Carter	CMD 12-H13.171
Bruce Peninsula Environment Group	CMD 12-H13.172
P. Bouchard	CMD 12-H13.173
National Farmer's Union, Ontario Division	CMD 12-H13.174
Veterans Against Nuclear Arms	CMD 12-H13.175
National Farmers Union Wellington Waterloo Local	CMD 12-H13.176
J. Adler	CMD 12-H13.177
N. Chaloner	CMD 12-H13.178
S. Sinayuk	CMD 12-H13.179 CMD 12-H13.179A
P. McNamara	CMD 12-H13.180
Greenpeace, represented by S.-P. Stensil	CMD 12-H13.181 CMD 12-H13.181A
B. Stevenson	CMD 12-H13.182
S. Sherman	CMD 12-H13.183
Toledo Coalition for Safe Energy, represented by M. Leonardi	CMD 12-H13.184
G. Cockburn	CMD 12-H13.185
Ontario Voice of Women for Peace, represented by S. Grady	CMD 12-H13.186
K. Clune	CMD 12-H13.187
Mississaugas of the New Credit First Nation, represented by	CMD 12-H13.188

C. King	
K. Cumbow	CMD 12-H13.189
Williams Treaties First Nations, represented by K. S. McKenzie	CMD 12-H13.190
N. Caine	CMD 12-H13.191
Don't Nuke TO	CMD 12-H13.192
G. Cowan	CMD 12-H13.193
F. Tahsin	CMD 12-H13.194
C. Winter	CMD 12-H13.195
City of Oshawa	CMD 12-H13.196
Committee for Future Generations	CMD 12-H13.197
M. Climenhaga	CMD 12-H13.198
Physicians and Scientists for a Healthy World	CMD 12-H13.199
Durham Nuclear Awareness, represented by J. Brackett	CMD 12-H13.200 CMD 12-H13.200A
International Institute of Concern for Public Health, represented by A. Tilman, L. Harvey and G. Albright	CMD 12-H13.201 CMD 12-H13.201A
Nothwatch, represented by B. Lloyd, G. Thompson and M. Resnikoff	CMD 12-H13.202 CMD 12-H13.202A
East Toronto Youth Nuclear Group, represented by E. Butler, A. Baskaran, L. Ye and Ms. Aishwaria	CMD 12-H13.203 CMD 12-H13.203A
The Nucleus	CMD 12-H13.204
CCNB Action, represented by S. Murphy and C. Rouse	CMD 12-H13.205 CMD 12-H13.205A
United Church of Canada, represented by V. Obedkoff	CMD 12-H13.206
M. Duguay	CMD 12-H13.207 CMD 12-H13.207A
Green Party of Ontario, represented by M. Schreiner	CMD 12-H13.208
M. Paul	CMD 12-H13.209
K. Chung	CMD 12-H13.210
D. McGorman	CMD 12-H13.211
S. Leahy	CMD 12-H13.212
Letter Writing Campaign (479 letters)	CMD 12-H13.213