



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

## Record of Proceedings, Including Reasons for Decision

In the Matter of

Applicant Bruce Power Inc.

Subject Application for a Transport Licence and  
Certificate for the Transport of 16 Steam  
Generators to Sweden

Public Hearing  
Dates September 28 and 29, 2010



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## Introduction

1. Bruce Power Inc. (Bruce Power) has applied to the Canadian Nuclear Safety Commission<sup>1</sup> (CNSC) for the issuance of a transport licence and certificate for the transport of 16 decommissioned steam generators from the Western Waste Management Facility (WWMF) in the Municipality of Kincardine, Ontario to Nyköping, Sweden. Bruce Power has applied for this licence and certificate for a period of one year.
2. The 16 steam generators were brought into service in 1977 at the Bruce A nuclear generating station (NGS) and decommissioned in the mid-1990s. Eight of the steam generators were decommissioned from Unit 2 in 1995 and eight were decommissioned from Unit 1 in 1997. The steam generators are each approximately 11.7 metres in length by 2.5 metres in diameter and weigh approximately 100 metric tonnes. Each steam generator comprises a 54-millimetre thick exterior steel shell containing 4,200 Inconel tubes<sup>2</sup>. Over nearly 20 years of use, traces of radioactive material deposited on the inner surface of the tubes<sup>3</sup>. In 2007, the steam generators were sealed with welded steel closure plates to contain the radioactive material. The sealed steam generators are classified as low-level waste.
3. Bruce Power submitted the application under the requirements of the CNSC's *Packaging and Transport of Nuclear Substances Regulations*<sup>4</sup> (PTNS Regulations), which incorporate Transport Canada's *Transportation of Dangerous Goods Regulations*<sup>5</sup> (TDG Regulations) and the International Atomic Energy Agency (IAEA) *Regulations for the Safe Transport of Radioactive Material*<sup>6</sup>, TS-R-1 (IAEA Regulations). Bruce Power applied for a licence to transport the steam generators under the special arrangement provision of the PTNS Regulations because the size of the steam generators makes it impractical to package them in certified Industrial Packages. Bruce Power proposed to transport the steam generators individually by truck from the Bruce Power site in Kincardine, Ontario to the port of Owen Sound, Ontario. Upon arrival at the port of Owen Sound, each steam generator will be loaded into the cargo hold of the vessel for maritime shipment through the Great Lakes, up the St. Lawrence Seaway system, across the Atlantic ocean to a Swedish facility, operated by Studsvik Nuclear AB (Studsvik), in Nyköping, Sweden.

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

<sup>2</sup> Throughout this Record of Proceedings it is understood that the exterior shell of the steam generators is SA516 – Grade 70 steel and the tubes are Inconel 600 (Nickel Chromium Iron alloy).

<sup>3</sup> Throughout this Record of Proceedings the following three 'zones' in and around the steam generators are referred to: 1) the exterior of the shell; 2) the interior of the shell/exterior of the tubes; and 3) the interior of the tubes.

<sup>4</sup> Statutory Orders and Regulations (SOR)/2000-208.

<sup>5</sup> SOR/2001-286.

<sup>6</sup> *Regulations for the safe transport of radioactive material : safety requirements — 2005 ed. — Vienna : International Atomic Energy Agency, 2005*

4. Studsvik's facility specializes in the recycling of contaminated metal. In the recycling process, uncontaminated steel is separated from contaminated steel. The uncontaminated steel can then be recycled into scrap steel. Bruce Power's recycling initiative is expected to result in a 90% reduction in the total volume of the existing full-size steam generators. The remaining volume, comprised of the contaminated components of the steam generators, would be returned to Bruce Power for storage at the WWMF.

#### Issue

5. In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*<sup>7</sup> (NSCA):
  - a) if Bruce Power is qualified to carry on the activity that the licence and certificate would authorize; and
  - b) if, in carrying on that activity, Bruce Power would make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

#### Public Hearing

6. Pursuant to section 22 of the NSCA, the President of the Commission established a Panel of the Commission to review the application. The Commission, in making its decision, considered information presented for a public hearing held on September 28 and 29, 2010 in Ottawa, Ontario. The public hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*<sup>8</sup>. During the public hearing, the Commission considered written submissions and heard oral presentations from CNSC staff (CMD 10-H19, CMD 10-H19.A, CMD 10-H19.B, CMD 10-H19.C) and Bruce Power (CMD 10-H19.1 and CMD 10-H19.1A). The Commission also considered oral and written submissions from Studsvik and 77 intervenors (see Appendix A for a detailed list of interventions).
7. Following the public hearing, the Commission determined that it required additional information from CNSC staff and that it would allow additional time for supplementary written submissions from hearing participants. The Commission requested that CNSC staff provide additional information on their evaluation of three specific areas:
  - the environmental impact assessment conducted pursuant to the NSCA;
  - Bruce Power's Emergency Response Plan, including accident scenarios; and
  - the IAEA *Regulations for the Safe Transport of Radioactive Material* and the amount of radioactivity allowed in shipments.

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<sup>7</sup> Statutes of Canada (S.C.) 1997, chapter (c.) 9.

<sup>8</sup> SOR/2000-211.

8. CNSC staff's supplementary submission, CMD 10-H19.D, was submitted on October 18, 2010. Hearing participants had until November 22, 2010 to submit their written submissions and 32 submissions were submitted by the deadline.

### **Decision**

9. 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 Bruce Power is qualified to carry on the activity that the licence and certificate will authorize. The Commission is of the opinion that Bruce Power, in carrying on that activity, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Therefore,

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, issues to Bruce Power Inc. a transport licence and certificate for the transport of 16 decommissioned steam generators from the Western Waste Management Facility in the Municipality of Kincardine, Ontario to Nyköping, Sweden. The transport licence, TL-SX-40039.01.00/2011, and certificate, CDN/5255/X-96 (Rev.0), are valid from February 4, 2011 to February 3, 2012.

10. The Commission includes in the licence the conditions set out in the draft licence attached to CMD 10-H19.C.
11. With this decision, the Commission requests that CNSC staff notify the Commission if an import licence for the return waste has been issued to Bruce Power. The Commission notes that it expects to receive this notification prior to the waste being returned to the WWMF.

### **Issues and Commission Findings**

12. In making its licensing decision, the Commission considered a number of issues relating to Bruce Power'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. The following issues were the key issues informing the Commission's decision:
  - the characterization of nuclear substances present in the shipment;
  - the waste management and alternatives to the shipment, including leaving the steam generators in the WWMF;
  - the classification of the steam generators in accordance with the PTNS Regulations;

- the proposed packaging of the shipment;
- the overall transportation plan of the shipment, including stevedoring;
- the compensatory measures for the shipment to meet the overall level of safety required for a special arrangement;
- radiation protection;
- the application of the *Canadian Environmental Assessment Act*<sup>9</sup>;
- the environmental impact of the shipment;
- the Emergency Response Plan for the shipment;
- the security plan to cover the shipment;
- the public information program; and
- Aboriginal consultation.

### **Steam Generators and Characterization of Nuclear Substances**

13. Steam generators are reactor components that transfer thermal energy from the primary heat transport system to the secondary heat transport system to produce steam used to drive the steam turbine/generator, which produces electricity. Over many years of operation, the inner surface of the steam generator tubes becomes contaminated with traces of radioactive deposits. These deposits occur on the inside of the tubes carrying the water of the primary heat transport system and consist mainly of metal oxides that adhere to the inner surface of the tubes as a form of scale due to the temperature drop of the water in the steam generator. Most of the contamination inside the steam generators is fixed to the inner surface of the tubes.
14. The 16 steam generators were brought into service in 1977 at the Bruce A NGS and decommissioned in the mid-1990s. Eight of the steam generators were decommissioned from Unit 2 in 1995 and eight were decommissioned from Unit 1 in 1997. The steam generators are each approximately 11.7 metres in length by 2.5 metres in diameter and weigh approximately 100 metric tonnes. Each steam generator comprises a 54-millimetre thick exterior steel wall containing 4,200 Inconel tubes. Over nearly 20 years of use, traces of radioactive material deposited on the inner surface of the tubes. In 2007, the steam generators were sealed with welded steel closure plates to contain the radioactive material. The sealed steam generators are classified as low-level waste.
15. The Commission inquired about the structural integrity of the decommissioned steam generators, as they had been removed from service. Bruce Power responded that the structural integrity of the decommissioned steam generators is intact, and that they remain robust. Bruce Power noted that they made a business decision to replace them with new steam generators during the Bruce A refurbishment.

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<sup>9</sup> S.C. 1992, c. 37.

16. The Commission asked for more information regarding Bruce Power's inspections of the decommissioned steam generators. Bruce Power responded that they are inspected every time they are handled. Bruce Power further stated that they performed a variety of inspections, including non-destructive testing and visual inspections, to verify the structural integrity of the steam generators and to ensure that there is no surface contamination or loose debris within the steam generators<sup>10</sup>. CNSC staff concurred with Bruce Power.
17. Bruce Power presented information regarding the nuclear substances contained within the 16 steam generators, including an inventory of nuclear substances. Bruce Power explained that the chemical forms of the substances are metal oxides, deposited during use, on the inner surfaces of the tubes. Bruce Power further explained that they determined the contents of the steam generators using precise measurements that were made over the lifetime of the steam generators, including during outages, analysis of tube samples taken from three steam generators in 1992 and 1997, as well as analysis of measurements taken from the external surface of the steam generators in 2007. Bruce Power stated that, based on these measurements and analysis, the total shipment is estimated to contain 5.46 terabecquerels (TBq) of nuclear activity. Bruce Power noted that 4 to 13% of the contamination confined within the tubes inside the steam generators was determined to be non-fixed (loose)<sup>10</sup>.
18. CNSC staff stated that Bruce Power's methodology to estimate the activity was acceptable. CNSC staff stated that they also performed an evaluation of the inventory of nuclear substances and concluded that Bruce Power adequately estimated the nuclear activity contained within the steam generators.
19. CNSC staff noted in their supplementary CMD 10-H19.C that Bruce Power's documentation submitted for the hearing contained an error that omitted the activity for the isotope plutonium-241 (Pu-241). Several intervenors expressed concerns regarding this omission. The Commission questioned the omission and asked for clarification regarding the corrections presented in the supplementary CMD. CNSC staff responded that the CMD had been updated to include radionuclides, including Pu-241, that had been omitted from the appendix of an earlier CMD. CNSC staff noted that this error did not affect their conclusions regarding the safety of the shipment. The Commission is of the view that this omission was unfortunate but is satisfied with CNSC staff's explanation of the matter.
20. Noting intervenors' concerns specifically related to plutonium, the Commission sought assurance from CNSC staff that the plutonium content of the shipment would not pose a risk to the public or the environment. CNSC staff stated that the quantity of plutonium in the steam generators is minimal and cannot be extracted from the inner surfaces of the tubes because it is fixed in a form of oxide deposits on the interior of

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<sup>10</sup> There is a distinction between loose debris and loose contamination. Loose debris should be understood to mean "fragments of solid material" and loose contamination should be understood to mean radionuclides that are not fixed to the inner surface of the tubes.

the tubes. CNSC staff further explained that the plutonium activity in each steam generator is low; less than the activity of plutonium in a single cardiac pacemaker. CNSC staff stated that, based on their analysis, the risk related to the plutonium content of the steam generators is negligible. The Commission is satisfied with CNSC staff's assessment of this matter and is of the view that that the plutonium content of the shipment does not pose a risk to the public or the environment.

21. The Commission asked for more information regarding the measurements of contamination within the steam generators. Bruce Power responded that they measured and analyzed the contents of the steam generators throughout their lifetimes. Bruce Power stated that, because they knew the isotopes of the heavy water and the reactor fuel in the tubes when the steam generators were in service, they were able to determine the isotopes and decay products that are currently in the tubes. Bruce Power noted that that this information was also used by the CNSC for oversight purposes. Bruce Power further stated that, from the exterior of the shell, they measured the radiation dose rate coming from the tubes in 2007 and that they ran statistical models on the collected data to determine the activities of the isotopes. Bruce Power stated that the measurements of contamination are very accurate with a low margin for error, and that the data presented is a conservative bounding of the actual contents.
22. The Commission asked if any parts other than the tubes inside the steam generators are contaminated. Bruce Power responded that although the majority of the contamination is fixed inside the tubes as oxide deposits, they made a conservative assumption that there may be some contamination inside the steam generators near the inlet and outlet of the tubes. CNSC staff concurred with Bruce Power's assessment of the contamination inside the steam generators.
23. Several intervenors expressed concerns regarding the uncertainty of the contents of the steam generators, noting that the exact amounts of contaminants contained within the steam generators were estimated and not directly measured. The Commission felt that it was important to address this issue and asked for CNSC staff's view on the matter. CNSC staff responded that, based on the methodology used by Bruce Power, which included precise measurements in 1997 and 2007, and established analysis procedures, they are satisfied that Bruce Power's estimate is accurate. CNSC staff noted that it was necessary to estimate the amounts rather than directly measure them because the tubes are now inaccessible. The Commission is satisfied that the methodology used by Bruce Power to determine both the nuclear activity and the contents of the steam generators is acceptable and is sufficiently reliable for the estimate to be accurate.
24. Some intervenors cited data from an Ontario Power Generation (OPG) document<sup>11</sup> regarding the radioisotope contents of steam generators and asked why this information differed from that presented by Bruce Power. The Commission questioned Bruce Power in this regard. Bruce Power responded that the document from OPG was for the purposes of a full-site decommissioning and includes all of the steam generators in

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<sup>11</sup> "Reference Low and Intermediate Level Waste Inventory for the Deep Geologic Repository", page 50, Ontario Power Generation, August 2008.

Ontario. Bruce Power stated that the table includes short-lived isotopes that are from what would be newly-decommissioned steam generators, and explained that these short-lived isotopes would no longer be present in the Bruce A steam generators because they have been out of service for 15 years. The Commission is satisfied with Bruce Power's explanation of this matter.

25. The Commission asked Bruce Power to provide clarification regarding the level of contamination on the external surface of the steam generators. Bruce Power stated that they tested the surfaces of the steam generators and found no surface contamination. CNSC staff stated that they conducted tests in July and September 2010<sup>12</sup>, and verified Bruce Power's results. The Commission is satisfied with this response.
26. Based on the above information and considerations, the Commission is satisfied that Bruce Power accurately determined the contents and nuclear activity contained within the steam generators.

### **Waste Management and Alternatives**

27. Bruce Power submitted that they wanted to recycle the steam generators in order to reduce the footprint of the steam generators in the WWMF. Bruce Power explained that their proposal would reduce the amount of waste volume in storage in the WWMF by 90 percent and facilitate the long-term management of the waste, which is considered a best practice of the nuclear industry.
28. Many intervenors opposed the shipment of steam generators and proposed that the steam generators be left in storage at the WWMF. The Commission asked Bruce Power to comment on the matter. Bruce Power responded that they considered alternatives to the proposal and they determined that reducing the footprint of the steam generators in storage in the WWMF is the best option. Bruce Power further stated that other countries recycle steam generators from light water reactors, and compared to those, the steam generators from CANDU reactors are smaller, simpler, and less radioactive. CNSC staff concurred with this statement.
29. The Commission asked for more information regarding the long-term storage of the steam generators. CNSC staff responded that the WWMF, which is operated by OPG, was built to hold up to 24 steam generators, which means that the WWMF footprint will have to be expanded if all of the steam generators from the Bruce Power site are to be stored there. CNSC staff stated that the steam generators are managed with all of the other low-level waste. CNSC staff stated that, for the short term, there is sufficient space at the WWMF and, for the long term, OPG is considering a deep geologic repository for low- and intermediate-level waste. Bruce Power concurred with CNSC staff's assessment and stated that, over time, 64 steam generators will be decommissioned.

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<sup>12</sup> CNSC staff confirmed after the hearing that the tests were conducted in accordance with PTNS Regulations.

30. The Commission asked if other decommissioned metals from Canadian nuclear facilities have been recycled in the past. Bruce Power stated that, as part of the decommissioning activities for facilities, certain items can be decontaminated and released for other uses. CNSC staff stated that there have been examples of recycled materials from the decommissioned Bruce Heavy Water Plant and the AECL Whiteshell nuclear research site. CNSC staff stated that such materials are cleared for release in accordance with the *Nuclear Substances and Radiation Devices Regulations*<sup>13</sup>.
31. The Commission is in agreement with Bruce Power that the reduction of the footprint of the steam generators in the WWMF is good practice for the long-term management of the waste. The Commission is of the view that this is consistent with CNSC Regulatory Policy P-290<sup>14</sup> in that, when making regulatory decisions concerning the management of radioactive waste, it is the policy of the CNSC to consider that the generation of radioactive waste is minimized to the extent practicable. In this regard, the Commission believes that material that is not waste does not need to be stored as waste.

### **Packaging and Transport**

#### *Licence Application in Accordance with the PTNS Regulations*

32. The Commission considered Bruce Power's application in accordance with the requirements of the PTNS Regulations, which incorporate the TDG Regulations and the IAEA Regulations. Bruce Power submitted their application for a transport licence under special arrangement in accordance with Section 5 of the PTNS Regulations.
33. Section 5 of the PTNS Regulations states that "an application for a licence to package or transport a nuclear substance under special arrangement shall contain, in addition to the information required by section 3 of the General Nuclear Safety and Control Regulations, (a) the information specified in paragraph 825 of the IAEA Regulations."
34. Paragraph 825 of the IAEA Regulations states that "an application for approval of shipments under special arrangement shall include all the information necessary to satisfy the competent authority that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of these Regulations had been met. The application shall also include: (a) A statement of the respects in which, and of the reasons why, the shipment cannot be made in full accordance with the applicable requirements; and (b) A statement of any special precautions or special administrative or operational controls which are to be employed during transport to compensate for the failure to meet the applicable requirements."

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<sup>13</sup> SOR/2000-207.

<sup>14</sup> CNSC Regulatory Policy P-290, *Managing Radioactive Waste*, July 2004

35. In order for the Commission to issue a transport licence under special arrangement, it must be satisfied that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of the PTNS Regulations had been met.

*Requirement for a Special Arrangement*

36. Based on the total estimated quantity of radioactive substances in the steam generators, Bruce Power proposed that the Steam Generators be classified as SCO-I<sup>15</sup> material. For the proposed shipment of the steam generators, Bruce Power submitted its application for a transport licence under a special arrangement, in accordance with Section 5 of the PTNS Regulations, because three requirements of the PTNS Regulations could not be met, specifically:
- SCO-I radioactive material must be packaged in an industrial package Type I (Type IP-1 Package);
  - the activity over all inaccessible surfaces must be less than the SCO-I activity limits for inaccessible surfaces; and
  - the total activity must be less than the SCO activity limits for a single conveyance.
37. Bruce Power explained that the requirements cannot be met because the size of the steam generators makes it impractical for them to be packaged; the interior of the steam generators cannot be accessed, which does not allow direct confirmation of the estimated internal surface contamination levels; and because the total activity is estimated to exceed the limits of the regulations for SCO-I material transported onboard a single ship.
38. CNSC staff concurred that Bruce Power's application meets the requirements for a special arrangement. CNSC staff stated that a special arrangement authorization allows for the shipment to exceed the conveyance limit applicable to SCO as long as the level of safety is equivalent or better than the requirements found in the regulations. CNSC staff stated that the IAEA Regulations outline when special arrangements should be considered, and concurred with Bruce Power's rationale that the steam generators be shipped under a special arrangement. CNSC staff stated that the PTNS Regulations take into account the risks from both normal and accident conditions of transport in the classification of the material and the associated packaging requirements. CNSC staff further stated that, for the transport of the steam generators under special arrangement, the overall level of safety in transport is required to be equivalent to or better than what would be required under the applicable regulatory requirements.

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<sup>15</sup> Surface Contaminated Object (SCO) Group-1 (SCO-I) material is the lowest categorization under the PTNS Regulations applicable to SCOs. SCO-I is defined in the IAEA Regulations as a solid object which is not itself radioactive but which has radioactive material distributed on its surfaces within certain radiation limits over the surface area.

39. In order for the Commission to issue a transport licence under special arrangement, it must be satisfied that the steam generators meet the requirements of the PTNS Regulations for SCO-I material, that the proposed package configuration with respect to the requirements applicable to SCO-I material and Type IP-1 packages meets regulatory requirements, and that the proposed shipment complies with the NSCA and PTNS Regulations. That is, the Commission must be satisfied that the steam generators are classified as SCO-I material, that Type IP-1 packaging requirements are met or exceeded, and that the proposed shipment meets or exceeds the safety requirements for SCO-I material.

*Classification of the Steam Generators in Accordance with the PTNS Regulations*

40. The Commission considered the classification of the steam generators in accordance with the PTNS Regulations. Bruce Power proposed that the steam generators be classified as SCO-I material. In the case of the steam generators, the applicable SCO-I limits are for fixed and non-fixed contamination on inaccessible surfaces. The applicable SCO-I limits in any 300 cm<sup>2</sup> of contaminated surface area are 4 x 10<sup>4</sup> Bq/cm<sup>2</sup> for beta, gamma and low-toxicity alpha emitters, and 4 x 10<sup>3</sup> Bq/cm<sup>2</sup> for all other alpha emitters. Bruce Power noted that, due to the inaccessible surface areas of the steam generator components, it was not possible to directly confirm that there is no 300 cm<sup>2</sup> area that does not exceed SCO-I limits.
41. CNSC staff concurred that the steam generators be classified as SCO-I material. CNSC staff stated that the amount of activity averaged over the inner surface of tubes within the steam generators meets SCO-I classification. CNSC staff noted that the contamination is contained within the steam generator tubes and is not accessible. CNSC staff stated that although a uniform distribution of contamination inside the tubes could not be directly confirmed, the total estimated quantity of radioactive substances in the steam generators from Unit 1, which were removed from service in 1997, was 36% of the SCO-I limit for beta, gamma and low-toxicity alpha emitters, and 45% of the SCO-I limit for all other alpha emitters. CNSC staff noted that the values were lower for the steam generators from Unit 2 because they were removed from service in 1995. CNSC staff stated that Bruce Power's activity estimate is conservative, and based on the results, it is reasonable that the steam generators be classified as SCO-I material.
42. Some intervenors expressed concerns regarding the classification of the steam generators as SCO-I due to the level and nature of the contents of the steam generators. The Commission asked for more information in this regard. Bruce Power responded that the estimation of the contents of the steam generators was performed using actual measurements and was based on an acceptable analysis methodology, and, as such, the classification as SCO-I is appropriate. The Commission was assured by CNSC staff that the omission of data, which was provided in supplementary CMDs, did not result in an incorrect classification of the steam generators. The Commission is satisfied with Bruce Power's and CNSC staff's response on this matter.

43. Based on this information provided by Bruce Power and CNSC staff, the Commission is of the view that the steam generators meet the requirements of the PTNS Regulations for SCO-I material and, therefore, the steam generators are classified as SCO-I material.

*Packaging*

44. The PTNS Regulations require that SCO-I radioactive material be packaged in a Type IP-1 Package. Under a special arrangement, the Commission must be satisfied that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of the PTNS Regulations had been met. As such, the Commission must be satisfied that Type IP-1 packaging requirements are met or exceeded.
45. Bruce Power submitted that the shells of the steam generators meet or exceed the packaging requirements for a Type IP-1 Package under exclusive use<sup>16</sup>. Bruce Power explained that Type IP-1 Packages are robust containers that must meet design conditions specified by the PTNS Regulations and the IAEA Regulations. Bruce Power stated that the sealed steam generators are rugged, leak-tight packages that meet or exceed the Type IP-1 packaging requirements. Bruce Power noted that there will be no other cargo on board the conveyance.
46. CNSC staff concurred with Bruce Power and agreed that the thick steel shell provides containment and shielding for the nuclear substances. CNSC staff stated that the openings to the steam generators were welded closed and tested in accordance with the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*<sup>17</sup>. CNSC staff stated that the steam generator shell meets the Type IP-1 packaging requirements.
47. CNSC staff also provided information regarding an international example of a similar steam generator shipment. CNSC staff stated that four 200-ton steam generators were transported under special arrangement by road and sea from Germany to Studsvik's facility in Sweden. CNSC staff noted that in this example, the steam generators required additional shielding because they contained a greater amount of contamination than those from Bruce Power's facility<sup>18</sup>. CNSC staff stated that their assessment of Bruce Power's application is consistent with international practice.
48. The Commission asked for a comparison between the shipment of the steam generators and a packaged shipment of medical isotopes. CNSC staff responded that the exterior surface of the steam generators has a lower surface dose than a package of medical isotopes.

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<sup>16</sup> As defined in paragraph 221 of the IAEA Regulations, "*Exclusive use* shall mean the sole use, by a single *consignor*, of a *conveyance* or of a large *freight container*, in respect of which all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the *consignor* or *consignee*." Regarding the proposed shipment, Bruce Power is the consignor and Studsvik is the consignee.

<sup>17</sup> American Society of Mechanical Engineers Boiler and Pressure Vessel Code - 2007 Edition

<sup>18</sup> The difference is due to the nature and greater quantity of contamination contained within the steam generators, as these steam generators are from light water reactors and not from CANDU-type heavy water reactors.

49. The Commission considered the robustness of the steam generators under accident scenarios. Several intervenors expressed concerns regarding the robustness of the steam generators and their ability to withstand accidents, such as fire or sinking. Intervenors noted that some types of packages need to undergo engineering tests, including a 30-minute fire at 800 degrees Celsius and a one-hour immersion in 200 metres of water. The Commission asked for more information on this matter. A representative from WMG Inc. (WMG), the company that would be overseeing the shipment, responded that Type B packages, which are certified for much higher quantities of radioactive material, must undergo tests, but those tests do not apply to industrial packages, which are designed for lower quantities of radioactive material. CNSC staff added that the steam generators were designed as pressure vessels and they can withstand pressures at a depth of 800 feet in water. CNSC staff further stated that the high-temperature properties of steel exceed the requirements of a Type IP-1 industrial package. The Commission is satisfied that, under accident scenarios, the robustness of the steam generators meets or exceeds the requirements of a Type IP-1 industrial package.
50. The Commission is of the view that the public would benefit from guidance information on shipments under special arrangement and asked CNSC staff if any guidance documents exist in this regard. CNSC staff responded that the IAEA will be developing guidance documents and advisory materials that will be linked with the regulations. CNSC staff explained that while special arrangement shipments are provided for in the PTNS Regulations and the IAEA Regulations, guidance is being prepared to assist applicants and reviewers on what should be applied based on past experience.
51. Based on the above information, the Commission is satisfied that the steam generator shells meet the SCO-I packaging requirement for a special arrangement. That is, the Commission is of the view that the steam generator shells meet or exceed Type IP-1 packaging requirements.

*Preparatory Work*

52. Bruce Power provided information regarding the work done to prepare the steam generators for shipment. Bruce Power stated that packaging and transportation preparations were performed in a designated construction island located at the WWMF at the Bruce Power site. Bruce Power stated that the steam generators were painted to provide additional protection to the exterior of the steam generators. Bruce Power further stated that the steam generators were fixed onto transport saddles.

*Road Transport*

53. Bruce Power described the proposed plan for the road transportation aspect of the shipment. Bruce Power stated that each of the steam generators would be shipped individually from Tiverton, Ontario to the Port of Owen Sound, and that the shipping route has undergone an engineering evaluation to ensure that the road will be able to accommodate the shipment. Bruce Power explained that the travelling speed would be limited to 15-20 kilometres per hour and would require an escort and permits from the Province of Ontario and the municipalities along the route. Bruce Power noted that the permits can only be issued within 30 days of the shipment. Bruce Power further stated that, upon arrival at the port of Owen Sound, each steam generator will be loaded into the cargo hold of the ship.
54. CNSC staff stated that they evaluated Bruce Power's proposed plan for the road transportation aspect of the shipment and determined that it is acceptable.
55. The Commission sought further information regarding the route from the Bruce Power site to the port of Owen Sound. Intervenors expressed concerns regarding the impact of the shipment on traffic, including during situations where road conditions were not ideal. Bruce Power stated that the route would be along a combination of different highways, and noted that they tried to keep the route off the main route between Owen Sound and Port Elgin for traffic reasons. Bruce Power further stated that both they and the Province of Ontario are conducting an engineering review and evaluation of the route to ensure that it is suitable for the transport. Bruce Power noted that they have experience transporting steam generators, as they have previously transported new steam generators to the Bruce Power site from Cambridge as part of the refurbishment of the Bruce A NGS. Bruce Power confirmed that they want to minimize the impact on local traffic.
56. The Commission got confirmation from Bruce Power that they have engaged with Transport Canada regarding the shipment to ensure that they meet Transport Canada's TDG Regulations. CNSC staff also confirmed that the Owen Sound transportation engineer has no concerns regarding the proposed shipment. Bruce Power noted that they have to apply for a permit from the Province of Ontario 30 days before the transport, and that the permit would only be granted if the route was deemed to be acceptable.
57. The Mayor of Owen Sound, in her intervention, expressed concerns regarding the road transport through the city of Owen Sound, including the impact on traffic and emergency response. The Mayor of Owen Sound requested that Bruce Power provide certain information regarding the shipment to the city prior to the shipment. Bruce Power responded that they would. The Commission is satisfied that Bruce Power will accommodate the city's request.

58. The Mayor of Owen Sound also indicated that there is a steep hill that leads into the city. The Commission asked whether Bruce Power has any concerns regarding this hill. Bruce Power responded that they have taken the hill into consideration in their assessment of the route and that they do not have any concerns in this regard.
59. The Commission is satisfied with the evaluation of the road transportation aspect of the shipment and finds that it is acceptable. The Commission notes that approximately 10 shipments per week of low-level radioactive waste are made by road from Ontario's NGSs to the WWMF, up to approximately 500 shipments a year.

#### *Marine Transport*

60. Bruce Power described the proposed plan for the marine transportation aspect of the shipment. Bruce Power stated that the steam generators will be loaded onto a dedicated, special-use vessel for shipment through the Great Lakes, up the St. Lawrence Seaway system and across the Atlantic ocean to Studsvik's facility in Nyköping, Sweden. Bruce Power also provided information regarding the marine transport vessel. Bruce Power stated that the vessel, even when fully loaded, is well within the maximum draught limits set by the St. Lawrence Seaway Management Corporation.
61. CNSC staff stated that they reviewed Bruce Power's application to ensure that it is compliant with the IAEA Regulations as well as the *International Maritime Dangerous Goods (IMDG) Code*<sup>19</sup>, as it is an international shipment. CNSC staff concluded that the shipment complies with these international regulatory requirements. CNSC staff noted that, under the IAEA Regulations and the IMDG Code, Bruce Power is responsible for obtaining approval by all countries where the shipment would go through or into in addition to Canada, including the United States and Sweden. CNSC staff further noted that the United States Department of Transportation and the Swedish Radiation Safety Authority will conduct their own reviews of Bruce Power's application.
62. In order for the Commission to issue a transport licence under special arrangement, it must be satisfied that the proposed shipment meets or exceeds the safety requirements for marine transport of SCO-I material. CNSC staff provided information regarding the applicability of the activity limits for various materials and packaging. CNSC staff stated that, based on their review, the overall level of safety in the proposed transport of all 16 steam generators on a single ship is at least equivalent to what is authorized in the regulations, and that there is no radiological impact on the environment, public and workers. The Commission requested that CNSC staff submit additional information and analysis on this matter and CNSC staff submitted further analysis in CMD 10-H19.D.

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<sup>19</sup> *International Maritime Dangerous Goods Code*, 2008 Edition, International Maritime Organization

63. CNSC staff provided information regarding the classification of the vessel that would transport the 16 steam generators. CNSC staff stated that the vessel is classified as INF2<sup>20</sup> vessel, and its safety requirements exceed those of a conventional sea-going vessel. CNSC staff explained that the vessel is qualified and authorized to transport irradiated nuclear fuel, highly radioactive waste and plutonium that have much higher levels of nuclear activity than the steam generators. CNSC staff stated that there is an adequate safety margin for the shipment due to the additional level of safety provided by the vessel.
64. Under section 5 of the PTNS Regulations, a special arrangement provides a mechanism for situations where a shipment cannot be made in full accordance with the applicable requirements but the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of the PTNS Regulations had been met. Intervenors expressed concerns that the special arrangement would allow the vessel to exceed the conveyance limit for SCO-I material. The Commission does not share this concern. The Commission notes that it must be satisfied that the overall level of safety in the proposed transport meets the requirements of the PTNS Regulations before it can issue a licence under special arrangement.
65. The Commission considered information regarding the level of safety of the proposed transport. Some intervenors expressed the view that the vessel would exceed the conveyance limit for SCO-I material by a factor of 50. The Commission requested that CNSC staff present their analysis on this matter. CNSC staff submitted further analysis in CMD 10-H19.D and explained that, while the intervenors' value of 50 is too high, the limit would, in the absence of compensatory measures, be exceeded by a factor of six. CNSC staff stated that Bruce Power's proposed compensatory measures, including welding shut all steam generator openings, painting the exteriors of the steam generators, making the transport an exclusive use transport with radiation protection controls, and using an INF2 vessel, ensure that the shipment meets the requirements for a special arrangement found in the PTNS Regulations. CNSC staff further stated that there is an additional level of safety because the activity in the steam generators is inaccessible, and, as such, less likely to be released during an accident. CNSC staff explained that this is because contamination on inaccessible surfaces is less likely to be subject to scraping, impact and thermal forces that may occur during an accident. The Commission is satisfied that the analysis presented by CNSC staff demonstrates that the overall level of safety in the proposed transport meets the requirements for a special arrangement.
66. The Commission asked for more information regarding the international aspect of the shipment through Norway and Denmark. Studsvik responded that approvals are necessary for shipments through international water around the United Kingdom, Norway and Denmark. The Commission notes that Bruce Power is responsible for obtaining these approvals.

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<sup>20</sup> INF stands for Irradiated Nuclear Fuel

67. The Commission asked about the shipment of other wastes by ship, including spent fuel. Studsvik responded that spent fuel shipments are made within Sweden using a dedicated vessel.
68. The Commission asked for more information regarding WMG and the regulations they would have to follow. CNSC staff responded that WMG would have to follow the IMDG Code, and that their personnel have met CNSC staff's expectations regarding safety training. WMG stated that they would be overseeing the shipment, and that they are experienced in these types of shipments.
69. The Commission asked how long the vessel would be in the port of Owen Sound. Bruce Power responded that it would be in the port for approximately 20 days.
70. One intervenor sought clarification regarding the timing of Bruce Power's transport licence application and an earlier application for an export licence from the CNSC. The Commission notes that Bruce Power applied for an export licence in January 2010 and applied for the transport licence and certificate in April 2010.
71. The Commission asked what the planned shipping date would be. Bruce Power responded that they had not yet picked a date for the shipment. Bruce Power noted that they will require a licence from Transport Canada to make the shipment, and Transport Canada would only issue a licence if they are satisfied that the vessel can safely navigate the route, including the St. Lawrence Seaway. In addition, Bruce Power indicated that they would also have to obtain approval from the U.S. Department of Transportation.
72. Many intervenors expressed the view that the proposed shipment would set a precedent for future shipments through the Great Lakes. The Commission asked for more information on the proposed shipment and other shipments in the Great Lakes. CNSC staff responded that there is regulatory oversight for the transportation of dangerous goods, and noted that other shipments that are currently being made on the Great Lakes could have a greater environmental impact than Bruce Power's proposal. CNSC staff noted that the potential impact of an accident involving the steam generators would be negligible. The Commission asked how the proposed shipment compares to other shipments of radioactive goods. CNSC staff responded that the proposed shipment is in the lowest category of radioactive shipments.
73. The Commission notes that if Bruce Power wants to make a similar shipment in the future, they would have to follow the same licence application process and the risk would be analyzed according to applicable rules and regulations. The Commission further notes that the current licence application is limited to the proposed shipment.

74. The Commission disagrees with the allegation put forward by the Council of Canadians that once the precedent of shipping radioactive waste is established, the Commission may be powerless to limit future shipments. In its licensing function, the Commission exercises the authority granted to it by Parliament. It is not for the Commission to use its statutory powers to prohibit trade activities. The mandate of the Commission is to regulate in accordance with the powers and responsibilities provided to it in its enabling legislation. The Commission evaluates the merits of each application on a case-by-case basis.
75. The Commission asked Bruce Power why they chose the port of Owen Sound for the shipment. Bruce Power responded that they looked at all of the available alternatives and decided that the port of Owen Sound, the closest, federally-approved location, was the best. The Commission is satisfied that Bruce Power has taken the draught of the harbour into consideration.
76. The Commission asked for clarification regarding the exclusive use of the shipment. CNSC staff responded that the entire shipment is under Bruce Power's direction and there cannot be any other cargo on the ship.
77. Based on the above information, the Commission is satisfied with the evaluation of the marine transportation aspect of the shipment and finds that it is acceptable. The Commission is satisfied that there is an adequate safety margin for the shipment due to the additional level of safety provided by the INF2 vessel. The Commission is satisfied that the proposed shipment meets the requirements for a special arrangement because the proposed shipment meets or exceeds the safety requirements for marine transport of SCO-I material.

#### *Return Shipment*

78. The Commission notes that its consideration of Bruce Power's application for a licence to transport the steam generators under special arrangement does not require it to consider the return shipment. The Commission is of the view, however, that information pertaining to the return shipment is important to consider in light of the fact that the return shipment will be made as a direct result of the proposed shipment to Sweden.
79. Bruce Power provided information regarding the future return shipment from Sweden. Bruce Power stated that the recycling initiative would result in a 90% reduction in the total volume of the existing full-size steam generators and the remaining volume of waste, comprised of the contaminated components of the steam generators, would be returned to Bruce Power for storage at the WWMF. Bruce Power stated that the returned materials would be packaged and shipped in accordance with applicable regulations without the need for a special arrangement.

80. The Commission sought further information regarding the packaging of the return waste. CNSC staff responded that the return waste would be low level waste in certified packaging. CNSC staff stated that the return waste shipment would be low-risk packages that meet international transport and packaging requirements. Studsvik stated that approximately 400 tonnes of material would be shipped back to Bruce Power in several packages.
81. Intervenors expressed concerns that the return waste would be “concentrated” and more radioactive. The Commission asked CNSC staff to provide clarification regarding the radioactive contents of the return waste. CNSC staff stated that the amount of radioactivity in the return waste would be precisely measured and that there would be no increase in the amount of radioactivity. The Commission asked for more information regarding the difference between the waste sent to Studsvik and the waste returned to Canada. Studsvik responded that the amount of radioactivity will be almost the same, minus the very small amount in the recycled metal that is below the clearance level. The Commission is satisfied that there will be no increase in the amount of radioactive contamination in the return waste.
82. Intervenors asked whether the CNSC would be licensing the return shipment. The Commission notes that as long as the waste is packaged in accordance with regulatory requirements, a licence would not be needed to transport the waste. Bruce Power will, however, require a licence from the CNSC to import the waste.
83. The Commission is satisfied that that the return waste will be low level waste and that the return shipment must be packaged and shipped in accordance with applicable regulations.

#### *Conclusion on Packaging and Transport*

84. Based on the above information and considerations, the Commission is satisfied that the steam generator shells meet Type IP-1 package requirements and that the overall level of safety in transport meets or exceeds all the applicable requirements of the PTNS Regulations. The Commission is satisfied that the proposed package configuration with respect to the requirements applicable to SCO-I material and Type IP-1 packages meets regulatory requirements, and that the proposed shipment complies with the NSCA and PTNS Regulations

#### **Radiation Protection**

85. Bruce Power presented information regarding the measures in place to ensure that workers and members of the public are protected from the radiation hazards associated with the transport of the steam generators. Bruce Power stated that the maximum dose rate on the exterior surface of the steam generators was 0.270 millisieverts per hour (mSv/h), and that most of the dose rates were less than 0.100 mSv/h. Bruce Power

further stated that the maximum dose one metre from the steam generators was 0.080 mSv/h. Bruce Power noted that there is no surface contamination on the steam generators and that the dose rates measured from the steam generators are a result of the radioactive contamination inside the steam generators.

86. CNSC staff stated that they confirmed Bruce Power's dose measurements from the steam generators, and noted that additional measurements would be performed once the steam generators are loaded on board the vessel. CNSC staff further noted that surface contamination surveys had been performed on two of the steam generators and no surface contamination was found.
87. CNSC staff stated that they reviewed the radiation protection programs submitted in Bruce Power's application and found that the overall program meets CNSC regulatory requirements, and follows the ALARA (As Low As Reasonably Achievable) principle. CNSC staff stated that adequate provisions are in place to protect the health and safety of workers and the public.

#### *Protection of Workers from Radiation*

88. Bruce Power stated that work activities during the preparation of the steam generators at the WWMF will be performed in accordance with OPG's radiation protection requirements and radiation protection program, as OPG is the licensee for the WWMF.
89. Bruce Power stated that highway transport activities from the Bruce Power site to the port of Owen Sound will be performed in accordance with Transport Canada's TDG Regulations and CNSC's PTNS Regulations. Bruce Power noted that the steam generators meet the requirements for Type IP-1 packages and will contain SCO-I material. Bruce Power noted that the drivers of the land transport vehicles will not require any protective clothing and that they will wear dosimeters to measure the dose they may receive.
90. Bruce Power stated that marine transport activities will be performed in accordance with the vessel's radiation protection program. Bruce Power explained that the vessel crew will be protected using the segregation requirements of the IMDG Code and that one person onboard will be certified in radiation safety. In addition, Bruce Power stated that the cargo hold will be locked and secured during the trip.
91. CNSC staff stated that they reviewed Bruce Power's radiation protection program as it pertains to the proposed shipment, and found that the program meets CNSC requirements. CNSC staff stated that they are satisfied that a person qualified in radiation protection will be accompanying the steam generators during transit and that all activities on board the vessel will be performed in accordance with the vessel's radiation protection program. CNSC staff noted that all workers will wear dosimeters to measure the "whole-body" and "skin" doses they may receive. CNSC staff stated that the predicted doses to crew members involved in the surveillance of the steam generators are 1.8 millisievert (mSv) for the duration of the trip, which is well below the nuclear energy worker dose limits of 50 mSv/year or 100 mSv/5 years.

92. The Commission asked for more information regarding the doses to workers during the preparation and shipment activities. Bruce Power responded that there are different “zones” for work and that a radioactive exposure permit defines what work is to be done in which zone and what protection is required. Bruce Power noted that in a non-radiological controlled area there is no need for additional protection. Bruce Power further noted that while the exterior surfaces of steam generators are not contaminated, the workers are monitored with dosimeters at all times. CNSC staff stated that they evaluated the radiation protection program and agreed that workers are monitored. CNSC staff noted that the dose estimates to workers are expected to be well below the Canadian and Swedish limits for workers, and the dose estimates will be verified and updated during the shipment.
93. One intervention included a reference to an Internet video of Bruce Power workers wiping the steam generators. The intervenor was of the opinion that the video depicted workers wiping surface contamination from the steam generators. The Commission asked for more information on this subject. Bruce Power explained that the video depicted workers sampling the surface of the steam generators prior to moving them from one work zone to another. Bruce Power reiterated that there is no surface contamination on the steam generators.
94. The Commission satisfied that Bruce Power has an effective radiation protection program in place and that the radiation risk of the proposed shipment to workers is negligible.

*Protection of the Public from Radiation*

95. Bruce Power stated that no member of the public will receive a dose that approaches or exceeds the regulatory limit for members of the public of 1 mSv/y. Bruce Power explained that, based on dose estimates for people walking by the steam generators while they are in transit on the highway, members of the public will have a maximum dose exposure of less than 0.1 percent of the public dose limit. Bruce Power stated that access to the steam generators will be controlled at all times.
96. CNSC staff concurred with Bruce Power’s assessment that no member of the public will receive a dose that exceeds the regulatory limit. CNSC staff stated that the total predicted dose to the driver of the steam generator transport is estimated to be 0.020 mSv for all 16 steam generators. CNSC staff noted that the driver will wear two dosimeters to measure the received “whole-body” and “skin” doses.
97. CNSC staff presented information regarding the health effects of various accident scenarios, including an accident in Lake Ontario, an accident in a lock, an accident in the St. Lawrence River, and an accident in Owen Sound. CNSC staff stated that they considered credible accident scenarios using conservative IAEA parameters and assumptions, as well as an extreme, unrealistic accident scenario where the total inventory of the 16 steam generators is released. CNSC staff stated that, based on their analysis, the risk to human health from the proposed shipment is negligible.

98. Many intervenors expressed concerns regarding the radioactive contents of the scrap metal that will be produced at the Studsvik facility. The intervenors expressed the view that the metal would be contaminated and pose a risk to the health of the public in its end use. The Commission inquired about the risks related to the scrap metal. Studsvik responded that the end use of the metal would have activity of less than 0.1 Bq/gram. CNSC staff stated that any material released by Studsvik for recycling must conform to the strict clearance levels in place in the European Union, and that the end use steel must comply with conditions for unconditional clearance. CNSC staff explained that unconditional clearance means that the metal is safe to be released for any use, and that the unconditional clearance levels are based on IAEA guidance and are also included in the *Nuclear Substances and Radiation Devices Regulations*. Bruce Power noted that the radioactive components of the steam generators will be returned to Bruce Power and will not be recycled.
99. The Commission asked for more information regarding Studsvik's recycling process. Studsvik responded it separates the scrap metal from the contaminated metal and ensures that the scrap metal is not contaminated above the clearance levels. Studsvik stated that it recycles the scrap metal into ingots, and sends the ingots to foundries in accordance with applicable Swedish regulations and standards. Studsvik stated that, as part of the recycling process and in order to improve the quality of the recycled steel, the recycled metal will go to foundries to be re-melted with other scrap metal a ratio of one part recycled metal to ten parts scrap metal. CNSC staff stated that Studsvik is in good standing with the Swedish Radiation Safety Authority.
100. Regarding the CNSC's role in the oversight of contaminated metals, the Commission notes that the *Nuclear Substances and Radiation Devices Regulations* are consistent with international practice and are related to health, safety and risk. Any nuclear substance above the clearance level limit is regulated; materials containing nuclear substances over the clearance level limit need to be licensed, and the CNSC regulates licensed facilities. The Commission further notes that radiation monitors are in place at metal facilities and recycling facilities, and manufacturers are responsible to ensure that they meet the limit.
101. Some intervenors expressed the view that the CNSC regulations were created in order to benefit the nuclear industry and did not take the public's opinion into consideration. The Commission is of the firm view that this is not the case. As explained by CNSC staff, the regulatory process is published and includes a public consultation process. CNSC staff noted that an extensive *Nuclear Substances and Radiation Devices Regulations* consultation process began in 2004 and the regulations were adopted in April 2008. The Commission welcomes input from the public at any time for future consideration of the regulations.

102. The Commission sought assurance that Bruce Power would provide adequate protection of the public in the transport of the steam generators. Bruce Power explained that the steam generators will be in a controlled environment and that a member of the public standing close to the steam generators for more than one hour would only receive a minimal dose. Bruce Power noted that no shielding would be necessary because the doses from the steam generators are low. CNSC staff concurred with Bruce Power and noted that the radiation protection aspect of the shipment appropriately takes into consideration distance, time and shielding.
103. Intervenors expressed concerns regarding the health effects of any accidents that may occur during the proposed shipments. The Commission sought further information in this regard. CNSC staff responded that they assessed a variety of credible bounding scenarios and determined that the environmental and human health risk from a release would be very low. CNSC staff explained that the bounding scenarios were conservative and based on credible accidents, following IAEA guidance.
104. Intervenors expressed the view that the bounding scenarios did not take a hypothetical worst-case scenario into consideration. The Commission asked for CNSC staff to submit additional detail regarding their analysis of accident scenarios. CNSC staff provided further details in CMD 10-H19.D. CNSC staff stated that, based on the robustness of the steam generators and the measures taken to ensure that they are transported safely, it is unlikely that an accident, such as a steam generator being dropped into the cargo hold, would result in several steam generators being breached. CNSC staff further stated that such an accident could only take place inside the ship, which would provide further containment for the releases. CNSC staff noted that in the extreme, unrealistic accident scenario where 100% of the total inventory of all 16 steam generators was released, the dose estimate would be 40.3 mSv. CNSC staff stated that, due to the levels of conservatism built into their analysis, it is highly improbable that a member of the public would be exposed in this fashion. CNSC staff further noted that health risks in people exposed to radiation doses of 100 mSv or less are low. The Commission is satisfied with the additional information submitted by CNSC staff. Based on the measures that would be in place to ensure the steam generators are transported safely, the Commission is of the view that the radiation risk of the proposed shipment in an accident is negligible.
105. The Commission notes that a perimeter around the ship at the port in Owen Sound is necessary, although the dose from the steam generators, which are contained within the ship at the port in Owen Sound, is negligible. The perimeter is primarily for security purposes and also provides an additional level of conservatism regarding the dose to the public.

106. Many intervenors expressed concerns regarding the health effects of radiation. Physicians for Global Survival, in their intervention, expressed the view that there is no safe dose of radiation and that dose limits have not been properly researched. The Commission asked CNSC staff to discuss health studies and the effects of low doses, such as those from the proposed shipment. CNSC staff presented an overview of health studies and health effects based on guidance from the United Nations. CNSC staff stated that a 2001 study by the United Nations Scientific Committee on the Effects of Atomic Radiation on hereditary effects concluded that there is no evidence of hereditary effects from radiation in human populations. CNSC staff further stated that the CNSC, the United Nations Scientific Committee on the Effects of Atomic Radiation, and the International Commission on Radiological Protection base their risk assessment on the linear, non-threshold model. CNSC staff explained that the linear, non-threshold model is a conservative approach based on risk being proportional to dose, and noted that health effects are not being observed at low doses.
107. The Grey Bruce Board of Health, in their intervention, expressed the view that the proposed shipment does not pose a public health hazard.
108. The Commission is satisfied that Bruce Power has an effective radiation protection program in place and that the radiation risk of the proposed shipment to the public is negligible.

#### *Conclusion on Radiation Protection*

109. Based on the above information and considerations, the Commission is satisfied that Bruce Power will provide adequate protection to the health and safety of persons, the environment and national security in the area of radiation protection, and that the radiation risk of the proposed shipment is negligible.

#### **Protection of the Environment**

110. Before making any licensing decision under the NSCA, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act* (CEAA) have been fulfilled, including ensuring the conduct of an environmental assessment (EA) where its licensing decision would enable a project, as defined in the CEAA, to be carried out.
111. What is equally important, in respect of the environment, is that under the NSCA, the Commission's statutory mandate is to regulate in order to prevent unreasonable risk to the environment (paragraph 9(a)(i)). As such, and notwithstanding whether there is a CEAA requirement in any given licence application, the Commission always evaluates whether the applicant is qualified to conduct those activities subject to licensing and whether, in conducting the activities to be licensed, the applicant would adequately

protect the environment. This evaluation involves analysis and assessment of the activities proposed and their potential impact on the environment, to determine what would be required to ensure the protection of the environment. The Commission may not issue a licence under subsection 24(4) of the NSCA unless it is satisfied of the adequacy of the applicant's proposal with respect to environmental protection.

112. CNSC staff stated that an EA under the CEAA was not required for the proposed shipment of the 16 steam generators, and explained that there is no "project" within the meaning of that term as defined in the CEAA, that would require an environmental assessment. The Commission agrees with this analysis by CNSC staff. The Commission is satisfied that as a planning tool, an EA under the CEAA is meant to assess the potential adverse environmental impacts of an undertaking in relation to a physical work, or a prescribed physical activity. The Commission finds that the packaging and the transport of the 16 steam generators do not constitute such a "project" under the CEAA. This is consistent with the Commission's treatment of other physical activities subject to licensing under the NSCA, which are not prescribed under the CEAA as 'projects', such as the storage and possession of nuclear substances, as well as other proposals involving the packaging and transport of nuclear substances. It is of note in this regard that the Commission is not being asked to authorize or license the actual recycling of the steam generators under the NSCA or in Canada.
113. CNSC staff addressed the relevance of the 2006 EA that the CNSC conducted for the Bruce A refurbishment project to the proposed packaging and transport of the steam generators. CNSC staff submitted that the Bruce A refurbishment project considered the undertakings in relation to the Bruce A NGS, which were, at that time, required in order to return the station to licensed operation. CNSC staff explained that this project included the removal of the steam generators from the station and their placement in the WWMF; this was the storage plan for the steam generators at the time of the return to service project regarding the station. CNSC staff noted that the EA for the Bruce A return to service project was approved and the project was licensed by the Commission. The fact that Bruce Power has now proposed to transport the steam generators does not alter the conclusions of the 2006 EA on the refurbishment project. CNSC staff explained that the current licence application is an entirely different proposal related specifically to the packaging and transport of the steam generators, and, as such, does not alter the completed refurbishment or the assessment that was conducted before the return to service. Furthermore, consistent with the ALARA principle, the Commission welcomes any proposal that might improve impacts on safety or the environment.
114. Several intervenors, including Sierra Club and Lake Ontario Waterkeeper, expressed the contrary view, that because the Bruce A refurbishment EA did not include the proposed transport and recycling of the steam generators, the steam generator transport should be subject to a new EA under the CEAA, as a 'modification' of the prior EA under subsection 15(3) of the CEAA.

115. The Commission asked Bruce Power about the timing of their decision to transport the steam generators and how it related to the previous EA for the Bruce A refurbishment. Bruce Power responded that they had noted the nuclear industry's success with steam generator recycling over the past few years, and that, in 2009, they decided to look into making the shipment. Bruce Power views its new plan as an environmentally responsible measure. CNSC staff stated that they began analyzing Bruce Power's proposed shipment in April 2010.
116. The Commission is satisfied that this application to package and transport the steam generators is a separate proposal from the 2006 refurbishment, and that it does not modify the 2006 return to service EA, which was completed and licensed in relation to the undertakings included therein. To agree to the intervenors' request, the Commission would be treating this packaging and transport application as altering the nature of the 2006 refurbishment project that was assessed and licensed; to do so could, in the Commission's view, render meaningless the EA that was completed, and would require its repetition after the refurbishment planning process is long done.
117. In *InterChurch Uranium Committee Educational Cooperative v. Canada (AECB)*,<sup>21</sup> the Federal Court of Appeal noted that changes do not necessarily render an assessed project a 'new' project, and emphasized the responsibility of the nuclear regulator (then the AECB, now the CNSC) to "evaluate the effects of these developments in the context of its licensing responsibilities", noting that an EA of further proposals is always possible, depending on the nature of the specific proposal. In doing such an evaluation in this case, the Commission is satisfied that this proposal to package and transport the steam generators does not affect or render inaccurate the 2006 EA conclusions. The Commission views the CEAA as a planning tool that was used appropriately in this matter in 2006. In addition, the Commission sees this proposal as a separate matter meriting treatment on its own. As noted above, the Commission is satisfied that this proposed activity would not constitute a 'project', as defined by the CEAA.
118. Aside from its role under the CEAA, and as noted above, environmental issues and review are mandated by Parliament in the NSCA as part of the Commission's regulatory and licensing role to regulate to protect the environment and evaluate the effects of proposed activities to be regulated. In this context, the Commission must be assured of the adequacy of the measures proposed for the protection of the environment in order for it to grant a license to Bruce Power to package and transport the steam generators under the NSCA.
119. Bruce Power stated that the environmental impact of the transportation of the steam generators to Sweden would be negligible. Bruce Power explained that the risk is very low due to the robust external shell of the steam generators providing a containment boundary between the nuclear substances and the environment.

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<sup>21</sup> 2004 FCA 218.

120. CNSC staff stated that they conducted a rigorous review of the environmental impact of the proposed shipment, pursuant to the NSCA and the *General Nuclear Safety and Control Regulations*. CNSC staff noted that this review included a detailed assessment of the potential environmental effects posed by the proposal, including the consequences of potential accidents and malfunctions. Following the hearing, the Commission requested that CNSC staff provide further details regarding the extent of their environmental review. CNSC staff submitted further analysis in CMD 10-H19.D.
121. CNSC staff stated that they considered all activities that would be required by Bruce Power to prepare and transport the steam generators and whether those activities would result in releases to the environment. CNSC staff explained that, based on their analysis, Bruce Power's proposal is not expected to have adverse effects on the environment under normal or expected circumstances.
122. CNSC staff discussed their assessment of the environmental impacts that may result from accidents and malfunctions. CNSC staff stated that they considered accidents on land, accidents at various locations along the marine route, and during the loading on board the ship in Owen Sound. CNSC staff stated that the risks posed by accidents and malfunctions are not expected to have impacts on the environment or to people. CNSC staff stated that there is an abundant safety margin for very low-probability accidents. Further information regarding evaluation of accidents and malfunctions can be found in the section "Emergency Preparedness" in this Record of Proceedings.

#### *Conclusion on Protection of the Environment*

123. Based upon its consideration of this matter, the Commission is satisfied that the requirements of the CEAA have been met. The Commission is satisfied that the requirements of the CEAA do not mandate an EA of the proposal to package and transport the steam generators. The Commission is satisfied that its environmental review under the NSCA provides sufficient treatment of the potential adverse environmental impacts of the conduct of the proposed activities.
124. Based on its consideration of the above information and the submissions made, the Commission is satisfied that Bruce Power would be able to fully provide for the protection the environment in conducting the packaging and transport activities, and that the environmental risk of the proposed transport is negligible.

#### **Emergency Preparedness**

125. Bruce Power presented information regarding its Emergency Response Plans for both land transportation and marine transportation. Bruce Power explained that any indication of contamination or exposure rates in excess of the limits specified in Transport Canada's TDG Regulations or the CNSC's PTNS Regulations for the transport of radioactive materials will invoke Bruce Power's project-specific Transportation and Emergency Response Plan.

126. Bruce Power provided information regarding hypothetical road transportation accidents that could occur, including a vehicle overturning, and the breach of a steam generator resulting in the release of radioactive contamination in various weather conditions. Bruce Power stated that they have a land route Emergency Response Plan for the road transport aspect of the shipment. Bruce Power explained that the WMG Project Manager with a radiation protection escort will provide immediate response to any radiological incident, and that the proper equipment will be used to mitigate the migration of any potentially released radioactive material. Bruce Power stated that qualified response staff will be called in to supplement the immediate responders once the scope of any incident has been assessed. Bruce Power noted that they will also have a field escort vehicle with repair equipment for minor mechanical failures and a spill kit.
127. Bruce Power also provided information regarding a hypothetical accident that could occur at the port of Owen Sound during loading and unloading operations. Bruce Power explained that a failure of a lifting device could allow the steam generator to drop to the pier surface and subsequently into the water, with a breach of the steam generator resulting in the release of radioactive contamination.
128. CNSC staff stated that they reviewed the Emergency Response Plan submitted with the application and found it to be acceptable. CNSC staff stated that they assessed the Emergency Response Plan, including mitigation actions, response actions, recovery actions and communications actions. CNSC staff noted that the initial cordon area for safety in the event of an accident of 300 feet (91.44 metres) is an adequate, safe distance from the incident.
129. Bruce Power stated that the Shipboard Emergency Response Plan complies with the IMDG Code requirements. CNSC staff stated that the Shipboard Emergency Response Plan is consistent with guidance to be followed in emergency situations that could potentially arise on an INF vessel. CNSC staff noted that the steam generators are not considered INF cargo and, as such, the INF plan is a more restrictive plan. CNSC staff stated that the emergency measures that would be in place for the shipment are adequate to protect the health and safety of workers and the public.
130. The Commission asked for more information regarding CNSC staff's assessment of Bruce Power's Emergency Response Plan. CNSC staff responded that, based on their detailed review of Bruce Power's Emergency Response Plan, they are confident that Bruce Power has the resources and the emergency response capability to respond to any situation that may arise. CNSC staff noted that Bruce Power satisfactorily addressed all of the issues raised by CNSC staff during their review of Bruce Power's submission. As requested by the Commission, CNSC staff provided further details regarding their assessment of Bruce Power's Emergency Response Plan in CMD 10-H19.D. The Commission is satisfied with the information and evaluation provided by CNSC staff.

131. The Bruce Peninsula Environment Group, in their intervention, questioned whether the Owen Sound Hospital would be capable of attending to a large number of patients as a result of an accident. CNSC staff indicated that the Grey Bruce Medical Officer of Health, who submitted a written intervention for the public hearing, had performed a risk assessment of the proposed shipment and informed Owen Sound City Council that there is no health risk associated with the proposed shipment. The Commission is satisfied with the information provided by the Grey Bruce Medical Officer of Health.
132. The Commission asked about the emergency response in the event of the vessel sinking, and whether the steam generators may be retrieved in such an event. Bruce Power responded that their Emergency Response Plan does take this into account. CNSC staff concurred that Bruce Power's Emergency Response Plan is acceptable.
133. Intervenors, including Beyond Nuclear, expressed concerns that there may be a low safety margin in the event of the ship sinking at the maximum depth within the Great Lakes, approximately 802 feet (244 metres) in Lake Ontario. CNSC staff indicated that, based on their analysis of the crushing strength of a steam generator shell, the steam generator shells would not be crushed should they become submerged to the maximum depth of Lake Ontario. CNSC staff noted that, in the event that the ship were to sink, given the lower temperatures and oxygen availability in the water, any radiological releases would be slow, allowing time for recovery of the vessel and generators. Bruce Power stated that if the exterior shells of the steam generators were crushed, they would still retain their contents. Bruce Power noted that the majority of radionuclides are fixed inside the tubes and are not soluble, and would therefore not be released. The Commission is satisfied that there is an adequate safety margin in the event of the ship sinking and that the majority of radionuclides would not be released.
134. Intervenors, including the Great Lakes and St. Lawrence Cities Initiative, expressed concerns that releases from accident scenarios could contaminate drinking water. CNSC staff presented analysis demonstrating that the radiological releases from an accident would not pose a risk to drinking water. CNSC staff stated that there is an abundant safety margin for the protection of drinking water during marine loading and transport of the steam generators.
135. Lake Ontario Waterkeeper, in its intervention, expressed the view that the IAEA Regulations do not protect the Great Lakes because the IAEA standards apply to oceans (large bodies of salt water) and not freshwater used for drinking water, such as the Great Lakes. The Commission asked for more information on this subject. CNSC staff responded that, although the international framework for the protection of drinking water is achieved through consensus from the scientific community and may be broader, CNSC staff performed their risk assessment specific to the Great Lakes. CNSC staff confirmed that their analysis was performed using the Great Lakes as a source of drinking water and concluded that there is an abundant safety margin to protect drinking water. The Commission is satisfied that CNSC staff performed their risk assessment specific to the Great Lakes and that there is an abundant safety margin to protect drinking water.

136. Coalition for a Nuclear-free Great Lakes, in their intervention, discussed the need for mitigation measures in the event of an accident. The Commission asked for information regarding mitigation measures that may be taken in the event that there is a release of radioactive contamination into water. CNSC staff responded that mitigation for a large body of water is difficult but steps can be taken in a confined body of water, such as a lock. CNSC staff explained that there are several mitigation techniques, including ion exchange resins, which use the chemical and physical properties specific to each radionuclide, and sediment cleanup.
137. Several intervenors expressed concerns regarding the possibility of a fire on the ship resulting in radiological releases. The Commission asked for more information in this regard. CNSC staff responded that they are satisfied with the fire suppression and emergency plans onboard the vessel. CNSC staff noted that, based on the lack of combustible materials in the cargo hold and the robustness of the steam generators, a radiological release due to fire is unlikely.
138. The Commission asked if CNSC staff have contacted fire departments in municipalities along the proposed shipping route. CNSC staff responded that they have not specifically contacted all of the fire departments. CNSC staff stated that Emergency Measures Ontario have indicated that if the licence were granted they would contact the regional offices for the applicable regions of Ontario and they would give notice to the appropriate communities. The Commission recommended that CNSC staff formally ensure that this be done for municipalities along the proposed shipping route in Ontario and Québec.
139. Some intervenors opposed the shipment, citing the precautionary principle. The Commission asked CNSC staff to explain the applicability of the precautionary principle in their review. CNSC staff responded that the precautionary principle suggests that when there is evidence of serious environmental effects, scientific uncertainty should not be an impediment to implementing measures to mitigate those effects. CNSC staff stated that, for the proposed shipment, there are very low-probability accident and malfunction scenarios, and appropriate mitigation measures are in place. The Commission is of the view that the precautionary principle was followed because there are very low-probability accident and malfunction scenarios and appropriate mitigation measures are in place.

#### *Conclusion on Emergency Preparedness*

140. Based on the above information and considerations, the Commission is satisfied that Bruce Power has adequate emergency preparedness plans in place and that the risk of the proposed shipment is negligible. 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, as well as the Emergency Response Plan and the assessment of potential accidents, Bruce Power will provide adequate protection to the health and safety of persons, the environment and national security.

## **Public Information Program and Aboriginal Consultation**

### *Public Information Program*

141. In its application, Bruce Power presented detailed information regarding communication and consultation activities undertaken in relation to its application for a licence to transport the steam generators. The communication methods included newsletters, open houses held in Owen Sound, Southampton and at the Bruce Power Visitors Centre, meetings with local municipalities, briefings, a dedicated Web site and e-mail address, radio advertisements, an information booklet, press releases, and a toll-free telephone number. Bruce Power's stated objective with regard to its communication program was "to make information available to anyone who wants to know more about the Recycling Plan."
142. As part of supplementary submission CMD 10-H19.1B, Bruce Power filed detailed outlines of the approach taken regarding stakeholder identification, examples of the information provided and the various communication methods used for directly-affected local residents and municipalities (communities where road transport will take place and where the steam generators would be loaded) and interested individuals, which included some local municipalities along the shipping route, non-governmental organizations and others who had expressed interest in the licence application. Bruce Power stated that they revised their transportation plan based on the feedback they received during the consultation activities.
143. Many intervenors, including Lake Ontario Waterkeeper and the Great Lakes and St. Lawrence Cities Initiative, expressed the view that Bruce Power did not provide sufficient information regarding the shipment to the public in a timely manner. Others suggested that timelines for the CNSC's public hearing were too short for them to adequately review the submissions from Bruce Power and CNSC staff. Some intervenors commented that there was not enough detailed information available.
144. Others, including the Bruce County Council, several municipalities, and the South Bruce Impact Advisory Committee, expressed the view that Bruce Power had adequately informed them regarding the proposed shipment and had addressed any concerns that they may have had. The representatives from Bruce County Council stated that they had enough time to review and assess the information and that, in their opinion, there were no concerns in the community regarding the shipment. The Grey Bruce Board of Health, after viewing Bruce Power's presentation, concluded that the proposed shipment would not pose a public health hazard and made a presentation to that effect to Owen Sound City Council.
145. The Commission notes the intervenors' concerns regarding the lack of public information on the shipment. The Commission realizes that issues that may be considered routine to the nuclear industry or to CNSC staff may not be perceived as such by the general public. The Commission emphasizes the importance of licensees' public information program in providing the public with the information they need.

146. The Commission is satisfied that Bruce Power consulted with the public and other stakeholders. The Commission notes that the extent to which intervenors expressed concerns regarding the lack of available and timely information demonstrates that Bruce Power could have done significantly more to inform interested stakeholders. However, the Commission is satisfied that its proceedings, including its request for additional information from CNSC staff and the extended public review period, provided the appropriate forum in which concerns could be expressed and dealt with.

*Aboriginal Consultation*

147. As part of its public information program, Bruce Power presented specific information regarding the Aboriginal consultation activities they undertook with respect to this proposed shipment. Bruce Power consulted specifically with the Saugeen Ojibway Nations (SON), the Historic Saugeen Métis (HSM) and the Métis Nation of Ontario (MNO).
148. According to Bruce Power, the concerns raised at those meetings referred mainly to the need for “proper consultation” and “concerns with the practice of importing nuclear waste into their traditional territory.” Bruce Power stated that they then provided additional information regarding the licence application. Bruce Power further stated that, following the meetings, the HSM and the MNO expressed satisfaction with the information presented and had no further “concerns or objections to the plan.”
149. CNSC staff stated that they sent notification letters about Bruce Power’s licence application to the SON, the HSM and the Grey Owen Sound Métis Council on June 23 and July 9, 2010. CNSC staff explained that the letters provided information on Bruce Power’s application, along with an invitation that CNSC staff could provide further information if required. CNSC staff noted that they did not receive any requests for information regarding the proposal or the CNSC process.
150. At the public hearing, CNSC staff stated that the consultation activities undertaken for this licence application were in accordance with the federal consultation process<sup>22</sup> despite their view that, for this particular proposal, the duty to consult was not triggered due to the negligible impact the proposal could have on alleged or recognized rights. CNSC staff further commented that, in their opinion, the public hearing process put in place to review Bruce Power’s application for the shipment of the steam generators would be sufficient to satisfy the Crown’s duty to consult for this particular application if such a duty applied.

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<sup>22</sup> “Aboriginal Consultation and Accommodation – Interim Guidelines for Federal Officials to Fulfill the Legal Duty to Consult (February 2008)” published under the authority of the Minister of Indian Affairs and Northern Development and Federal Interlocutor for Métis and Non-status Indians, Ottawa, 2009

151. The SON, in their intervention at the public hearing, mentioned that Bruce Power had failed to properly consult and involve them in the design and planning of the proposed shipment, and suggested that Bruce Power should increase its level of consultation in the future. In its intervention, the SON recognized that, since it became aware of the proposal and informed Bruce Power of its concerns with certain aspects of the plan, it had been working with Bruce Power to resolve some of the issues. Further, the SON stated that they had insufficient time to review the full technical details of the proposal to allow for a “meaningful review of the safety and advisability of the plan” and that the scope of the review of Bruce Power’s application should include the return of the radioactive material back into Canada.
152. The Union of Ontario Indians Inc. (UOI)<sup>23</sup>, in its intervention, raised a number of concerns, alleging that the “shipment of radioactive waste through the Great Lakes is a threat to, and violation of the Treaty and Aboriginal rights of the Anishinabek.” The UOI stated that fishing activities conducted by its members on the Great lakes could be threatened by the shipment of radioactive waste, “fishing on the Great Lakes, in the past and currently, pursuant to this treaty right, is a significant means of subsistence for First Nation community members within the Great Lakes basin and on the Great Lakes themselves.” According to the UOI, the CNSC failed to fulfill its duty to consult and the CNSC public hearing process does not fulfill the duty to accommodate and consult First Nations.
153. The Commission notes that, with regard to Aboriginal consultation, a number of interventions raised the issue with respect to the duty on the Crown to consult aboriginal people and, where appropriate, accommodate the protected interests.
154. As an agent of the Crown, it is incumbent on the Commission to ensure that its decision accords with the honour of the Crown. In assessing the applicability and adequacy of the duty to consult, the Commission must consider the particular facts of each application and determine whether the subject matter of consultation and accommodation falls within its mandate as defined under its enabling legislation.<sup>24</sup> The Courts have, on a number of occasions, reconfirmed that in instances where an administrative Tribunal such as the Commission has the authority under its governing legislation to decide questions of law, and the subject matter of consultation falls within the Tribunal’s mandate and expertise, not only does the Tribunal have the ability to decide if the consultation is consistent with section 35 of the *Constitution Act, 1982*,<sup>25 26</sup> the Crown can rely on regulatory processes to fulfill its duty to consult.

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<sup>23</sup> The Anishinabek Nation incorporated the UOI in 1949 as a political advocate and secretariat to forty member First Nations across Ontario. Thirty-nine of the forty member First Nations of the UOI are located within the Great Lakes Basin, including 19 First Nations reserves whose lands directly border on at least one of the Great Lakes.

<sup>24</sup> *Brokenhead Ojibway Nation et al v. Attorney General of Canada (National Energy Board) et al.*, 2009 FC 484 The Court stated that, except to the extent that Aboriginal concerns cannot be dealt with, the appropriate place to deal with project-related matters in the circumstances of the Pipeline Projects was before the NEB existing and not in some collateral discussion with either the GIC or some arguably relevant ministry.

<sup>25</sup> *The Constitution Act, 1982*, being Schedule B to the Canada Act 1982 (U.K.), 1982, c. 11.

155. As the Commission has previously found<sup>27</sup>, it is of the view that, for a proposed activity such as the one proposed by Bruce Power, the Commission is an appropriate body to determine the adequacy of the consultation. For those reasons, the Commission does not agree with the argument raised by some intervenors that its proceedings cannot fulfill the duty to accommodate and consult First Nations.
156. As stated by the Supreme Court of Canada in *Haida*<sup>28</sup>, the duty to consult arises when the Crown has knowledge, real or constructive, of the potential existence of the Aboriginal right and contemplates conduct that might adversely affect it.
157. For the duty to consult to arise there must be some evidence presented to establish an adverse impact on the alleged or recognized Aboriginal rights. The duty to consult may not be triggered where there is minimal adverse affect or in instances referring to speculative impacts on recognized or alleged rights. The duty to consult is not engaged simply whenever the Crown makes any decision related to traditional territory.
158. In the present matter, the Commission notes that the evidence provided is expressed in generalities (impact over fishing rights across the Great Lakes) and does not point to any significant impact on existing or alleged rights that the Commission could consider and potentially resolve within the regulatory process.<sup>29</sup> The concerns raised by the intervenors during the hearing process relate mostly to the lack of or insufficient information being provided and the ability to review and understand the information.
159. The Commission is of the view that the impact on the environment and on fishing of the shipment of the steam generators via an existing port facility and a busy commercial maritime route is negligible. The Commission is of the view that, under the circumstances, there is minimal potential adverse effect on alleged rights and therefore the duty to consult does not arise for this particular application. In as much as there could be a duty to consult if the duty to consult were triggered, the Commission is satisfied that the duty would be at the lower end of the consultation spectrum and that it would have been discharged through a minimal notice requirement and the hearing process.

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<sup>26</sup> Section 35 recognizes and affirms the existing aboriginal and treaty rights of the aboriginal peoples of Canada.

<sup>27</sup> Record of Proceedings, McClean Lake Operation Renewal issued June 30, 2009 at par. 130 where the Commission stated that: “for project-related matters which may cause concern to rights-holders about potential impacts, which are within the authority of the Commission to address and perhaps accommodate, the Commission has the jurisdiction to deal with consultation on behalf of the Crown, and its process is the appropriate forum in which to deal with such issues.” A Judicial Review of the Commission’s decision was filed and in its decision (*ARG v. AGC* 2010 FC 948) the Federal Court further endorsed the Commission’s view that its proceedings provide the applicant with an opportunity to understand the nature of the Decision being made and to provide input regarding any Aboriginal and Treaty rights affected.

<sup>28</sup> *Haida Nation v. British Columbia (Minister of Forests)*, [2004] 3 S.C.R. 511

<sup>29</sup> *Brokenhead*, Supra note 3 at par. 34- In order to establish a procedural breach around projects such as these there must be some evidence presented which establishes both an adverse impact on a credible claim to land or to Aboriginal rights accompanied by a failure to adequately consult.

160. The Commission is satisfied that the public consultation program, including the Aboriginal consultation component, provided sufficient notice to the Aboriginal peoples. The Commission's hearing process provided an opportunity to the intervenors to make submissions and to participate in the regulatory process. The Commission is satisfied that its proceedings provided the appropriate forum in which concerns could be expressed and dealt with. The Commission has considered all of the submissions in making its decision and is satisfied that, in this particular instance, the duty to consult was not triggered and, to the extent the duty to consult might have been triggered, it was adequately discharged.

*Conclusion on Public Information Program and Aboriginal Consultation*

161. Based on the above information and considerations, the Commission is satisfied that, for the proposed shipment of the steam generators, Bruce Power consulted with the public, Aboriginal persons and other stakeholders. The Commission notes that the extent to which intervenors expressed concerns regarding the lack of available and timely information demonstrates that Bruce Power could have done significantly more to inform interested stakeholders and Aboriginal groups. However, the Commission is satisfied that its proceedings, including its request for additional information from CNSC staff and the extended public review period, provided the appropriate forum in which concerns could be expressed and dealt with. The Commission is also satisfied that the duty to consult was not triggered and, to the extent the duty to consult might have been triggered, it was adequately discharged.

**Security**

162. With respect to site security issues, the Commission was provided with separate, protected CMDs, which were considered in a closed session.
163. The Commission concludes that Bruce Power has adequate provisions for ensuring the physical security of the transport.

**Non-Proliferation and Safeguards**

164. 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 a safeguards agreement with the IAEA. The objective of the agreement 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.

165. Some intervenors expressed concerns regarding the presence of plutonium in the steam generators. Based on the information provided by CNSC staff, the Commission is of the view that, although there is plutonium present in the steam generators, it does not pose a proliferation risk because the quantity is extremely low and it is inaccessible inside the steam generator tubes.
166. Based on the above information, the Commission is satisfied that Bruce Power will make adequate provision in the areas of safeguards and non-proliferation during the transport that are necessary for maintaining national security and measures necessary for implementing international agreements to which Canada has agreed.

### **Nuclear Liability**

167. In its submissions, Bruce Power stated that, under the provisions of the *Nuclear Liability Act* (NLA),<sup>30</sup> they retain liability for any damage arising from a nuclear incident involving the steam generators (up to Canada's territorial limits) and that general liability insurance would cover all non-nuclear incidents involving the shipment of the steam generators. Bruce Power stated that they are responsible for the entire shipment until it reaches Sweden. Bruce Power noted that Studsvik is under contractual obligation to ensure the safe and secure transport of the steam generators from the point of collection at the Bruce Power site, as well as to maintain adequate insurance coverage for any potential incidents associated with the transport of the steam generators up to the point of arrival at Studsvik's facilities.
168. With regard to the shipment, Bruce Power acknowledged that, although they would not have a representative on board the ship, they are still responsible to ensure that appropriate controls are in place, including emergency preparedness and training.
169. CNSC staff confirmed that, in their opinion, the provisions of the NLA apply to the shipment of the steam generators and that Bruce Power is responsible to have all requisite insurance policies in place for the shipment.
170. The Commission is of the view that coverage under the NLA would apply to the radioactive material distributed within the internal surfaces of the steam generators. The Commission notes that that material was made radioactive by being mixed with or associated with nuclear fuel and remains nuclear material whether or not it continues to be "combined, mixed or associated" with nuclear fuel.
171. The Commission recognizes that the NLA provides a regime that ensures that the liability for injuries or damage associated with a nuclear incident is channelled exclusively to the operators of the nuclear installations. The comprehensive general liability (CGL) insurance provides the proper insurance coverage for the non nuclear hazards. Together, the NLA and the CGL would provide a complete coverage.

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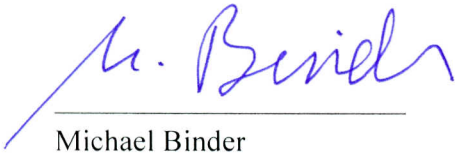
<sup>30</sup> R.S.C. 1985, c. N-28

172. The Commission is satisfied that Bruce Power has all the required insurance coverage in place for the shipment of the steam generators.

### **Conclusion**

173. 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.
174. Based upon its consideration of this matter, the Commission is satisfied that the requirements of the *Canadian Environmental Assessment Act* have been met. The Commission is satisfied that its environmental review under the NSCA provides sufficient treatment of the potential adverse environmental impacts of the conduct of the proposed activities. The Commission is satisfied that the risk to the health and safety of the public and the environment from the proposed shipment is negligible.
175. The Commission is satisfied that Bruce Power's application meets the requirements of the PTNS Regulations for a special arrangement. That is, the Commission is satisfied that the steam generators are classified as SCO-I material, that Type IP-1 packaging requirements are met or exceeded, and that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable requirements of the PTNS Regulations had been met.
176. The Commission is satisfied that the applicant meets the requirements of subsection 24(4) of the *Nuclear Safety and Control Act*. That is, the Commission is of the opinion that the applicant is qualified to carry on the activity that the proposed licence will authorize and that the applicant will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
177. Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, issues to Bruce Power Inc. a transport licence and certificate for the transport of 16 decommissioned steam generators from the Western Waste Management Facility in the Municipality of Kincardine, Ontario to Nyköping, Sweden. The transport licence, TL-SX-40039.01.00/2011, and certificate, CDN/5255/X-96 (Rev.0), are valid from February 4, 2011 to February 3, 2012.
178. The Commission includes in the licence the conditions set out in the draft licence attached to CMD 10-H19.C.

179. With this decision, the Commission requests that CNSC staff notify the Commission if an import licence for the return waste has been issued to Bruce Power. The Commission notes that it expects to receive this notification prior to the waste being returned to the WWMF.



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Michael Binder  
President,  
Canadian Nuclear Safety Commission

FEB 04 2011

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Date

**Appendix A – Intervenors**

<b>Intervenors</b>	<b>Document Number</b>
Studsвик Nuclear AB, represented by B. Wirendal	CMD 10-H19.2
Sierra Club Canada, represented by J. Bennett	CMD 10-H19.3
Sharen Skelly Kolohon	CMD 10-H19.4
Donald Tim Seitz	CMD 10-H19.5
Bruce County Council, represented by Mayor M. Smith	CMD 10-H19.6
Nuclear Information and Resource Service, represented by D. D'Arrigo	CMD 10-H19.7
Patricia Lawson	CMD 10-H19.8 CMD 10-H19.8A
Bruce Peninsula Environment Group, represented by Z. Kleinau	CMD 10-H19.9 CMD 10-H19.9A
Swedish Environmental Movement's Nuclear Waste Secretariat, represented by M. Goldstick	CMD 10-H19.10
John Miller	CMD 10-H19.11
Saugeen Ojibway Nations, represented by Chief R. Kahgee	CMD 10-H19.12
Union of Ontario Indians Inc., represented by J. Kechego	CMD 10-H19.13
Council of Canadians, represented by E. Lui	CMD 10-H19.14 CMD 10-H19.14A
Provincial Council of Women of Ontario, represented by G. Janes	CMD 10-H19.15
Canadian Environmental Law Association, represented by T. McClenaghan	CMD 10-H19.16
Penny Sanger	CMD 10-H19.17
Town of The Blue Mountains, represented by P. Graham	CMD 10-H19.18
Great Lakes and St. Lawrence Cities Initiative, represented by D. Ullrich and S. Rang	CMD 10-H19.19 CMD 10-H19.A
Michigan Sierra Club, represented by E. McArdle	CMD 10-H19.20
Chaitanya Kalevar, Just One World	CMD 10-H19.21 CMD 10-H19.21A
Power Workers' Union, represented by D. Shier and H. Phorson	CMD 10-H19.22
Lorraine Rekmans, Aboriginal Affairs Critic for the Green Party of Canada	CMD 10-H19.23
Janet McNeill	CMD 10-H19.24
Lake Ontario Waterkeeper, represented by M. Mattson	CMD 10-H19.25
Coalition for Nuclear Free Alberta, represented by A. Boucher Rymns	CMD 10-H19.26
Lynn Jones	CMD 10-H19.27
Concerned Citizen of Renfrew County, represented by O. Hendrickson	CMD 10-H19.28 CMD 10-H19.28A
Anabel Dwyer	CMD 10-H19.29

Port Hope Community Health Concerns Committee, represented by F. More	CMD 10-H19.30
Coalition for a Nuclear-Free Great Lakes, represented by M. Keegan	CMD 10-H19.31
Alfred C. Meyer	CMD 10-H19.32
Beyond Nuclear, represented by K. Kamps	CMD 10-H19.33
Citizens for Alternative to Chemical Contamination, represented by K. Cumbow	CMD 10-H19.34 CMD 10-H19.34A
Northwatch, represented by B. Lloyd	CMD 10-H19.35
Mouvement Vert Mauricie, represented by M. Fugère	CMD 10-H19.36
Canadian Coalition for Nuclear Responsibility, represented by G. Edwards	CMD 10-H19.37 CMD 10-H19.37A
Physicians for Global Survival, represented by D. Dewar	CMD 10-H19.38
Elaine Hughes	CMD 10-H19.39
William Terence Tufts	CMD 10-H19.40
James Brophy	CMD 10-H19.41
Patricia Hunte-Cusack	CMD 10-H19.42
Municipality of Arran-Elderslie	CMD 10-H19.43
Stefan Kodet	CMD 10-H19.44
Rosalie Bertell	CMD 10-H19.45
Port Colborne Fire & Emergency Services	CMD 10-H19.46
Andrea Guay	CMD 10-H19.47
Doris A. Arnold	CMD 10-H19.48
Victor Lau	CMD 10-H19.49
Wanda Laurin	CMD 10-H19.50
Marcie Lane	CMD 10-H19.51
Township of Georgian Bluffs	CMD 10-H19.52
Municipality of Kincardine	CMD 10-H19.53
South Bruce Impact Advisory Committee	CMD 10-H19.54
Shirley Farlinger, International Institute of Concern for Public Health	CMD 10-H19.55
Margaret Gaviller	CMD 10-H19.56
Susan Michetti	CMD 10-H19.57
Linda Murphy	CMD 10-H19.58
Historic Saugeen Métis	CMD 10-H19.59
Town of Saugeen Shores	CMD 10-H19.60
Teresa Kurtzhall	CMD 10-H19.61
Jennifer Tsun	CMD 10-H19.62
Wilbert (Will) Gerlach	CMD 10-H19.63
Glenn R. Sutton	CMD 10-H19.64
James V. Penna	CMD 10-H19.65
Sanford Haskill Farms	CMD 10-H19.66
Darlene Buckingham	CMD 10-H19.67
Bill Adamson	CMD 10-H19.68 CMD 10-H19.68A

Grey Bruce Board of Health	CMD 10-H19.69
Canadian Nuclear Workers' Council and the Grey-Bruce District Labour Council	CMD 10-H19.70
Mohawk Council of Akwesasne	CMD 10-H19.71
Philippa Lawson	CMD 10-H19.72
City of Owen Sound, represented by Mayor L. Stanners	CMD 10-H19.73 CMD 10-H19.73A
Morgan Lindsey	CMD 10-H19.74
Erika Simpson and Gordon Edwards	CMD 10-H19.75
City of Amqui, represented by P. Giroul	CMD 10-H19.76 CMD 10-H19.76A
Grey County Council	CMD 10-H19.77
Alliance for the Great Lakes	CMD 10-H19.78
David Huntley	CMD 10-H19.79

**Appendix B – Acronyms**

AECB	Atomic Energy Control Board
ALARA	As Low as Reasonably Achievable
ASME	American Society of Mechanical Engineers
Bq	Becquerel
CEAA	Canadian Environmental Assessment Act
CGL	Comprehensive General Liability
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
EA	Environmental Assessment
HSM	Historic Saugeen Métis
IAEA	International Atomic Energy Agency
IMDG	International Maritime Dangerous Goods
MNO	Métis Nation of Ontario
NGS	Nuclear Generating Station
NLA	Nuclear Liability Act
NSCA	Nuclear Safety and Control Act
OPG	Ontario Power Generation Inc.
PTNS	Packaging & Transport of Nuclear Substances
SCO	Surface Contaminated Object
SCO-I	Surface Contaminated Object, Group I
SON	Saugeen Ojibway Nations
Sv	Seivert
TDG	Transportation of Dangerous Goods
UOI	Union of Ontario Indians Inc.
WMG	WMG Inc. (the company that will be overseeing the shipment)
WWMF	Western Waste Management Facility