Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on April 6 and 7, 2016

Canada

Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held Wednesday, April 6th (beginning at 3:44 p.m.) and resumed Thursday, April 7th, 2016 at 9:04 a.m. in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario.

Present:
M. Binder, President
D. D. Tolgyesi
R. Velshi
S. McEwan

M. Leblanc, Commission Secretary
L. Thiele, Senior General Counsel
M. Young and S. Dimitrijevic, Recording Secretaries

CNSC staff advisors were: R. Jammal, T. Jamieson, D. Newland, B. Howden, C. Moses, P. Thompson, S. Faille, K. Glenn, R. Barker, J. Burtt, A. Du Sautoy, K. Lafrenière, L. Sigouin, J. Stevenson, H. Khouaja, K. Kirkhope, P. Wong, K. Owen-Whitred, J. Hunt, B. Torrie and K. Murthy

Other contributors were:

- Cameco Corporation: L. Mooney and M.A. Charette
- CNL: K. Kehler, S. Kenny and D. Coyne
- OPG: R. Manley and M. Knutson
- NB Power: J. Nouwens, D. Essensa and M. Cowan
- Bruce Power: F. Saunders and M. Burton
- TSSA: C. Turylo
- Province of New Brunswick: E. Creaser

Constitution

1. With the notice of meeting CMD 16-M10 having been properly given and all permanent Commission members being present, the meeting was declared to be properly constituted.

2. Since the meeting of the Commission held January 28, 2016, Commission member documents CMD 16-M10 to CMD 16-M18 were distributed to members. These documents are further detailed in Appendix A of these minutes.

Adoption of the Agenda

3. The agenda, CMD 16-M11, was adopted as presented. In addition to the items on the agenda, the Commission closed three action items from previous meetings and heard verbal updates on two events, as detailed in the following sections.

Chair and Secretary

4. The President chaired the meeting of the Commission, assisted by M. Leblanc, Secretary, and M. Young and S. Dimitrijevic, Recording Secretaries.

Proposed Closing of Action Items

Nuclear package incident at the Bathurst Airport, New Brunswick

5. Concerning an incident at the Bathurst Airport, New Brunswick, where a package containing a nuclear substance was damaged, the Secretary reported that the CNSC duty officer had filed a report to the Commission Secretariat on February 22, 2016. The Secretary noted that the President had previously requested additional information on the CNSC's response to this event, and that a briefing note providing information on the chronology of the event, and a discussion on good practices and potential improvements, was filed on March 8, 2016. This briefing note was provided to the Commission Members.

6. The Commission asked for more information concerning the time that was required to identify the material inside the damaged package. CNSC staff responded that the timing between the initial discovery of the damaged package and the delay to confirm that there was no breach of the package and no external contamination was due to the need to have qualified staff onsite at the airport with appropriate equipment. CNSC staff noted that, as with all air shipments and consistent with the *Air Transportation Regulations*[1], the contents of the package and contact information were present on the manifest that was provided to the pilot of the aircraft. CNSC staff further noted that the packaging also included this information.

7. The Commission asked for more information about the CNSC duty officer's conversations with several individuals at the airport who did not have information about the contents of the package. CNSC staff responded that the duty officer was required to converse with different individuals at the airport. CNSC staff noted that there was a lesson learned during this event since these individuals were not those with whom the duty officer would usually speak. CNSC staff stated that they had reached out to Air Canada, the carrier, to clarify Air Canada's reporting structure.

[1] SOR/88-58.

8. The Commission asked why no one had looked at the information on the package itself to determine its contents. CNSC staff acknowledged that this could have been done, and stated that the CNSC would address this with the carrier.

9. The Commission asked if information about the event had been posted on the CNSC website. CNSC staff confirmed that it had. The Commission confirmed that this action item was closed. — Action item closed

Implementation of regulatory limits for uranium, molybdenum, and selenium in effluents

10. The Secretary stated that the second item was an action arising from a 2011 meeting[2] of the Commission regarding the implementation of regulatory limits for uranium, molybdenum, and selenium in effluents. The Commission requested that a formal presentation be made to the Commission at a future Commission meeting. — **ACTION** by August 2016

Summary of corrective actions implemented by Cameco Corporation (Cameco) following four action level exceedances that occurred in 2014 at the Blind River Uranium Refining Facility

11. The Secretary reported that CNSC staff filed a memo to the Commission on February 26, 2016, stating that CNSC staff had reviewed the investigation conducted by Cameco, that corrective actions had been identified, and that additional steps were being undertaken to enhance worker dose control measures. The Commission confirmed that the action item was closed. — Action item closed

Verbal Updates on Items from Previous Commission Meetings

Verbal Update from CNSC staff on the January 11, 2016 Transport Accident Involving Uranium Concentrate Near Swift Current, Saskatchewan (Cameco Corporation)

12. CNSC staff presented an update regarding the January 11, 2016 transport accident involving uranium concentrate near Swift Current, Saskatchewan. This item was initially presented at the January 28, 2016 Commission meeting in CMD 16-M8. The accident involved a truck, hauling drums of uranium concentrate in a container, tipping on its side in a highway ditch, with the container becoming dislodged and damaged, standing on its end. CNSC staff described Cameco's recovery and cleanup following the accident, as well as the transfer of the damaged container to

[2] While the meeting transcript states January 2011, the action item arises from a meeting held in June 2011. Refer to the *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held Wednesday and Thursday, June 8 and 9, 2011*.

Cameco's Blind River Uranium Refinery. CNSC staff reported that: regulatory requirements were met throughout the recovery of the accident; work practices and controls were in place to limit contamination and maintain doses as low as reasonably achievable (ALARA); and CNSC staff had identified opportunities for Cameco to improve its proactive communications. CNSC staff confirmed that doses to workers were well below regulatory limits. A representative from Cameco stated that the recovery operations at the Blind River Uranium Refinery were successful. The Commission acknowledged that the response to the accident appeared to be rapid and well-coordinated between emergency responders.

13. The Commission sought further insight into the cause of the accident. CNSC staff responded that the event was attributed to driver error because the driver had deviated off the shoulder and overcorrected. CNSC staff noted speed was not a factor in the accident, and that the driver's drug and alcohol test results were negative. A representative from Cameco noted that the container dislodged because the locks for securing the container to the chassis had broken.

14. The Commission enquired about the contamination levels associated with the accident. A representative from Cameco responded that Cameco monitored the air in and around the container and established work zones for radiation protection purposes. While the Cameco representative did not have the specific monitoring results, they were noted to have been low. The Cameco representative noted that the container was being decontaminated, and that it was expected that it could be free-released afterwards.

15. The Commission asked for more information concerning the salvage drums that were used to hold some of the damaged and deformed uranium concentrate drums, noting that, in some cases, the salvage drums were too small for some of the deformed drums. A representative from Cameco responded that while Cameco used salvage drums to minimize the handling of damaged drums, it was not necessary that every drum be placed in one because they were being unloaded and processed in the Blind River Uranium Refinery, and the objective was to process their contents as soon as possible. The Cameco representative noted that Cameco does have larger salvage drums that could be used in different circumstances.

16. The Commission asked Cameco to comment on the CNSC recommendation that Cameco should improve its proactive communications. A representative from Cameco responded that while there were no issues with Cameco's communication with

local authorities in response to the event, Cameco decided not to publish information about the accident out of commercial interests, as the uranium concentrate was imported from a customer of Cameco's. CNSC staff commented that Cameco had missed the opportunity to share information about the accident and its clean-up, and noted that CNSC staff used the CNSC website and social media to keep the public informed.

17. The Commission expressed dissatisfaction with Cameco's position. CNSC staff noted that Cameco's performance and response to the accident would be considered should there be a future event. The Commission reiterated the importance of proactive disclosure.

Verbal Update from CNSC staff with Respect to an April 1, 2016 Nitric Acid Spill at the Port Hope Conversion Facility (Cameco Corporation)

18. CNSC staff presented information regarding an April 1, 2016 nitric acid spill at Cameco's Port Hope Conversion Facility. CNSC staff reported that a tank that was being cleaned with a diluted nitric acid solution was found to be leaking, which released approximately 1,850 litres of diluted nitric acid into secondary containment in the facility. CNSC staff noted that all of the released liquid was contained in the plant, and that the spill was quickly identified and cleaned up. CNSC staff further noted that Cameco appropriately notified the CNSC, the Ontario Ministry of the Environment and Climate Change, and the Municipality of Port Hope, and proactively disclosed the event on its website.

19. CNSC staff stated that, based on the information provided in Cameco's preliminary reporting of this event, there were no immediate concerns to workers, the public or the environment as a result of the event, and that Cameco's response was timely and adequate in accordance with the requirements of the *Nuclear Safety and Control Act*[3], its associated Regulations, and Cameco's operating licence. CNSC staff further stated that Cameco would be required to provide a full report to the CNSC within 21 days of the event, as required under Section 29 of the *General Nuclear Safety and Control Regulations*[4]. A representative from Cameco concurred with CNSC staff's report.

20. The Commission noted that Cameco's public disclosure of the event in this case was different from the event in Swift Current, and questioned Cameco on this matter. A representative from

[3] S.C. 1997, c. 9.
[4] SOR/2000-202.

Cameco responded that Cameco viewed the two events differently, noting there were reporting requirements associated with this event.

21. The Commission asked if CNSC staff would provide an update once Cameco submits its report to CNSC staff. CNSC staff confirmed that it would. **ACTION** by June 2016

Minutes of the CNSC Meeting Held January 28, 2016

22. The minutes of the January 28, 2016 Commission meeting were presented in CMD 16-M13. The Commission asked for clarification concerning paragraph 34, regarding the failure of a fuel caddy at Chalk River Laboratories. A representative of Canadian Nuclear Laboratories (CNL) responded that CNL had made changes to its inspection requirements and identified corrective actions in its root cause analysis. CNSC staff stated that it was monitoring CNL's progress in implementing those corrective actions. The Commission members approved the minutes of the January 28, 2016 Commission meeting as presented.

INFORMATION ITEMS

Canadian Nuclear Laboratories (CNL): Status Update for CNL Prototype Waste Facilities and Whiteshell Nuclear Laboratories

23. With reference to CMD 16-M12 and 16-M12.A, CNSC staff presented its status update for CNL prototype waste facilities – the three shut-down power reactors: Douglas Point in Tiverton, ON; Gentilly-1 in Bécancour, QC; and Nuclear Power Demonstration (NPD) in Rolphton, ON – and Whiteshell Nuclear Laboratories (Whiteshell Laboratories), a nuclear research and test facility located near Pinawa, Manitoba. CNSC staff described the current state of each of these facilities, the currently approved decommissioning strategies, and potential future plans, as well as CNSC staff's regulatory oversight of these facilities. CNSC staff stated that CNL is maintaining these facilities safely, in compliance with the requirements of the *Nuclear Safety and Control Act* and their respective licences, and is making progress on the accelerated decommissioning of the Whiteshell Laboratories.

24. CNSC staff noted that if the proposed decommissioning strategy and end state for these projects were to vary from what was previously approved by the Commission, CNL would be required to seek the Commission's authorization through a licence

25. amendment process. In this process, CNL would also need to revise, update and reassess key planning tools for the proposals, such as the detailed decommissioning plans, the work plans/work instructions and the environmental assessment.

26. A representative from CNL confirmed that CNL was planning to seek the Commission's authorization to accelerate the decommissioning plans for the facilities. The CNL representative offered to present an overview of CNL's full decommissioning and waste management strategy at a future Commission meeting in order to inform the Commission of its overall plans before making applications for specific licensing decisions. The Commission accepted this offer.

ACTION by September 2016

27. The Commission sought detail on the safety risks and oversight at the various sites. CNSC staff responded that the shut-down power reactors are in a surveillance state with few staff on the sites, whereas the Whiteshell Laboratories has a larger staff complement due to the number of activities at the site, including research and decommissioning activities.

28. The Commission enquired about the reconfiguration of radiation zones at the NPD reactor. CNSC staff explained that the transition zone was reconfigured to provide more space, which improved worker access and facilitated the use of personal protective equipment.

29. The Commission asked for more information concerning the possibility of accelerated decommissioning. A representative from CNL described CNL's plans for decommissioning Whiteshell Laboratories and NPD, which were specified in CNL's contract with the Government of Canada. CNSC staff noted that these two sites were likely identified by the government because Whiteshell Laboratories had been scheduled to be decommissioned the earliest, and because the NPD had already been partially dismantled, making it the most straightforward of the three shut-down reactors to decommission. The representative from CNL noted that CNL would also be looking into accelerating the timelines for the decommissioning of Gentilly-1 and Douglas Point.

30. The Commission asked for clarification regarding the timelines for the end of the research activities at Whiteshell Laboratories. A representative from CNL responded that the research activities at Whiteshell Laboratories were expected to end in 2018. The CNL representative noted that several research activities would continue at Chalk River Laboratories.

31. The Commission asked for more information concerning the safety culture at the sites. A representative for CNL responded that CNL has focused on having a strong safety culture, noting improved performance at Whiteshell Laboratories with 500 days without a lost-time injury.

32. The Commission questioned CNL's plans for accelerated decommissioning at Whiteshell Laboratories, noting the significant work that would be required to address the waste management areas. A representative from CNL acknowledged this and explained that CNL would be characterizing the waste management areas and comparing them to historical documentation. CNSC staff noted that CNL's licence for Whiteshell Laboratories would expire in 2018 and reiterated that any work that is different from the existing decommissioning plan for the site would have to be reviewed in a licence application before CNL could proceed. A representative from CNL noted CNL's intention to have an integrated approach for all of its sites.

33. The Commission asked for progress updates on work that was to be completed by the end of March 2016. A representative from CNL stated that some of the work had been completed as anticipated; however other work had been delayed to May 2016 due to contractor scheduling. The CNL representative noted the importance of doing the work properly and safely.

34. The Commission enquired about the plans for low and intermediate level radioactive waste. CNSC staff described the different waste management areas and the plans for this waste, and whether it would remain onsite or be transported to Chalk River Laboratories, which is authorized to receive and manage this waste. CNSC staff noted that materials would be transported in certified containers. CNSC staff also presented information, including volume and radioactivity, with respect to the waste that was anticipated to be generated at the sites and the waste that is already in storage.

35. The Commission asked for clarification regarding the category of mixed waste. A representative from CNL responded that this waste was in aged containers and needed to be sorted, minimized and repackaged. The CNL representative noted that radioactive asbestos would be treated as radioactive waste, and that CNL has facilities at Whiteshell Laboratories to dispose of non-radioactive asbestos.

36. The Commission asked whether the sites are inspected by the International Atomic Energy Agency (IAEA). CNSC staff responded that the IAEA regularly inspects all of the facilities that have used fuel.

Technical Briefing on the Bystander Effect in Radiation Biology and its Relevance to Radiation Protection in Uranium Mines and Mills

37. With reference to CMD 16-M14 and 16-M14.A, CNSC staff presented its technical briefing on the bystander effect in radiation biology and its relevance to radiation protection in uranium mines and mills. CNSC staff's submission followed a request from the Commission at the October 1 and 2, 2014 Commission meeting[5]. CNSC staff also provided information regarding genomic instability. The bystander effect and genomic instability are classified as non-targeted effects of radiation, meaning that effects have been observed in cells that have not been directly hit by radiation. CNSC staff noted that these effects, and their significance in the risk of developing cancer as a result of exposure to radiation, have been the subject of numerous experimental studies and reviews.

38. CNSC staff explained that, at low and very low doses, non-targeted effects likely influence the shape of the dose response curve, and that, at this time, there is not enough evidence to strictly say whether this impact would be harmful or beneficial in persons exposed to radiation. CNSC staff noted that, at doses below 100 millisieverts/year (mSv/y), any impact of non-targeted effects should be minimized through the use of the ALARA principle; at doses above 100 mSv/y, the impact of non-targeted effects is captured in epidemiological studies looking at cancer incidence and mortality. CNSC staff stated that, for this reason, the current radiation protection framework, including the implementation of the ALARA principle, is of great importance for keeping members of the public and all nuclear workers adequately protected. CNSC staff affirmed that the current radiation protection framework in Canada is considered to be adequately protective, and noted that CNSC staff would continue to evaluate and track new science to ensure that the basis for radiation protection remains based on the best science.

39. The Commission asked for more information concerning the dose response curve and the different dose response models used by international regulators. CNSC staff responded that regulators use International Commission on Radiological Protection (ICRP) recommendations for the purpose of setting dose limits and ALARA requirements, and noted that the "linear no-threshold" (LNT) model is considered to be the most appropriate model for radiation protection purposes. CNSC staff noted, however, that in

[5] Refer to the *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on October 1 and 2, 2014*.

the low- and very low-dose range (below 100 mSv/y), the LNT is likely not the most accurate dose model, and cautioned that the LNT should not be used to determine an individual's risk of developing cancer at a given dose.

40. While acknowledging that the CNSC staff presentation was in response to a specific request at the October 2014 Commission meeting, the Commission noted that there are other low-dose models and non-targeted effects that were not covered in the CNSC presentation. The Commission asked that CNSC staff provide a more comprehensive overview of the different low-dose models, including hypersensitivity and hormesis, to provide greater context to the discussion of the effects and risks associated with low doses of radiation. CNSC staff affirmed that they could prepare a report to summarize the various models and the weight of evidence behind each one. CNSC staff further noted that, while the ALARA principle and the dose limits set out in the *Radiation Protection Regulations*[6] were reasonable for setting out regulatory expectations, low doses remain a challenging concept to convey to the public in a meaningful way, given, for example, the variability in background doses around the world.

ACTION by February 2017

41. The Commission asked CNSC staff to clarify and describe how non-targeted effects occur in mine workers after occupational radiation exposures.[7] CNSC staff explained that the bystander effect, which is one type of non-targeted effect, is a low to moderate dose effect and is not observed at high doses, such as doses seen in external beam radiotherapy. In a radiation therapy environment, high doses intended to treat cancers result in most cells being directly irradiated, leaving nearly zero non-irradiated cells to receive bystander communication signals from irradiated neighbouring cells. Low doses and low dose rates may also mean that few cells are directly hit by radiation; therefore, significant numbers of unirradiated cells can receive communication signals from the few directly irradiated cells. CNSC staff noted that mine workers operate in a very low dose and dose rate environment. With the radiation protection provisions in place at modern mines, including remote control operations, reinforced ventilation systems and personal protective equipment, CNSC staff stated that radiation exposure is limited, and doses to these workers are very low and hence the risks of adverse effects are low.

[6] SOR/2000-203.

[7] Radiological non-targeted effects are defined as radiation-like effects observed in cells that have not been directly irradiated. Non-targeted effects can also be observed in other pathobiologies such as transplantation.

42. The Commission asked if CNSC staff planned to have their studies peer-reviewed for publication and shared with the public. CNSC staff responded that the CNSC staff research on the subject had been peer-reviewed and published in the *Journal of Radiological Protection*. The Commission encouraged CNSC staff to publish this information on the CNSC website and to clearly communicate with the public.

43. The Commission wishes to formally acknowledge the retirement of Dr. Patsy Thompson, the CNSC's Director General of the Directorate of Environmental and Radiation Protection and Assessment, who was making her final presentation to the Commission. The Commission thanks her for her many years of excellent professional service to the CNSC.

STATUS REPORTS

Status Report on Power Reactors

44. With reference to CMD 16-M15, which includes the Status Report on Power Reactors, CNSC staff informed the Commission about the status of nuclear power reactors in Canadian Nuclear Generating Stations (NGS). In addition, CNSC staff provided information regarding an event that occurred at the Kakrapara Atomic Power Station, India, where Unit 1 had incurred a leak from its heat transport system on March 11, 2016. CNSC staff stated that, as part of its international cooperation, CNSC maintains open communication with the Atomic Energy Regulatory Board (AERB) of India at the highest level. Both agencies are committed to work closely on the follow-up to this event and the CNSC intends to participate in learning relevant lessons.

45. The Commission asked if the Kakrapara event was a "leak-before-break" incidents linked to a fuel channel failure. CNSC staff responded that the exact cause was not yet established and the fact that the leak had occurred indicates that the failure mechanism may be explained by the "leak-before-break" model.

Pickering NGS

46. The Commission sought more details about steam generator tube thinning discovered during an inspection of steam generators 11 and 12 in Unit 4 of the Pickering NGS. An Ontario Power Generation (OPG) representative explained specifics of these two steam generators and attributed the tubes thinning to chemical reasons. The OPG representative also explained the mitigation actions undertaken to modify the chemistry and address the tube material degradation mechanism.

47. The Commission enquired about the number of tubes affected by thinning. The OPG representative stated that 23 tubes in generator 11 and 87 tubes in generator 12 needed to be removed from service and explained that the heat transfer would be affected if 600 to 700 tubes, of the existing 2600 tubes, were plugged.

48. The Commission asked if steam generators in other stations could be exposed to similar degradation. The OPG representative responded that Pickering boilers have unique tubes different from all other CANDU reactors in Canada. OPG personnel are performing, on a regular basis, scheduled inspections of the tubes at other units and had not observed indications of tube thinning. OPG intends to expand its sampling regime during the inspections in order to sooner detect any abnormality. The OPG representative added that they had shared the information regarding this matter with other operators in Canada.

49. The Commission enquired if this tube thinning could affect any possible intended extension of life for Pickering NGS to 2024. The OPG representative responded that the observed thinning does not affect the current operation of the units; however, this matter would have to be addressed in terms of potential life extension of the station.

Event Initial Report (EIR)

Bruce Power: A Worker was Injured on February 1, 2016 at the Bruce B Nuclear Generating

50. With reference to CMD 16-M18.1, a Bruce Power representative presented information regarding an operation performed by a worker, circumstances that had led to an injury. During the event, hydrogen present in the bore of a generator rotor had ignited and exploded while the worker was drilling a hole in the rotor bore plug, in order to allow for an internal inspection of the rotor bore. The worker operating the drill had received burns to his hands, chest and face. The event had been reported to both the Ontario Ministry of Labour (MOL) and the CNSC. The Bruce Power representative stated that responsibility for the management of the work that had been performed on the generator was shared between Bruce Power and the vendor General Electric (GE). Bruce Power had no specific procedure for this kind of work and had been providing support task for GE. The Bruce Power representative added that GE had issued a Technical Information Letter (TIL) and stressed that the vendor had allowed Bruce Power to view relevant information only upon request, rather than to proactively provide it. In conclusion, the Bruce Power representative presented a summary of undertaken corrective actions.

51. CNSC staff informed the Commission about a follow-up inspection conducted by CNSC onsite inspectors working closely with the Ministry of Labour inspectors. CNSC staff reported that, after discovering that several employees of Bruce Power and GE had been aware of the potential of hydrogen presence in the rotor bore, the MOL had issued a stop work order to prevent the uncontrolled release of flammable substances from rotor bores on site. This order has been applicable for Bruce B units, since Bruce A has a different design which prevents hydrogen from being trapped inside the bore. The stop work order will remain in place for the Bruce B units until MOL inspectors are satisfied that the appropriate measures have been put in place to ensure worker safety. CNSC staff added that it had received the detailed event report which provides the root cause, contributing causes to this event and corrective actions taken to prevent reoccurrence of this event. This report matches what was found in CNSC staff's joint investigation.

52. The Commission enquired about the status of the injured worker. The Bruce Power representative responded that the worker had spent about one week at the burn unit of a hospital, and had been released to recover at home. The worker was waiting for a clearance from the doctor to return to work.

53. The Commission asked for the origin of hydrogen presence inside the rotor bore and the purpose of it. The Bruce Power representative responded that hydrogen is used as material of choice for an efficient heat transfer medium in the heat exchanger, and had found its way into the rotor bore through leaking seals. The Bruce Power representative recognized that the risk was present and added that this event was a transition issue, since the performed task had been previously done always by GE so that Bruce Power did not have a working procedure for it. The Bruce Power representative stated that this issue was corrected.

54. The Commission enquired whether GE had provided any specific information regarding potential risks related to this task after being advised that Bruce Power intended to take it over and perform it. The Bruce Power representative clarified that Bruce Power had taken over a very small portion of this job while the main job had been done by GE. The Bruce Power representative added that GE had been open in providing any information that had been asked for, but did not come forward with other instructions.

55. The Commission asked about the risk of hydrogen leaking out of the system into the working environment. The Bruce Power representative responded that hydrogen could leak out of the system; however, the small amount that had leaked and had been

trapped into the rotor bore would not represent a safety risk in the large volume of the turbine hall, and that this kind of risk had been accounted for. The new procedure requires checking of this possibility so that the atmosphere could be purged if hydrogen is present, or other measures could be applied.

56. The Commission asked about the frequency of support tasks that Bruce Power provides for its vendors. The Bruce Power representative responded that such tasks were frequent; however, such tasks were generally more straightforward and with well-known risks. In rare cases, like this one, the risks were less obvious, and Bruce Power has changed its procedures to identify such risks and make sure that all those tasks are well-defined by the vendor.

57. The Commission asked about the frequency of this particular job on generator rotors and whether this kind of accident had happened before and elsewhere. The Bruce Power representative responded that this operation, linked to the ageing of rotors, is rather infrequent, and that similar accidents had happened a couple of times in the past.

58. The Commission sought more details, including the timeline for implementation, of improvements and revision of procedures governing the management of contractors, which are included in corrective actions proposed by Bruce Power. The Bruce Power representative responded that these improvements and changes would be introduced before the next generator inspection scheduled for 2017, and noted that, in the meantime, Bruce Power follows its interim process that encompasses a document change requirement and allows for interim notices that identify risks associated with specific tasks.

59. The Commission enquired about a procedure to transmit information contained in TILs supplied by vendors to the operators executing related tasks. The Bruce Power representative responded that, in the case of this event, such information had not been transmitted properly and stressed that corrective actions were aimed at preventing a repetition of this mistake. The Bruce Power representative added that they have put in place a procedure to input all relevant information into OPEX database for future uses.

Updates on Items from Previous Commission Proceedings

Update on the Ontario Planning Basis Document for the Provincial Nuclear Emergency Plan

60. Following the discussions during earlier proceedings of the Commission on emergency management and preparedness[8], CNSC staff presented an update on its review of the Ontario Planning Basis document that was discussed at the Nuclear Emergency Management Coordinating Committee meeting. CNSC staff submitted that the Office of the Fire Marshal and Emergency Management (OFMEM) had reviewed the Provincial Nuclear Emergency and Response Plan (PNERP) and its planning basis. The resulting PNERP Planning Basis Discussion Paper had been submitted to the CNSC and discussed at the meeting of the Nuclear Emergency Management Coordinating Committee. CNSC staff had participated at the meeting and submitted its comments to the discussion paper. CNSC staff added that it would be meeting with the OFMEM's team to discuss its analysis of the PNERP. The OFMEM intends to complete the PNERP review, including public consultations, by the end of 2016.

61. The Commission enquired about representation of municipalities at the meeting of the Nuclear Emergency Management Coordinating Committee. CNSC staff responded that the municipalities that participate in this Coordinating Committee are the nuclear host municipalities that have Class I nuclear facilities and require emergency planning arrangements. These municipalities include Durham Region for Pickering and Darlington, the Kincardine Region for Bruce Power, and Deep River-Laurentian Hills Region for Chalk River.

62. The Commission sought more information regarding the public engagement in the PNERP planning basis review, in particular with respect to the Commission's view that the public should be involved in an earlier stage of the process. CNSC staff responded that the OFMEM is still committed to engage with the public; however, CNSC staff's understanding was that the OFMEM does not have enough information to have meaningful interaction with the public, waiting for, among others, CNSC staff's comments that are scheduled to be submitted by May 2016. CNSC staff committed that it would reiterate, at a meeting with the OFMEM, the Commission's view of the importance to have public

[8]Minutes of the Canadian Nuclear Safety Commission (CNSC) meeting held January 28, 2016, s.5; Minutes of the Canadian Nuclear Safety Commission (CNSC) meeting held December 17, 2015, s.41; *Record of Proceedings, Including Reasons for Decision* for the renewal of the operating licence for the Darlington Nuclear Generating Station, CNSC, November 2015, s. 222 and s. 228.

engagement earlier rather than later, and would inform the Commission about this matter and outcome of the meeting.

63. The Commission noted that the process was taking longer than originally planned and asked if Health Canada was involved in consultations. CNSC staff responded that, even though the process was delayed due to the work on establishing the planning basis, the completion of the PNERP is still scheduled for the end of 2016. CNSC staff stated that the schedule includes 45 days of public consultation mandated by Ontario law, and that Health Canada was involved in the process.

64. The Commission enquired whether the plan includes evacuation, return and other post-event actions. CNSC staff responded that their understanding was that the review of the plan includes reviewing the protection strategy, concept of operations, which includes evacuation and sheltering, and noted that the CSA N1600 standard [9] includes requirements for the emergency plans to identify transitioning into the post-emergency and post-accident state. CNSC staff did not have information whether the province was ready to undertake the full activity of developing the post-accident recovery plans. The Commission noted that, after the Fukushima event, solutions to be included in post-event protocols have been debated internationally, and that Canada needs to have its position regarding this issue. The CNSC, together with Health Canada will be reviewing provincial protocols with international learnings in mind. In this respect, the Commission expects that CNSC staff prepare detailed information on the outcome of the meeting with the OFMEM scheduled later in April 2016.

ACTION by August 2016

INFORMATION ITEMS

Status Update on Suspect Items Used to Manufacture Valves

65. With reference to CMD 16-M17 and CMD 16-M17.A, CNSC staff presented its third update to the Commission on the status of the issue of suspect material used in the manufacturing of nuclear-class valves. The presentation included the description of counterfeit, fraudulent, and suspect items (CFSI), description of the event where licensees have reported a list of suspect valves having material properties that do not meet ASME material certification requirements[10], and a short history of the issue since the first vendor's disclosure in March 2015. CNSC staff also presented regulatory requirements and expectations regarding CFSI, technical and safety assessments performed since the last update, measures

[9] CSA Group: CSA N1600-16: *General requirements for nuclear emergency management programs.*
[10] The American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code*, Section III, NCA-3855.5.

to prevent reoccurrence and future steps. In conclusion, CNSC staff stated that, at this time, there were no safety or operability risks for the continued use of affected valves and that enhanced measures were implemented to prevent CFSI intrusion into the nuclear supply chain.

66. Representatives from the NPPs informed the Commission about the industry involvement in resolving the CFSI issue. A representative from Bruce Power stated that they were continuing to work to apply their non-conformance process to all the valves that contain suspect material. A representative from New Brunswick Power (NB Power) pointed out to successful collaboration between the industry and CNSC staff. A representative from OPG added that engineering assessments had been done using an already established standard international process. The results of the process, including a review by the authorized inspection agency, operating experience of those valves in service and CNSC staff oversight, have demonstrated that safe operation of the facilities had not been affected. Lessons learned from this issue have been used to enhance already existing CFSI programs, in order to reduce the possibility of it happening in the future.

67. The Commission asked representatives from Technical Standards and Safety Authority (TSSA) for a submission about this CFSI case. A representative from TSSA responded that the process was complex and that their review had been done using a very conservative approach. The TSSA representative concluded that this case has demonstrated that the CFSI process integrity was reinforced and that all necessary measures were in place.

68. The Commission sought more detailed explanation of the supply chain and certification procedure, and enquired about the instance where the fraudulent activity was done. CNSC staff explained the supply chain in more detail and stated that this CFSI had not been connected to the source material or valve manufacturing process, but to an additional certification process. The Bruce Power and OPG representatives provided a detailed description of the steps of the supply process and certification process at which an employee of the steel supplier company allegedly altered and falsified the certificates. It is believed that the falsification had been going on between 2003 and 2011. This activity had been discovered after one of the customers of the steel supplier company, a Korean nuclear power company, conducted audits through its entire supply chain and discovered that there were discrepancies between information included in certificates from two companies. After the vendor of the valves had been notified of the problem, the vendor had initiated a thorough investigation and started the processes to

deal with the suspect issue. The OPG representative added that Canadian NPPs were conducting a thorough review of their supply chains in order to be able to identify potential problems more efficiently.

69. The Commission enquired about a possibility that the presence of the suspect material in the valves could lead to their failure while in use. The OPG representative responded that the rigorous evaluation, undertaken before the valves had been put in use, had demonstrated that these valves were acceptable for use as is, due to a large safety margin built into the manufacture of these components. The Bruce Power representative added that a failure was not expected, since the material in question had been manufactured to an adequate standard. However, a nuclear standard (at a higher level) is normally used by NPPs. The TSSA representative confirmed that all aspects of required testing of the valves had been done prior to their having being put in use.

70. The Commission asked if an all-inclusive, general, approval of a group of quarantined valves would be considered. CNSC staff explained its risk informed approach to verification of components, and stated that a usual verification comprises a case by case look for approval to install a valve; however, an approval of a group of valves for this specific application is also possible.

71. The Commission asked about international harmonization between different national standards. The Bruce Power representative responded that, among different national standards having similar levels of safety, the ASME is a widely accepted one in the nuclear area, and that the European Union was working on harmonization of their standards. Other countries, such as China, India and Russia, have their own standards that are similar and based on operational experience around the world. CNSC staff added that over the past decade an international project called Multinational Design Evaluation Program is operating to enable work at harmonizing the different codes.

72. The Commission asked about roles of inspection agencies in discovering CFSI issues. The Bruce Power representative responded that the obligation to engage authorized inspection agencies and their role in the process is defined in codes and standards. Both licensees and manufacturers are therefore required to have authorized inspection agencies that qualify manufacturing processes and test the material, in general and not only when a CFSI is discovered. The TSSA representative added that they have

inspectors at manufacturing facilities and on nuclear sites. They are conducting two types of inspections; one would be in support of oversight of the quality programs, while the other is specific to items being manufactured.

73. The Commission enquired about harmonization of criteria applied by different agencies in the same province, as well as agencies operating in different provinces. The Bruce Power representative responded that the criteria are defined by the codes and standards which are specified in the licence, and that, for an authorized inspection agency to be qualified, it needs to have a certification from ASME. CNSC staff confirmed this information.

74. The Commission asked about overall trends regarding CFSI. CNSC staff and representatives from the nuclear industry agreed that, according to information from other regulators, the trend in the nuclear sector is rather steady, while in some other, non-nuclear sectors, mostly in electronics, the number of cases is increasing. Asked by the Commission to comment on potential cases in the area of software used in the nuclear industry, the Bruce Power representative responded that the industry does not use off-the-shelf software and has requirements under N286.7[11], which is included in NPP licences for software qualification.

75. The Commission commended the collaborative way in which all sides had addressed this issue and the comprehensive update provided, and expressed its satisfaction that the measures necessary for addressing CFSI issues, like this one, are in place.

Regulatory Document REGDOC-3.6, Glossary of CNSC Terminology

76. With reference to CMD 16-M16 and CMD 16-M16.A, CNSC staff presented to the Commission a draft of the regulatory document REGDOC-3.6, *Glossary of CNSC Terminology*. CNSC staff noted that this document had been developed at the request of the Commission members and that the presentation was prepared for information only. No decision was required since this regulatory document consolidates and reprints terms and definitions that were previously reviewed and approved by the Commission. CNSC staff also provided detail regarding the development and implementation of the document. The initial version of REGDOC-3.6 is expected to be published in May 2016, and the glossary will be continuously improved to include new terms and definitions and to improve

[11] CSA Group: CSA N286.7: *Quality assurance of analytical, scientific, and design computer programs*.

accessibility. The glossary will be publicly available on the CNSC website, and notices will be sent to licensees and stakeholders through the CNSC's email distribution list and other communication channels.

77. The Commission enquired about the completeness of the presented glossary and pointed out items that were not included or merited more thorough explanation. CNSC staff responded that the scope of this first version of the glossary was limited to only terms and their definitions that have been published previously by the CNSC, and the REGDOC will be regularly updated.

78. The Commission asked if there were any major inconsistencies that would necessitate any of the regulatory documents to be re-issued. CNSC staff responded that the cross-functional team that had been working on this project had not discovered any inconsistencies that would require editing or changes in the existing regulatory documents. Some minor discrepancies had been noted, discussed and resolved to obtain consistent definitions that are included in the glossary.

79. The Commission sought more information about further development of the glossary. CNSC staff responded that, besides regular updates of the content, the intent was to have hyperlink functionality throughout the document that would address context or source questions. The glossary is also intended to be searchable electronically. Further intention is to bring consistency in terminology with all older existing regulatory documents and extend it to new ones, still to be developed and brought before the Commission.

80. The Commission commended the effort to assemble a document that defines terminology used during the Commission's proceedings and consolidates all terms used in regulatory documents and other documents that are presented to the Commission.

81. The Commission expressed its satisfaction with the successful completion of this project and is looking forward to the publication of the glossary. The Commission made several suggestions for improvements of REGDOC-3.6.

Closure of the Public Meeting

82. The meeting closed at 12:15 p.m.

Sophie Gingras-Bois — 2016-09-23

Recording Secretary — Date

M. Young and S. Dimitrijevic

Secretary — 19-09-2016

Secretary — Date

APPENDIX A

16-M11	March 23, 2016	e-Docs 4947217
Agenda of the Meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday, April 6 and 7, 2016 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa Ontario		
16-M13	April 4, 2016	e-Docs 4970336
Approval of Minutes of Commission Meeting held on January 28, 2016		
16-M12	March 22, 2016	e-Docs 4952931
Status Update for CNL Prototype Waste Facilities and Whiteshell Nuclear Laboratories Submission from CNSC Staff		
16-M12.A	March 30, 2016	e-Docs 4966371
Status Update for CNL Prototype Waste Facilities and Whiteshell Nuclear Laboratories Presentation by CNSC Staff		
16-M14	March 18, 2016	e-Docs 4806681
The Bystander Effect in Radiation Biology and its Relevance to Radiation Protection in Uranium Mines and Mills Submission from CNSC Staff		
16-M14.A	March 30, 2016	e-Docs 4806692
The Bystander Effect in Radiation Biology and its Relevance to Radiation Protection in Uranium Mines and Mills Presentation by CNSC Staff		
16-M15	April 4, 2016	e-Docs 4968328
Status Report on Power Reactors Submission from CNSC Staff		
16-M18	February 5, 2016	e-Docs 4941262
Event Initial Report – A Bruce Power worker was injured on February 1, 2016 at the Bruce B Nuclear Generating Station Oral Presentation by CNSC Staff		
16-M18.1	April 4, 2016	e-Docs 4970285
Event Initial Report – A Bruce Power worker was injured on February 1, 2016 at the Bruce B Nuclear Generating Station Presentation by Bruce Power		
16-M17	March 22, 2016	e-Docs 4963986
Licensees of Canadian Nuclear Power Plants Status Update: Suspect Materials Used to Manufacture Valves Submission from CNSC Staff		
16-M17.A	March 30, 2016	e-Docs 4966718
Licensees of Canadian Nuclear Power Plants Status Update: Suspect Materials Used to Manufacture Valves Presentation by CNSC Staff		

16-M16	March 17, 2016	e-Docs 4956920
REGDOC-3.6, Glossary of CNSC Terminology Submission from CNSC Staff		
16-M16.A	March 30, 2016	e-Docs 4968517
REGDOC-3.6, Glossary of CNSC Terminology Presentation by CNSC Staff		