



Minutes of the Canadian Nuclear Safety  
Commission (CNSC) Meeting held on  
March 8, 2017



Minutes of the Canadian Nuclear Safety Commission (CNSC) meeting held Wednesday, March 8, 2017 beginning at 9:00 a.m. at the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, ON.

Present:

M. Binder, President

S. McEwan

R. Velshi (present for the meeting item on risk-informed assessment of CANDU safety issues only)

D. Tolgyesi (present for the meeting item on risk-informed assessment of CANDU safety issues only)

M. Leblanc, Secretary

L. Thiele, Senior General Counsel

S. Dimitrijevic and P. McNelles, Recording Secretaries

CNSC staff advisors were: R. Jammal, G. Frappier, B. Poulet, M. Santini, H. Khouaja, C. Harwood, D. Miller, G. McDougall, P. Elder, N. Mesmous, S. Gyepi-Garbrah, D. Newland and J. Jin

Other verbal contributors were:

- OPG: Z. Khansaheb, R. Manley, C. Lorencez and F. Grant
- Bruce Power: F. Saunders and P. Purdy
- NB Power: R. Prime and P. Thompson
- J.C. Luxat and Associates Inc.: J. Luxat
- Eric J. Leeds Consulting LLC: E. Leeds and M. Satorius
- CANDU Owners Group: F. Dermakar
- Fauske and Associates: R.E. Henry
- Intervenors: S. Nijhawan and F. Greening

### Constitution

1. With the notice of meeting CMD 17-M7 having been properly given and a quorum of a panel of Commission members being present, the meeting was declared to be properly constituted.
2. As per subsection 23(2) of the *Nuclear Safety and Control Act*, the President authorized R. Velshi and D. Tolgyesi to be present for the meeting item on the risk-informed assessment of CANDU safety issues, since they held office as members at the August 17, 2016 Commission meeting when this topic was discussed and CNSC staff was requested to return to the Commission with further information.

3. Since the meeting of the Commission held January 26, 2017, Commission member documents CMD 17-M7 to CMD 17-M12 and CMD 17-M14 were distributed to members. These documents are further detailed in Annex A of these minutes.

#### Adoption of the Agenda

4. The revised agenda, CMD 17-M8.A, was adopted as presented.

#### Chair and Secretary

5. The President chaired the meeting of the Commission, assisted by M. Leblanc, Secretary, and S. Dimitrijevic and P. McNelles, Recording Secretaries.

#### Minutes of the CNSC Meeting Held January 26, 2017

6. The Commission approved the minutes of the January 26, 2017 Commission meeting as presented in CMD 17-M9.

### STATUS REPORTS

#### Status Report on Power Reactors

7. With reference to CMD 17-M10, which includes the Status Report on Power Reactors, CNSC staff presented updates on the following:
  - Darlington Nuclear Generating Station (NGS) Unit 1 fuelling resumed on March 6, 2017 after a brief shutdown due to the inability to fuel during the installation of the Unit 2 bulkhead.
  - Pickering NGS Unit 7 was running at 10% of full power after an unplanned outage on March 4, 2017 caused by an overpressure and opening of a large steam release valve. Unit 7 is expected to return to full power on March 10, 2017. The steam release valve was not located on a system exposed to radioactivity and no radioactive elements or radiation were released into the environment.
8. The Commission enquired about the cause for the forced outage at Bruce Unit 2 that occurred on February 26, 2017. A representative from Bruce Power provided a detailed description of the pipe damage that led to the outage and informed the Commission about the modifications done to prevent reoccurrence. The Bruce Power representative added that there were no other safety risks associated with this kind of event, with

the exception of the potential risk to personnel in the immediate vicinity to the event.

9. The Commission asked for details on the February 23, 2017 forced outage of Bruce Unit 6 to repair a valve located on the emergency coolant injection (that valve had failed a safety test). The Bruce Power representative explained the continuing testing of Bruce Power's safety systems and provided details regarding this case where a valve remained stuck open and interfered with the operators' ability to test the operation. The Bruce Power representative added that, due to the existing redundancy, the safe operation of the system in question had not been compromised. CNSC staff concurred with Bruce Power.
10. The Commission sought more details about a leak search in the Pickering Unit 5 moderator room that occurred on February 24, 2017. A representative from OPG responded that they were still investigating the exact cause of the failure and that tritium contamination associated with this water leakage had been fully contained within the foundation drain system and the fuel handling tunnel. CNSC staff confirmed that they are expecting a full report from OPG on this incident.
11. The representative from OPG provided more details regarding the Pickering Unit 7 unplanned outage on March 4, 2017. The OPG representative reported that the fault had been traced to the turbine control system and that the unit had been placed in a safe state. Repairs were completed and the unit returned to service. OPG will do a full examination to determine the cause of the incident. The Commission requests that the update on the leak event and the Unit 7 unplanned outage be presented to the Commission when more information is available and CNSC staff is in a position to provide the update.
12. Referring to the reported brief shutdown of Darlington Unit 1 due to a lack of refuelling during the installation of the bulkhead in Unit 2 under refurbishment, the Commission enquired about the impact of the Unit 2 refurbishment on the operation of the other units. A representative from OPG explained the reasons in terms of their Reactivity Management Plan and their inability to bring the fuelling machine through Unit 2 due to the refurbishment activities. The OPG representative noted that the activities at Unit 2 are expected to be complete by the end of March 2017. After that time, further operation of other units would not be affected by the activities at Unit 2.

**ACTION**  
by  
May 2017

13. The Commission asked for reasons for the reported reduction of reactor power at Point Lepreau. CNSC staff responded that the reduction had been done in order to calibrate one of the four valves that operate in parallel. A representative from New Brunswick Power confirmed this explanation.

Event Initial Report (EIR)

*Ontario Power Generation: Darlington Nuclear Generating Station - Contaminated Motors Shipped to Unlicensed Vendor*

14. With reference to CMD 17-M11, CNSC staff presented information regarding an event reported on February 10, 2017 by the licensee to CNSC staff. This event involved the shipment of four electrical motors from the Darlington NGS to Ainsworth Corporation for repair. During the repair, water contaminated with tritium leaked from two motor casings. The released water was promptly contained within the established perimeter and Darlington NGS staff were promptly contacted for radiation protection support. Two workers potentially affected by the event were assessed for contamination and requested to submit a urine sample to ascertain radiation doses from a possible uptake of tritium. The workers had received a dose of 1% of the regulatory dose limit for members of the public (1mSv). The affected area was cleaned and decontaminated by dispatched OPG personnel. The representative from OPG stated that OPG was working on a root cause analysis.
15. The Commission enquired whether such an event could have been prevented. The OPG representative responded that, since these are sealed motors from vapour recovery systems, it was not expected to find water inside a motor, and that the event was not foreseeable. The OPG representative explained that the survey methods used to detect potential contamination of motors were not able to detect the presence of water and contamination inside a motor. CNSC staff added that OPG has a very strict procedure in order to release the components from the plant that may have been exposed to contamination, and that a root cause assessment would have to determine whether the procedure to release certain components of the plant would have to be modified to cover this type of events. CNSC staff will provide an update to the Commission after the completion of the root cause analysis.

**ACTION**  
by  
May 2017

INFORMATION ITEM

CNSC Staff Assessment of Industry's Disposition of Issues raised during the Bruce and Darlington Licensing Hearings (2015)

16. With reference to CMD 17-M14 and CMD 17-M14.A, CNSC staff presented its assessment of the Canadian nuclear industry's disposition of issues raised by Dr. S. Nijhawan during the Bruce NGS<sup>1</sup> and Darlington NGS<sup>2</sup> licensing hearings held in 2015. The Commission also considered submissions from the CANDU Owners Group (COG) (CMD 17-M14.1 and CMD 17-M14.1A), the nuclear industry of Canada, including contributions by Énergie NB Power, OPG and Bruce Power (CMD 17-M14.2), and a submission by Dr. Nijhawan (CMD 17-M14.3).
17. In the context of the Bruce hearing, the NPP industry and Dr. Nijhawan had agreed to meet to address technical questions that Dr. Nijhawan had raised in his intervention. The same issues were also raised in the context of the Darlington hearing. In both licensing decisions, the Commission requested that CNSC staff report on the progress of discussions regarding the raised technical issues and on its assessment of the report prepared by COG regarding these issues.
18. The Commission, in considering the submitted and presented material, concentrated on whether the concerns expressed by the intervenor and related issues had been adequately addressed, and whether there were remaining issues that merited for their study.

*Presentation by CNSC staff*

19. CNSC staff presented its assessment of the safety significance of the issues raised by the intervenor and of COG's findings regarding these issues. CNSC staff's presentation also included reports of external experts contracted to perform an independent, third party review, to establish whether CNSC staff had exercised due diligence on the topics raised by the intervenor, and to review the robustness of CNSC staff's disposition process from both technical and regulatory aspects. The external review of technical disposition was conducted by Dr. J.C. Luxat (CMD 17-M14.B), President of J.C. Luxat and Associates, Inc. and

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<sup>1</sup> Record of Proceedings and Reasons for Decision on the Application to Renew the Power Reactor Operating Licences for Bruce A and Bruce B Nuclear Generating Stations, hearing dates February 5, 2015 and April 13 to 15, 2015.

<sup>2</sup> Record of Proceedings and Reasons for Decision on the Application to Renew the Power Reactor Operating Licence for the Darlington Nuclear Generating Station, hearing dates August 19, 2015 and November 2 to 5, 2015

Professor and NSERC/UNENE Industrial Research Chair in Nuclear Safety Analysis at McMaster University. The external review of regulatory disposition was conducted by E. Leeds of Eric J. Leeds Consulting LLC, Engineering and Regulatory Services and M. Satorius of Satorius Consulting Services LLC, both of them having former employment with the US Nuclear Regulatory Commission (NRC) (CMD 17-M14.C).

20. CNSC staff reported that it had not been part of the discussion between Dr. Nijhawan and COG, nor had it participated in the COG dispositioning process. However, CNSC staff had conducted an independent assessment of COG's final report. The discussion was conducted in two phases. Phase 1 of the discussion included eight of the 34 questions raised by Dr. Nijhawan, grouped into the following four key areas:

- bleed condenser relief valve (BCRV)
- hydrogen/deuterium production and passive autocatalytic recombiners (PARs)
- Modular Accident Analysis Program modelling for CANDU (MAAP-CANDU)
- in-vessel retention (IVR)

CNSC staff completed its review of these issues and conducted afterwards a review of the remaining 26 questions (Phase 2) to evaluate their safety significance and to assess potential safety risk associated with these assertions. CNSC staff also reviewed COG's disposition of the issues. The final report<sup>3</sup>, prepared by COG upon the completion of Phase 2, encompassed all 34 questions grouped in nine groups, as follows:

- emergency mitigation equipment (EME), 9 questions
- containment integrity, 5 questions
- design modifications for instrumentation and control, 3 questions
- design modifications for pressure relief, 2 questions
- design modifications for radiation detection, 2 questions
- severe accident management guidelines (SAMG), 3 questions
- reliability, one question
- security, one question
- safety analysis, 8 questions

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<sup>3</sup> *Final Report, CANDU Post-Fukushima Questions*, CANDU Owners Group Inc., October 2016.



21. Upon completion of Phase 2, CNSC staff reviewed COG's final report and presented in CMD 17-M14 a summary of CNSC staff's review of the report. CNSC staff's findings were communicated to the industry and Dr. Nijhawan for information. CNSC staff expressed the opinion that many topics raised by Dr. Nijhawan had been previously evaluated by CNSC staff and the industry. CNSC staff informed the Commission about its position regarding all nine groups of questions raised by Dr. Nijhawan, and stressed that it agrees with COG's disposition of the issues. CNSC staff also made several observations related to ongoing research that the industry carries out to support the basis for the industry's disposition of the issues raised. CNSC staff added that all these areas covered in the 9 groups will form part of the regulatory oversight of NPPs by the CNSC. CNSC staff recommended to the Commission that the issues raised by Dr. Nijhawan do not merit further analysis at this time.

*Presentation by Dr. J.C. Luxat*

22. Dr. Luxat summarized the results of his review with the objective to determine whether CNSC staff had exercised due diligence concerning the issues raised by the intervenor and the disposition of these issues by the Canadian nuclear power plant licensees. Dr. Luxat also presented his assessment on whether the issues raised by the intervenor were clearly stated and adequately addressed by the licensees and by COG. Dr. Luxat informed the Commission about the scope of his review and about the resources used to establish the technical basis for his review. Dr. Luxat concluded that the CNSC had exercised appropriate due diligence in addressing the issues raised by the intervenor and in examining the disposition of these issues by the Canadian nuclear industry.
23. With respect to the specific issues raised by the intervenor, Dr. Luxat pointed to a lack of supportable technical statements of the presented concerns and what was, in his view, a lack of reference made to up-to-date technical knowledge. In Dr. Luxat's view, the intervenor's concerns did not reflect an accurate or up-to date reflection of the technical issues.

*Presentation by E.J. Leeds and M.A. Satorius*

24. Mr. Leeds and Mr. Satorius informed the Commission about the results of their review that was focused on the following aspects of the CNSC staff's approach to this matter:
  - regulatory requirements in place for a

- beyond-design-basis accident;
- regulatory openness and transparency;
- rigour of the technical review of the potential safety issues; and
- an appreciation and respect for differing professional opinions.

The reviewers noted that the scope of their review included the four major technical topics addressed in the COG Phase 1 report. The reviewers found that there was limited safety significance with regard to the issues raised and that many of the intervenor's assertions were not technically supported and impossible to verify. The reviewers expressed their views that the CNSC has a robust regulatory process that emphasizes openness and transparency with the public. The reviewers found that the CNSC encourages community engagement through its Participant Funding Program and provides multiple paths for individuals to raise issues and concerns. The reviewers underlined the importance of the CNSC using the same procedure for conducting a technical assessment whether the concern is raised by a member of the public or by CNSC staff itself. The reviewers further found that CNSC staff uses international standards, including the International Atomic Energy Agency fundamental safety principles and safety standards.

25. The reviewers concluded that CNSC staff had exercised due diligence in the review, assessment and disposition of the issues raised, and that the CNSC engagement with the Canadian nuclear industry to address these issues had been appropriate and consistent with international regulatory practices. Based on their findings, the reviewers recommended that the CNSC consider the following:

- establishing a process for responding to issues raised repetitively over time; and
- implementing a more robust system of control and oversight for responding to issues raised by the public.

26. Invited by the Commission to comment on the two recommendations, CNSC staff recognized the importance of addressing concerns expressed by intervenors, but also pointed out to the inefficiency of repetitive, long lasting discussions of matters that have been fully considered. CNSC staff indicated that the NRC has a process to manage in such situations. CNSC staff agreed that, for the sake of improved efficiency in decision making, the experience from the NRC should be looked at and reported back to the Commission for its consideration.

*Presentation by COG*

27. With reference to CMD 17-M14.1 and CMD 17-M14.1A, a representative from COG informed the Commission about COG's response to the intervenor's concerns related to severe accidents. The presentation encompassed COG's research projects conducted over several years and the results obtained that are relevant to the issues raised by the intervenor. The COG representative submitted that COG had examined each of 34 questions, compared the issue and comments against what the industry had already done after the Fukushima event, determined whether any additional actions were required, and provided a justification for the disposition in each issue. The COG representative explained that, during the process, in Phase 1, COG had addressed the key safety analysis issues, obtained input from the intervenor regarding the disposition of his comments and addressed the remaining 26 questions. The Phase 1 report had been reviewed by an independent international expert Dr. R. Henry. As part of the process, Dr. Nijhawan was given an opportunity to provide detailed written comments on COG dispositions of his raised issues. Dr. Nijhawan provided comments upon receiving the final report. The expert group concluded that the final report had been adequate in addressing the additional details provided by the intervenor.

*Presentation by Representatives from the Nuclear Industry*

28. With reference to CMD 17-M14.2, the representatives from the nuclear industry in Canada, including Énergie NB Power, OPG and Bruce Power, presented to the Commission the NPP operators' response to the questions raised by the intervenor. The presentation included a general explanation of nuclear plant design principles and safety objectives, CANDU reactor and its design basis, safety analysis, and approach to response to accidents that are not included in the design basis (beyond design basis accidents). The presentation also included the mitigating measures developed by the industry to respond to major events and enhance safety, based on experience and lessons learned from the Fukushima event. In conclusion, the representatives from the nuclear industry stated that the introduced enhancements have resulted in an increase in safety compared to the original plant designs.

*Presentation by Dr. S. Nijhawan*

29. Dr. S. Nijhawan, in his intervention, maintained his view that the issues had not been adequately addressed, objected to the technical level of CNSC staff's assessment and questioned the true independence of the third party reviews. The intervenor expressed a preference for a meeting that would be deferred and organized at a later date, after a more complete, independent and technical review of the safety issues.

*Questions from the Commission*

30. The Commission enquired about the status of the four areas encompassed within Phase 1 review. CNSC staff submitted that the areas of BCRVs and hydrogen/deuterium had been discussed on several occasions at Commission public proceedings, and that the American Society of Mechanical Engineers (ASME) standard committee confirmed the appropriate application of the related standards and codes. Dr. R. Henry from Fauske and Associates (United States), who performed a review of Phase 1 and was available to respond to questions, confirmed this statement.
31. With respect to the hydrogen/deuterium issue, CNSC staff noted that both experimental and analytical work has been done on this issue. The OPG representative commented that a large body of experimental results on the behaviour of hydrogen and deuterium with PARs had demonstrated that there was no significant difference in the performance of PARs with the presence of either deuterium or hydrogen. The OPG representative noted that, for the industry, the issue was closed. Dr. Luxat explained that similar behaviour of PARs with hydrogen and deuterium is expected and explained the reasons for this behavior.
32. The Commission further enquired about the uncertainties related to the MAAP-CANDU modelling and IVR issue. Dr. S. Nijhawan explained his concerns related to the up-to-date status of the modelling program. CNSC staff expressed its awareness of the existence of other modelling programs and of an ever-existing possibility to modify a code by introducing more details and more parameters. CNSC staff stated that the currently used MAAP had evolved over the years to reflect evolving regulatory requirements and is currently being used for licensing purposes. Invited by the Commission to comment, Dr. R. Henry stated that codes always continue to develop, and that the development of MAAP has been based on experiment and experience.

33. Referring to the Phase 1 report and the COG *Final Report, CANDU Post-Fukushima Questions*, as well as nine groups encompassing 34 questions, the Commission examined if there were any outstanding issues that would still require additional analysis in the future. The Commission enquired through each of the nine groups of questions asking for inputs from all participants, noting that safety analysis had been mostly covered through the consideration of the issues encompassed in the Phase 1 report.
34. With respect to emergency mitigation equipment (EME), the representatives from the industry and COG submitted that the actions stemming from the Fukushima events were completed, and that the emergency mitigating equipment was in place and tested. The representatives described the technical modifications and design changes that had been implemented to address concerns related to potential severe accidents. The representatives added that several Severe Accident Management Guides had been completed, and severe accident kits had been put in place and were being tested during drills and exercises. CNSC staff stated that there were no further actions that they were looking at.
35. Responding to the Commission's question regarding the containment integrity, CNSC staff reported that there were no outstanding issues.
36. With respect to design modifications for instrumentation and control, CNSC staff submitted that one outstanding issue was related to the industry's survivability assessments for their instrumentation for the severe accident management period. The industry had addressed this issue; however, although outside the scope of the Fukushima action item, CNSC staff still had a residual concern related to the limited amount of instrumentation that would be needed beyond the accident management phase into the long-term recovery phase. The industry has been asked to provide more information on how their instruments are expected to perform or whether they could be replaced.
37. CNSC staff submitted that there were no outstanding issues regarding the design modifications for pressure relief and for radiation detection. With respect to the severe accident management guidelines, CNSC staff submitted that they were still performing reviews of these guidelines. CNSC staff added that there were no outstanding issues regarding reliability and security questions.

38. With respect to safety analysis, CNSC staff summarized its assessment of the four items considered during Phase 1, and noted that, as a result of the intervenor's observations, CNSC staff asked the industry to provide a prioritized list of future enhancements for MAAP-CANDU. Dr. Nijhawan expressed his satisfaction with this development and reiterated the benefits that further improvements could make in this area. The representative from COG informed the Commission of research and development activities and projects that are focusing on severe accidents. The COG representative pointed out how research programs are prioritized, and that some issues raised by the intervenor would find their place according to this prioritization scheme. The COG representative added that this continuous work would be coordinated with the CNSC.
  
39. Recognizing the effort made and resources engaged by the industry, COG and CNSC staff to address the intervenor's concerns, the Commission asked Dr. Nijhawan to explain his reaction to the results of the assessments of the issues presented in the Phase 1 report and COG final report. The intervenor responded that the issues included in his intervention had not been received, interpreted, or addressed adequately by the engaged experts, and expressed the view that the reviews of certain issues were based on incorrect information and data sets. The intervenor mentioned that his views were supported by specialists not involved in this review process. The intervenor re-stated his disappointment with the process and with technical level of the assessment of his concerns. In conclusion, the intervenor requested a new meeting with the Commission for a further consideration of the technical issues he raised.
  
40. The Commission recognizes the importance of the issues raised by the intervenor. The Commission is satisfied with the methodical approach by the industry, COG and CNSC staff in addressing these issues and concerns, as well as with reported results of the review of these issues. In its consideration of such issues, the Commission is the body that has the responsibility of assessing the value of evidence, including expertise. The Commission believes in scientific method and rigour. The Commission notes the rigour of the evidence that was presented by CNSC staff, the nuclear industry and experts. Based on the Commission's review of the material presented and its weighing of the evidence, the Commission is satisfied that there remain no outstanding issues that would require further attention. At the

same time, the Commission requests that CNSC staff, under the leadership of the CNSC Secretariat, consider the recommendations by Mr. Leeds and Mr. Satorius and present to the Commission a review of the NRC model to address technical and other safety issues raised by stakeholders in an efficient and transparent way and, as appropriate, to present recommendations on a procedure to deal with long-standing technical issues.

**ACTION**  
by  
November  
2017

## DECISION ITEM

### Continuation of Commission Meeting Item (August 17, 2016): Risk-Informed Assessment of CANDU Safety Issues

41. With reference to CMD 17-M12 and CMD 17-M12.A, CNSC staff presented on the *Continuation of Commission Meeting Item: Risk Informed Assessment of CANDU Safety Issues* to the Commission. This report contains the response from CNSC staff to the Commission's request to return to the Commission with a further treatment of the issues in, and disposition of intervenor comments on CMD 16-M34, *Risk Informed Assessment of CANDU Safety Issues*<sup>4</sup>. CMD 16-M34 was presented at the August 2016 Commission meeting and described the approach used by CNSC staff to assess the current status and implementation plans of safety improvement initiatives for Canadian CANDU reactors. CMD 17 M-12 provides further information on the re-categorization of the Category 3 CANDU Safety Issues (CSIs). CNSC staff reviewed the intervenors' submissions and is of the opinion that no new issues were identified and that the process for the re-categorization of Category 3 CSIs outlined in CMD 16-M34 remains valid.

#### Risk-Informed Decision Making

42. The Commission noted that intervenors raised the concern that no risk-informed decision making methodology was used to categorize the CSIs, however the Commission also noted that a 2009 CNSC staff report contained detailed information on the risk-informed decision making process used to categorize CSIs. The Commission enquired if that report was made publically available. CNSC staff responded that the 2009 report illustrates the application of CNSC staff's risk informed decision making process and is available to the public
43. The Commission noted that, during the *Fifth Review Meeting for the Convention on Nuclear Safety* in 2011, there was a peer review

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<sup>4</sup> Canadian Nuclear Safety Commission Technical Briefing (CMD 16-M34) – *Risk Informed Assessment of CANDU Safety Issues*, August, 2016.

of the application of the CNSC's risk-informed decision-making process to develop the path forward for resolution of the most significant CANDU safety issues. The Commission asked if CNSC staff planned on obtaining a third-party review of the re-categorization of the CSIs as well. CNSC staff explained that the said process and its applications were accepted and, as such, the peer review under the *Nuclear Safety Convention* endorsed the CNSC's risk-informed categorization of CANDU safety issues. The process and its applications were accepted by the international community.

#### General Comments on CSIs

44. Addressing the source of the CSIs, CNSC staff explained that the list of CSIs in CMD 16-M34 and CMD 17-M12 is a combination of issues raised in the IAEA document TECDOC-1554<sup>5</sup> as well as generic action items. Asked about the tracking of additional safety issues that may be discovered, CNSC staff responded that issues are generally tracked via the regulatory data bank and can be tracked as site-specific actions or through research programs. On the need for a complete list of all issues, CNSC staff stated that CSIs are tracked separately due to legacy tracking issues, however all safety issues could be integrated into a single list at the Commission's discretion. The Commission asked that a list of all safety issues that are equivalent to Category 3 CSIs be compiled into one list and summarized in an appendix of the annual NPP Regulatory Oversight Report.
45. The Commission expressed concern about the optimal use of CNSC staff resources regarding these CSIs, as not all of them are of high importance to safety but may still take considerable time and resources to properly track and categorize. CNSC staff stated that the emphasis is on the Category 3 CSIs, which is one reason why the categorization of CSIs is important. CNSC staff added that all the CSIs were brought before the Commission, as per the Commission's request, and all safety issues are brought before the Commission as part of the annual regulatory oversight report.
46. The Commission asked for information on the public review and comments on the CSIs. CNSC staff explained that CNSC staff reports produced in 2007 and 2009 were made available to the public and the public has commented on select items at various Commission hearings and meetings. CNSC staff added that these CSIs were also discussed in the Canadian National Report for the

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<sup>5</sup> International Atomic Energy Agency (IAEA) TECDOC-1554, *Generic Safety Issues for Nuclear Power Plants with Pressurized Heavy Water Reactors and Measures for their Resolution*, Vienna, June, 2007.



Convention on Nuclear Safety, Fifth Report<sup>6</sup>.

47. Addressing the process for re-categorizing a CSI from a lower safety significance to a higher safety significance (such as in the case from re-categorizing a Category 1 CSI to a Category 2 CSI), CNSC staff explained that there is the potential for this transition to occur, if new information and new data suggest it should do so.
48. The Commission asked about the acceptability of a CSI remaining in Category 2 for an extended amount of time. CNSC staff confirmed to the Commission that, if adequate controls are in place and if the licensee is managing the situation properly, then it is acceptable to CNSC staff if a CSI remains in Category 2 indefinitely. CNSC staff added that they will continue to monitor every Category 2 CSIs.

Category 3 CSIs

49. The Commission asked for more details regarding the process for re-categorizing Category 3 CSIs. CNSC staff stated that there is a formal, documented process to follow, and a large amount of discussion, research and analysis before the licensee can formally submit a request for re-categorization. CNSC staff added that, once a formal request is made, CNSC staff will perform a technical assessment and document their view on the licensee's request.
50. Regarding the position of CNSC staff on Category 3 CSIs and their plan to address the four outstanding issues (analysis for void reactivity coefficient (AA 9), fuel behaviour in high temperature transients (PF 9), fuel behaviour in power pulse transients (PF 10), need for systematic assessment of high energy line break effects (IH 6)), CNSC staff explained that CNSC staff and the licensees have agreed upon the actions that will be taken that are intended to result in the re-categorization of these remaining Category 3 CSIs. CNSC staff provided examples of work being performed to re-categorize three of the CSIs, and stated that the licensees are using what is known as a Composite Analytical Approach in their re-categorization efforts. CNSC staff added that re-categorization will occur only if the results of the analyses indicate that re-categorization is appropriate. The Commission is satisfied with the explanation provided by CNSC staff with regards to the re-categorization plans for the remaining Category 3 CSIs.

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<sup>6</sup> Canadian National Report for the Convention on Nuclear Safety, Fifth Report, September 2010.

51. The Commission enquired on the timeframe and deliverables associated with the re-categorization of Category 3 CSIs. CNSC staff confirmed that there are milestones and dates for the deliverables in the project plan. CNSC staff added that there must be analysis and demonstrations from the licensees that the Category 3 CSIs can be re-categorized appropriately, and CNSC staff will ensure that the licensees will complete the required work.
52. The Commission enquired about the licensees' plan for the work to be performed in order to re-categorize all Category 3 CSIs into Category 1 CSIs. The Bruce Power representative explained that Bruce Power has performed significant work on these Category 3 CSIs, and provided the example of the work performed to date on the Large Break Loss of Coolant (LBLOCA) CSIs, as well as the timeline for future work that is intended to result in the re-categorization of those CSIs. The Bruce Power representative added that, in the view of that organization, all Category 1 CSIs and many of the Category 2 CSIs are design basis events and could be tracked as part of the normal processes.

#### Discovery of New CSIs

53. The Commission noted that additional safety issues (issues not included in the seventy-four CSIs) could arise, and enquired as to what the path forward for resolving those issues would be. CNSC staff explained that these additional issues are referred to as "generic action items", and those issues are described, tracked and appropriate measures are taken to address them.
54. The Commission enquired on the optimal method(s) to keep the Commission up-to-date on all safety issues related to Canadian NPPs. CNSC staff replied that if new safety issues were discovered, then they would be included in the monthly NPP status reports and/or would be included as an EIR if the issue was especially significant. CNSC staff stated that, as periodic safety reviews occur, each facility will have a detailed safety review that will include all safety concerns and safety requests for that facility, which will all be tracked through an implementation plan. CNSC staff added that an improved method for tracking all safety issues will be implemented and brought before the Commission.

Employee Training and Qualification

55. With consideration to the CSI “MA 13” (called availability of research and development, technical and analysis capabilities for each NPP), the Commission enquired about the financial resources invested by the licensees into R&D and knowledge transfer. The Bruce Power representative stated that, while the exact resource allocation will fluctuate with the needs of the organization, a significant amount of resources are invested in those activities and that investment generally increases every year. The OPG representative stated that CANDU Owner’s Group (COG) also reports to the CNSC on R&D capabilities and ongoing technical research in the nuclear industry. CNSC staff explained that the industry’s research program is reviewed annually, that CNSC staff works with Atomic Energy of Canada limited (AECL) with regards to research, and is on the Board of the Steering Committee for the federal government funding that is allocated to the Canadian Nuclear Laboratories.
56. Regarding the training programs for Bruce Power employees, the Bruce Power representative stated that the modern training programs are very extensive, and provided a brief explanation of improvements made to those training programs over the years. CNSC staff added that REGDOC-2.2.2<sup>7</sup> provides requirements for personnel training and is part of the licensing requirements that must be met by licensees.
57. Asked why CSI “MA 13” was listed as a Category 2 issue, CNSC staff responded that certain Category 2 CSIs are candidates to be re-categorized as Category 1. CNSC staff stated that, in this case, there had been uncertainty regarding the research capabilities of the Chalk River Laboratories following the restructuring of AECL. CNSC staff added that, now that that restructuring is complete, this CSI will likely be reviewed.

*Oral Intervention from Dr. Greening (CMD 17-M12.1 and CMD 17-M12.1A)*

58. In his intervention, Dr. Greening raised a number of matters, focusing on the Annulus Gas System (AGS) and the Leak-Before-Break (LBB) methodology in CANDU reactors that were considered by the Commission.

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<sup>7</sup> Canadian Nuclear Safety Commission Regulatory Document – REGDOC-2.2.2, *Personnel Training*, August, 2014.

Leak-Before-Break and Break-Before-Leak

59. CNSC staff noted that the LBB analysis methodology described by this intervenor was logical, however it is not the methodology used by CNSC staff to analyze LBBs, and that the modern LBB analyses performed by the licensees are more complex. CNSC staff discussed the difference between the LBB and the more serious Break-Before-Leak (BBL) case, which occurs when a pressure tube reaches critical cracking before the reactor is shut down. CNSC staff explained that all licensees have regulator-accepted LBB cases and there has not been a BBL incident in Canada since 1986, after which the licensees made large improvements to their facilities and procedures. CNSC staff stated that LBB analysis is only one of the safety analysis tools available and provided additional examples of LBB assessments. CNSC staff added that fuel channels are inspected and that the current CSA standards require that any pressure tube exhibiting crack-like phenomena be replaced and the licensees must demonstrate that any other flaws will not evolve into cracks. The Commission is satisfied with the response from CNSC staff.
60. The Commission enquired about the application of risk-informed decision making to potential breaks in the pressure tubes. CNSC staff explained that pressure tube ruptures are a Design Basis Accident (DBA), so if this event were to occur, the safety systems would shut down the reactor, keep it controlled and cooled, there would be no radioactive release to the environment and no threat to personnel at the site. CNSC staff added that the use of risk-informed decision making includes the effects of the different safety systems in the context of an accident, and does not focus solely on one system.
61. Dr. Greening noted that the August 1983 PT G16<sup>8</sup> event at the Pickering NGS was a case of a BBL, as the flaw that caused the pressure tube rupture was not detected before the break occurred. Addressing this event, CNSC staff explained that this is a well-known event, and that it prompted the licensees to remove all pressure tubes of that particular type from service in Canada. CNSC staff added that there were several problems with that type of pressure tube, and that that event led to substantial changes to the design and operation of CANDU reactors. The Bruce Power representative explained that, at the time of that event, there was no inspection program for pressure tubes or spacers and that this event led to much analysis and to much more detailed inspection programs. The Bruce Power representatives provided a detailed

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<sup>8</sup> Ontario Hydro – CNS-75, *Pressure Tube Failure – Pickering NGS Unit 2*, July, 1984.

explanation of the inspection programs, defence-in-depth and research and development programs that were established after the PT G16 incident to ensure the integrity of the pressure tubes. The Bruce Power representative added that, in the event of a pressure tube failure, the reactor is designed to survive such an event, even without the actuation of any safety systems.

62. The Commission asked for the number of LBB cases that have occurred in Canada. CNSC staff responded that there were several cases, with the majority of those instances occurring in the 1970s and 1980s, due to a design flaw in the early pressure tubes which caused unexpected cracking. CNSC staff added that changes have been made to the design and installation of the pressure tubes to correct this issue, and substantial improvements were also made to the AGS. The Commission notes that the last example of an LBB in Canada occurred in 1986, and is satisfied with the explanation provided by CNSC staff.

#### Annulus Gas System

63. The Commission notes the information presented by the intervenor with regards to the design, functionality and potential limitations of the AGS, and commented that the intervenor's arguments were presented in a logical fashion. Asked if the potential flaws in the AGS identified by this intervenor would impair the ability of the AGS to monitor safety, CNSC staff responded that the AGS is a monitoring system, not a form of safety system.
64. Regarding the AGS, the Bruce Power representative presented a different view of the function of the beetle device used in the AGS, and stated that the primary defence against a LBB was the rate-of-rise of dew points. The Bruce Power representative provided a detailed explanation of the theory and functionality of the AGS and the operating procedures, and stated that the reactor must be manually shut down within one hour after a rate-of-rise detection. The Bruce Power representative noted that the AGS has experienced problems in the past, but the modern AGS operates as intended. The Bruce Power representative added that the operating limits and licence conditions have been established based on detailed analyses, and that if a leak is detected and the reactor is offline, then the pressure tube(s) are examined to determine the exact location of the leak(s).
65. Dr. Greening provided a description of the potential difficulties encountered with using the AGS and potential improvements to it, as asked by the Commission. The OPG representative reported

- that the difficulties in operating the AGS are a matter of opinion, and stated that the AGS maintains defence-in-depth and reliability requirements. The OPG representative provided an example of the system operating as intended, which occurred in 2013. The OPG representative added that the reactor cannot be operated without the AGS in service.
66. The Commission asked for additional comments from CNSC staff on improvements to the AGS. CNSC staff provided a detailed overview of the improvements made to the AGS over the past 30 years, such as improvements to the AGS operating modes and annulus gas composition, the AGS leak detection capability, and the operational provisions.
67. The intervenor expressed concern about the frequency for purging the AGS. CNSC staff provided details on the last instance of “continuous purging” (where the AGS is purged every twelve hours) where the licensee met with CNSC staff and performed a significant amount of analysis work to demonstrate that the leak detection capability would not be compromised. CNSC staff agreed with the analysis presented by the licensee. CNSC staff added that each “continuous purging” scenario submitted by a licensee would be reviewed and that the overriding principle is that leak detection must be maintained at all times. The Bruce Power representative stated that the “continuous purging” mode is not the mode of standard operation. However, it is used for a short period of time to help determine the location of the leakage and is performed on a case-specific basis with proper supporting analysis.
68. Considering the worst case scenario in the event of a failure of the AGS, the Bruce Power representative explained that the worst possible case would be the development of a leak in a pressure tube that goes undetected and causes the pressure tube to rupture. The Bruce Power representative provided an overview of the accident progression and eventual repair of the reactor, and stated that there would be no radioactive release to the public. CNSC staff stated that there is no safety consequence if the AGS is not working, as the reactor must be shut down and the AGS must be repaired before the reactor can return to service. The Commission is satisfied with the responses from the Bruce Power representative and from CNSC staff.

#### Licensee Worker Training

69. Regarding the training and qualification of NPP workers, this intervenor expressed concern over the education and work

experience of NPP staff members with respect to their positions in the NPP. The Bruce Power representative responded that everyone in the organization must be qualified to perform their job. The Bruce Power representative stated that technicians and functional area managers are experts in their field; however, at a large organization such as Bruce Power, it is not feasible for every employee to be a technical expert in a certain field. The Bruce Power representative stated that there are minimum hiring criteria in place that applicants must meet before they are granted a job interview.

70. Asked about conflict of interest policies for family members within the organization, the Bruce Power representative responded that a conflict of interest policy is in place, and that family members are not permitted to supervise or interview other family members.

#### Treatment of CNSC Site Inspectors

71. This intervenor expressed concern over the treatment of CNSC site inspectors by licensee staff. CNSC staff responded that they have not received any complaints from site inspectors, and provided the example of the recent audit report from the Commissioner for the Environment and Sustainable Development<sup>9</sup>, which stated that in every instance when an inspector wanted the licensee to perform a certain task, the licensee always complied. CNSC staff added that the results of inspections are addressed promptly by the licensees, as is the expectation. CNSC staff clarified to the Commission that licensee cooperation with the inspectors is embedded in the law as part of the *Nuclear Safety and Control Act*<sup>10</sup> (NSCA), and that failure to comply with the NSCA has severe consequences. CNSC staff added that, if evidence of non-compliance with the NSCA is found, then action would be taken against the licensee. The Bruce Power representative acknowledged that the licensee is legally required to provide anything that the CNSC site inspector requests.

72. The Commission asked CNSC staff to follow up with the union respecting the existence of concerns from CNSC site inspectors. CNSC staff reported that there is an upcoming Labour Management Committee meeting, and this item will be added to the agenda. The Commission is satisfied with this response from CNSC staff.

**ACTION**  
by  
August 2017

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<sup>9</sup> 2016 Fall Report of the Commissioner for the Environment and Sustainable Development – Inspection of Nuclear Power Plants, published October 4, 2016.

<sup>10</sup> S.C. 1997, c. 9

R&D Programs and Pressure Tube Hydrogen Uptake

73. Dr. Greening also expressed concern over the usefulness of the results from the licensee's R&D programs. CNSC staff responded that designated specialists are assigned to follow any research that is important from a safety perspective, and that in some cases CNSC staff will review the research objectives to ensure that that research will provide the necessary information. CNSC staff stated that they are satisfied with the quality of research being performed by the licensees, and that this research provides information that can be used to make improvements to the plant and serves to provide technical training to NPP staff. The Bruce Power representative stated that the R&D programs within the organization will always be ongoing, that the results of that research has produced tangible benefits, and provided examples of improvements made to the modern AGS.
74. The intervenor expressed concern over CNSC staff's focus on the measurement of the hydrogen concentration over finding the source of the hydrogen with regards to the "CL 1" CSI. The intervenor also provided an example of the potential source of the hydrogen, based on his professional experience. CNSC staff clarified that the priority of CNSC staff is not to interfere with the licensees' R&D program, and that the licensees are performing ongoing research to determine the cause of the hydrogen in the pressure tubes. CNSC staff stated that the main priority for CNSC staff from a regulatory perspective is ensuring the structural integrity of the pressure tubes, and to determine the effect that hydrogen will have on pressure tube cracking. CNSC staff provided a brief overview of the fitness for service assessments for the pressure tubes, and outlined the research on this matter being performed by the NPP licensees, COG, and at CRL.
75. The intervenor restated his unease over the lack of conclusive results regarding the source of the hydrogen from the licensees' research programs and its potential effects on pressure tube cracking. The OPG representative stated that the fundamental requirement of the organization is the safety of the plant, and that OPG will continue to perform R&D in order to satisfy safety requirements and CNSC technical specialists and to demonstrate that the plant is fit for service. CNSC staff stated that, regardless of the source of the hydrogen, proof of fitness for service for the pressure tubes is the main concern of CNSC staff, and that the licensees may only extend the pressure tube life if it is demonstrated that the pressure tubes will remain fit for service.



76. The intervenor further conveyed his concern over the variability of the hydrogen concentration in the pressure tubes, as well as the reasons behind that variation. The Bruce Power representative stated that the predictability of hydrogen in the pressure tubes has improved, and gave a brief overview of the predictive capabilities with respect to pressure tube hydrogen uptake. The Bruce Power representative explained that not all of the mechanisms for hydrogen uptake are understood, however some of the contributing factors to hydrogen uptake have been identified and newer manufacturing processes have been shown to reduce the hydrogen uptake. The Bruce Power representative added that research on this issue is scheduled to continue for several years. Asked if the results from this research is shared or published, the Bruce Power representative responded that some of the research is shared, however some of it is proprietary and commercially sensitive. The Bruce Power representative added that the results are not typically published in technical journals; however, such a suggestion will be taken under advisement. The Commission recommended that the outcomes of the research should be more publically available as appropriate.

77. The Commission asked Dr. Greening if he had provided the licensee, CNSC staff or the CSA with potential solutions to the hydrogen issues. The intervenor responded that he wrote to the CSA with regards to CSA Standard N285.8<sup>11</sup> two years ago, but did not receive a response. Addressing potential improvements to the CSA N285.8 standard as raised by this intervenor, CNSC staff stated that the CSA has a technical committee that has several ongoing activities with respect to the improved modelling and analysis of the effects of hydrogen on the pressure tubes. CNSC staff added that the CSA committees welcome members of the public who are subject matter experts, and suggested that this intervenor could contact the chair of this committee about joining that committee.

78. Dr. Greening expressed concern over the aspect of a pressure tube that exhibits an unexpected material property, referred to as a “rogue tube”. CNSC staff provided an overview of the original practice regarding the treatment of rogue tubes, including data collection and analysis, R&D programs, and the limitations of that practice, which continued until approximately ten years ago. CNSC staff gave a detailed description of the new practice as performed through the CSA committee, stating it is a very

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<sup>11</sup> CSA Group – CSA N285.8-15, *Technical Requirements for In-Service Evaluation of Zirconium Alloy Pressure Tubes in CANDU Reactors*, 2015.

rigorous process that requires a significant amount of data collection and statistical analysis as stated in the N285.8 standard. CNSC staff added that CNSC staff were involved in the development of the N285.8 standard, and are confident in their models and analysis methodologies with respect to these rogue tubes. The Commission is satisfied with the response from CNSC staff.

*Oral Intervention by Dr. Sunil Nijhawan (CMD 17-M12.3)*

General Comments on CSIs

79. Dr. Nijhawan provided several comments on the various Category 1 CSIs. CNSC staff explained that, in their view, the intervenor did not disagree with the overall conclusions from CNSC staff on those CSIs; however, he would have preferred to see more technical information to corroborate those conclusions and that it was not feasible to include all that additional information into the CMD.
80. This intervenor provided several comments regarding Category 2 CSIs, including issues such as hydrogen management, thermosyphoning and containment testing. The intervenor enquired if recent computer models and experiments were used to obtain new data in order to re-categorize these CSIs. The intervenor also suggested that all safety issues equivalent to Category 3 CSIs be compiled and tracked together.

Hydrogen Management

81. Regarding the intervenor's concerns about hydrogen management during accidents, CNSC staff explained that all NPPs have been upgraded with Passive Autocatalytic Recombiners (PARs), which represents a significant design change and improvement to the safety and management of hydrogen at the plants. CNSC staff added that, in their view, the use of the PARs provides sufficient control of hydrogen in the event of a Design Basis Accident (DBA). The Commission is satisfied with the response from CNSC staff.
82. The intervenor raised a further concern regarding hydrogen management in the case of a Loss of Coolant Accident plus the Loss of Emergency Core Cooling (LOCA + LOECC). CNSC staff explained that this scenario is a design basis accident and is the scenario used to calculate the number of PARs needed in each station. CNSC staff presented a description of the three cases of steam flow for this scenario. CNSC staff also provided

the example of the Point Lepreau NGS where the analysis showed that only one PAR was strictly needed. However, nineteen PARs were added for the purpose of defence-in-depth. The OPG representative provided an additional example of the number of PARs used in the Darlington NGS, and stated that the LOCA + LOECC accident is analyzed in accordance with REGDOC-2.4.1<sup>12</sup> regarding design basis and beyond design basis accidents.

### Thermosyphoning

83. Addressing Dr. Nijhawan's concern with regards to thermosyphoning in the event of a station blackout, the Bruce Power representative agreed with the intervenor that thermosyphoning would be lost after a period of time during such an event. The Bruce Power representative gave a detailed account of this scenario, including operator actions, the thermosyphoning process, buoyancy induced flow, and the fuel temperature. The Bruce Power representative provided a different conclusion than the intervenor in this scenario and stated that heat transfer from the core to the steam would still occur due to the buoyancy driven flow mechanism. The Bruce Power representative added that this mechanism has been verified both analytically and experimentally.

### Containment Testing

84. The Bruce Power representative explained that Bruce Power continues to work on new codes and standards. The Bruce Power representative stated that Research and Development (R&D) work is ongoing, and the result of that research has been incorporated into the safety cases. Regarding the testing of containment and of the vacuum building, the Bruce Power representative stated that testing has not stopped and is performed every six years for containment and every twelve years for the vacuum building, in accordance with standard CSA N287<sup>13</sup>. The OPG representative noted that these tests were performed on the Darlington vacuum building in 2015 and on the Pickering vacuum building in 2010, and that the containment structures of individual units are tested during major unit outages.

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<sup>12</sup> Canadian Nuclear Safety Commission Regulatory Document – REGDOC-2.4.1, *Deterministic Safety Analysis*, May, 2014.

<sup>13</sup> CSA Group – N287.1-14, *General Requirements for Concrete Containment Structures for Nuclear Power Plants*, 2014.

*Written Intervention from Michel Duguay (CMD 17-M12.2)*

85. In his intervention, Michel Duguay raised a number of matters that were considered by the Commission.
86. Regarding the question from the Commission on the effect that the size or the intensity of a LOCA would have on the effectiveness of the two CANDU safety systems (shut-off rods and poison (gadolinium nitrate)), CNSC staff submitted that there will be no effect on the safety systems as both systems would automatically activate to shut down the reactor. The Bruce Power representative added that, in the design basis model, the LOCA will not affect either shutdown system.
87. Regarding the topic of software issues raised in this intervention, CNSC staff stated that it is in relation to the fact that REGDOC-3.1.1<sup>14</sup> requires licensees to update their safety report every five years. However, in the case of the Gentilly-2 NPP (G-2), a delay in the safety report update was permitted as the facility was slated to undergo refurbishment. CNSC staff added that, as G-2 is currently undergoing decommissioning, there is no need for a safety report update.

*General Comments from the Commission*

88. The Commission expressed its appreciation for CNSC staff's thorough explanation of the process for the categorization and re-categorization of these CSIs. The Commission also expressed its appreciation with regards to the commitment and continuous engagement of the intervenors.

*Commission Decision and Directive*

89. After examining the contents regarding the CSIs and with consideration to the information provided by the intervenors, licensees and CNSC staff, The Commission confirms the categorization of CSIs.

**DECISION**

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<sup>14</sup> Canadian Nuclear Safety Commission Regulatory Document – REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, April, 2016.

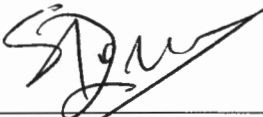
90. The Commission directs CNSC staff to include in future Regulatory Oversight Reports on NPPs:

**ACTION**  
by  
August 2017

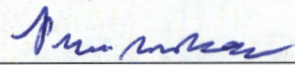
- An appendix that includes all Category 3 equivalent safety issues
- An appendix that tracks the change in categorization of any/all CSIs that are re-categorized

Closure of the Public Meeting

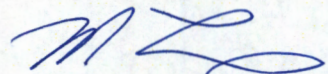
91. The meeting closed at 18:17:

  
\_\_\_\_\_  
Recording Secretary

2017-04-19  
Date

  
\_\_\_\_\_  
Recording Secretary

2017-04-19  
Date

  
\_\_\_\_\_  
Secretary

20-04-2017  
Date

APPENDIX A

2016-M-08	2016-12-21	5158353
Notice of Continuation of Commission Meeting Item with Opportunity to File Supplementary Written Submissions		
17-M7	2017-02-03	5183158
Notice of Commission Meeting of March 8, 2017		
17-M8	2017-02-06	5183876
Agenda of the meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday, March 8, 2017 in the Public Hearing Room, 14 <sup>th</sup> floor, 280 Slater Street, Ottawa, Ontario		
17-M8.A	2017-03-02	5200054
Revised Agenda of the meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday, March 8, 2017 in the Public Hearing Room, 14 <sup>th</sup> floor, 280 Slater Street, Ottawa, Ontario		
17-M9	2017-03-01	5201552
Approval of Minutes of Commission Meeting held on January 26, 2017		
17-M10	2017-03-03	5203792
Status Report on Power Reactors Submission from CNSC Staff		
17-M11	2017-03-02	5201856
Event Initial Report – Ontario Power Generation Darlington Nuclear Generating Station Contaminated Motors Shipped to Unlicensed Vendor Submission from CNSC Staff		
17-M14	2017-01-09	5150969
Information Item CNSC’s Staff Assessment of Industry’s Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Submission from CNSC Staff		
17-M14.A	2017-03-01	5191580
Information Item CNSC’s Staff Assessment of Industry’s Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Presentation by CNSC Staff		
17-M14.B	2017-02-28	5200792
Information Item CNSC’s Staff Assessment of Industry’s Disposition of Issues Raised during Bruce and		

CMD		
Darlington Licence Hearings (2015) Presentation by John C. Luxat		
17-M14.C	2017-02-27	5200133
Information Item CNSC's Staff Assessment of Industry's Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Presentation by Eric J. Leeds and Mark A. Satorius		
17-M14.1	2017-01-31	5181897
Information Item CNSC's Staff Assessment of Industry's Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Submission from CANDU Owners Group		
17-M14.1A	2017-02-28	5200776
Information Item CNSC's Staff Assessment of Industry's Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Presentation from CANDU Owners Group		
17-M14.2	2017-02-20	5200111
Information Item CNSC's Staff Assessment of Industry's Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Presentation by Ontario Power Generation, Énergie NB Power and Bruce Power		
17-M14.3	2017-02-22	5200104
Information Item CNSC's Staff Assessment of Industry's Disposition of Issues Raised during Bruce and Darlington Licence Hearings (2015) Submission from Sunil Nijhawan		
17-M12	2016-12-16	5132387
Continuation of Commission Meeting Item (August 17, 2016): Risk-informed Assessment of CANDU Safety Issues Submission from CNSC Staff		
17-M12.A	2017-03-01	5200067
Continuation of Commission Meeting Item (August 17, 2016): Risk-informed Assessment of CANDU Safety Issues Presentation by CNSC Staff		
17-M12.1	2017-01-31	5181154
Continuation of Commission Meeting Item (August 17, 2016): Risk-informed Assessment of CANDU Safety Issues Submission from Frank Greening		

CMD	Date	e-Docs No.
17-M12.1A	2017-02-28	5200340
Continuation of Commission Meeting Item (August 17, 2016): Risk-informed Assessment of CANDU Safety Issues Presentation by Frank Greening		
17-M12.3	2017-01-31	5182121
Continuation of Commission Meeting Item (August 17, 2016): Risk-informed Assessment of CANDU Safety Issues Presentation by Sunil Nijhawan		
17-M12.2	2017-01-31	5181178
Continuation of Commission Meeting Item (August 17, 2016): Risk-informed Assessment of CANDU Safety Issues Presentation by Michel Duguay		