Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on December 14, 2016

December 14, 2016

Minutes of the Canadian Nuclear Safety Commission (CNSC) meeting held Wednesday, December 14, 2016, beginning at 8:34 at the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, ON.

Present:

M. Binder, President
R. Velshi
Dr. S. McEwan

M. Leblanc, Secretary
L. Thiele, Senior General Counsel
M. Hornof, P. McNelles, and S. Dimitrijevic, Recording Secretaries

CNSC staff advisors were: R. Jammal, G. Frappier, K. Lafrenière, H. Tadros, J. LeClair, N. Tran, B. Carroll, S. Thompson, K. Glenn, C. Purvis, M. Rinker, K. Sauvé, R. Dwyer, N. Kwamena, K. Murthy, C. Moses, R. Buhr, J. Mecke, A. McAllister, A. Bouchard, K. Owen-Withred, H. McRobbie, G. Lamarre, R. Lojk, N. Greencorn, M. Langdon, E. Kanasewich, D. Humphreys, W. Stewart, K. Lange, A. Levine, S. Faille, M. Thériault, P. Fundarek,

Other contributors were:

- OPG: R. Manley, Z. Khansaheb, K. Dehdashtian, L. Morton,
- CNL: D. Cox, N. Mantifel,
- Bruce Power: F. Saunders
- NB Power: B. Plummer
- Cameco Corporation: L. Mooney, L. Yesnik, K. Nagy, M. Webster, K. Lamont
- AREVA Resources Canada: D. Huffman, D. Martens, E. Pacquet, V. Laniece, T. Searcy
- Nuclear Waste Management Organization: P. Gierszewski
- Canadian Nuclear Workers' Council: D. Shier
- UniTech Services Group: K. Anderson
- EnergySolutions Canada: T. Ryder
- Mississauga Metals & Alloys: D. Sharpe
- CANDU Energy Incorporated: G. Boudens
- NWMO: P. Gierszewski
- Ontario Ministry of the Environment and Climate Change: T. Dagilis
- BHP Billiton: Mrs. Berthelot
- Ministry of the Economy – Province of Saskatchewan: K. Cunningham
- Government of Saskatchewan: T. Moulding
- Population Health Unit: J. Irvine
- Dynamex: R. Tuggle

Constitution

1. With the notice of meeting CMD 16-M65 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 November 10, 2016, Commission member documents CMD 16-M49 to CMD 16-M49.6, CMD 16-M50 to CMD 16-M50.2, CMD 16-M64 to CMD 16-M66.C, and CMD 16-M68 to CMD 16-M72 were distributed to members. These documents are further detailed in Annex A of these minutes.

Adoption of the Agenda

3. The revised agenda, CMD 16-M66.C, was adopted as presented.

Chair and Secretary

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

STATUS REPORTS

Status Report on Power Reactors

5. With reference to CMD 16-M68, which is the Status Report on Power Reactors, CNSC staff presented updates on the following:

   - Bruce Nuclear Power Plant (Bruce NPP) - Unit 1 and Unit 2 were at 8% full power and 70% of full power respectively, returning to service from a forced outage and after repairs;
   - Darlington NPP, Unit 2 - 74% of the channels had been defuelled, and the date for completion of the defuelling campaign has been moved to January 9, 2017, from February 6, 2017;
   - Pickering NPP, Unit 4 - fuelling machine repairs have been completed and the Unit was at 92% of full power;
   - Pickering NPP, Unit 7 - a completion date of planned maintenance outage has been projected for late December 2016.

6. CNSC staff informed the Commission about the injury of a contractor employee who suffered a broken leg while working in Unit 2 of the Darlington NPP on December 1, 2016. The Commission sought more details on the event, information on immediate corrective actions and for an update on the worker's status. Representatives from Ontario Power Generation (OPG)

described the event and explained that immediate corrective actions had been taken. The OPG representative informed the Commission that the worker was back to work with modified duties, and that the Ministry of Labour interviewed the workers involved and issued no orders. The Commission does not require any further update on this matter.

7. Responding to the Commission's question about reasons for omitting Gentilly-2 NPP information from this status report, CNSC staff stated that this report and the Annual Report on Power Reactors will no longer include the Gentilly-2 NPP since it is no longer operating. CNSC staff continues its regulatory oversight of the facility, and reporting on oversight of Gentilly-2 will be part of the regulatory oversight annual report on waste and decommissioning.

8. With regard to safety implications of the Bruce A Unit 2 forced outage, CNSC staff explained the characteristics of the event and stated that there were no safety implications.

9. The Commission enquired about the capacity of the pool for used fuel at Darlington NPP and its ability to receive the fuel elements from the defuelling campaign. The OPG representative provided more details about the defuelling campaign and responded that there is sufficient room in the pool to allow for a full-core defuel.

10. The Commission enquired about recurrent problems with the fuelling machine at Pickering NPP Unit 4. CNSC staff responded that, from a safety perspective, the Pickering NPP management were taking appropriate actions. The representatives from OPG submitted that OPG has had an extensive reliability improvement program for the fuelling machines across the site, and that they continue to improve the performance of the fuelling machine systems. Answering the Commission's request for trending data regarding the fuelling machine reliability for the last six months, the OPG representative responded that the data would be sent to the CNSC Regulatory Program Director who would in time provide an update to the Commission. **ACTION** by March 2017

11. Regarding the update on an injury in September 2016 to a Pickering NGS employee who fell and broke his knee cap, the Commission requests a final update once CNSC staff receives and assesses the Detailed Event Report. **ACTION** by June 2017

Canadian Nuclear Laboratories Limited: Status Report on Fitness for Service for the Chalk River Laboratories

12. With reference to CMD 16-M64, CNSC staff presented the fifth

update on the status of fitness for service at Chalk River Laboratories (CRL) and Canadian Nuclear Laboratories' (CNL) progress towards a satisfactory rating. CNSC staff submitted that these regular updates continue to focus on the National Research Universal (NRU) reactor and criteria within specific areas associated with Fitness for Service where CNL performance remained below expectations. CNSC staff reported that CNL continues to make progress towards a satisfactory rating and that all target dates from the last update remain the same. CNSC staff further informed the Commission about programs and activities where CNL had achieved a satisfactory rating, and pointed to the areas and remaining activities to be carried out by CNL. CNSC staff also provided a detailed list of their observations and findings related to each specific area reviewed since the last update presented in November 2016. A representative from CNL added that the remaining activities were either on track or ahead of schedule.

13. The Commission commended CNSC staff for the concise and informative report and CNL for the progress made since the previous update. The Commission asked whether the cessation of routine molybdenum production had resulted in changes to the schedule of the ongoing activities. The CNL representative responded that the cessation of molybdenum isotope production at the end of October 2016 allowed for additional flexibility in maintenance completion and flexibility in terms of operating the NRU reactor.

14. The Commission enquired about the estimated fitness of the NRU reactor vessel over the projected lifetime of operations of the reactor. The CNL representative responded that, following the completed sixth annual cycle of inspections, they confirmed that the fitness for service of the vessel was adequate. CNSC staff confirmed this statement.

Event Initial Report (EIR)

Vancouver Coastal Health Authority: Exceedance of a Regulatory Dose Limit by a Nuclear Energy Worker During a Therapeutic Nuclear Medicine Procedure

15. With reference to CMD 16-M72, CNSC staff presented a report regarding an extremity exposure (hand contamination) above regulatory limits to a nuclear energy worker. CNSC staff provided a comprehensive description of the event and reported that the CNSC was notified of this incident on October 28, 2016, and that the full report had been submitted on December 2, 2016. No physical effects have been noted following the exposure and none

were expected. There was no contamination located at the work space and there was no exposure to any other person. CNSC staff informed the Commission about the actions taken by the licensee and added that they had reviewed and accepted the investigation report, including received doses recalculation, submitted by the licensee. CNSC staff considers that the actions taken were appropriate and reasonable.

16. The Commission enquired about the possibility of contamination of the patient's skin. CNSC staff responded that the licensee had been unable to recall the patient to conduct further monitoring due to the short half-life of the injected Yttrium-90; however, the licensee had monitored the area in the hospital where the injection had taken place and noted that there was no contamination in that area. CNSC staff committed to follow up with the licensee to verify whether any further measures had been taken.

17. The Commission also enquired about the profession of the worker administering the injection. CNSC staff responded that dose was administered by a radiologist with the assistance of a nuclear medicine technologist.

18. The Commission asked about the adequacy of using gloves for protection against radiation exposure and contamination. CNSC staff responded that gloves provide adequate protection and that the contamination of the worker's hand had occurred because the worker took off protective gloves in order to immobilize the patient's hand after administering the injection. CNSC staff added that hospitals were one of the areas where CNSC staff considers the possibility to look thoroughly at the application of its safety culture assessment methodology during inspections.

19. The Commission sought more information about the seriousness of the dose received by the worker and potential consequences of such a dose. CNSC staff responded that the skin dose received by the worker was above the regulatory limit; however, since the regulatory limit is set well below a threshold where health effects are noticed, health effects have not been observed and are not expected.

20. CNSC staff submitted that they do not plan to provide further updates to the Commission on this event. The Commission confirms that no further update is required regarding this event, unless new findings are observed.

INFORMATION ITEMS

Regulatory Oversight Report for Waste Management, Storage and Processing in Canada: 2015

21. With reference to CMD 16-M50 and CMD 16-M50.A, CNSC staff presented the annual "Regulatory Oversight Report for Waste Management, Storage and Processing in Canada: 2015" to the Commission. This report provides information on the results of CNSC staff's analysis of the safety of Class I waste management and storage facilities, waste management sites, and provided a status update on waste management initiatives. This report focuses on three safety and control areas (SCA): radiation protection, environmental protection, and conventional health and safety. This report also includes information on regulatory requirements and expectations, significant events, licence changes, major developments and the overall performance in the 14 SCAs.

22. The Commission noted that CMD 16-M50 represents the first instalment of this specific Regulatory Oversight Report (ROR), and commended CNSC staff on their initial efforts. The Commission has suggested editorial changes in the ROR.

Section I. Class I Waste Management and Storage Facilities

23. CNSC staff reported that, through its evaluations, it was of the opinion that these facilities operated safely in 2015 and met the performance expectations for the health and safety of workers, the protection of the environment, and Canada's international obligations. All of these facilities received at least a satisfactory performance rating in each of the 14 SCAs, with several of the facilities receiving a fully satisfactory rating in multiple SCAs.

Availability of CNSC Staff Reports

24. Asked how CNSC staff could assist intervenors such as Northwatch access RORs, CNSC staff responded that the procedure for obtaining any or all of the Commission documents is to make a request to the Secretariat. CNSC staff stated that members of the public may subscribe to the CNSC info account, and that RORs are made available 30-45 days ahead of the meeting in order to allow intervenors time to adequately review the documents. CNSC staff added that the information is made available immediately upon request, and that information cannot be published on the CNSC's website until it has been translated into both official languages.

25. Regarding the availability of published documents and reports on the CNSC public website, CNSC staff explained that there is work being undertaken to improve public access to CNSC documentation on the website. CNSC staff expressed its agreement with many of the intervenor's recommendations regarding improvements to the website and the accessibility of RORs, and that CNSC staff is continuously working to improve the existing website. The Commission is satisfied with the efforts of CNSC staff regarding improvements to the accessibility of CNSC staff documents.

Scope of Waste Reporting

26. Addressing the intervenor's comments that the scope of this report is too narrow and does not provide enough detailed information with regards to the amount and storage of nuclear waste, CNSC staff responded that there are various means by which staff reports on the nuclear fuel and nuclear waste cycle, including reports on the operations of the nuclear power plants themselves. CNSC staff stated that the complete waste management picture is published every three years under the *Joint Convention for the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management*[1] (Joint Convention), where the last iteration was published in 2015 and the next instalment is slated for publication in 2018. CNSC staff added that this report is produced on behalf of Canada.

27. The Commission asked if Canada's triennial report under the Joint Convention would be tabled with the Commission. CNSC staff responded that it would not be, as that report represents a collaboration of federal entities and represents Canada's position, not the position of the CNSC. CNSC staff added that the CNSC is the lead organization to the Joint Convention, and a summary of the report was presented to the Commission at the August 2015 Commission meeting. The full report, presentation and all questions and answers have been published on the CNSC website.

28. With this information being provided, the Commission expressed its desire for CNSC staff to present to the Commission, for its information, the next Canadian report under the Joint Convention, with related information on the review meeting.

[1] International Atomic Energy Agency – INFCIRC/546, *Joint Convention for the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management*, 1997. < https://www.iaea.org/topics/nuclear-safety-conventions >

General

Focus of this ROR

29. CNSC staff explained that the main goals of this report were to communicate to the public information on the safety of these waste facilities, the regulatory oversight provided by the CNSC, and to have the opportunity to gain feedback from the public. CNSC staff added that some of the facilities in this report were being presented to the Commission for the first time, and that staff will be looking into structuring future reports to ensure that they include all pertinent information on the overall waste management and storage facilities in Canada.

Action Levels and Dose Monitoring

30. Addressing action levels per shift with respect to the radiation doses received by workers, CNSC staff confirmed that the action levels are set at a value of 1 millisievert (mSv) above the planned dose for the shift. Asked if a worker could work multiple shifts above the planned dose and not hit an action level, the OPG representative stated that this is technically possible, but is very unlikely to happen in practice. The OPG representative provided an overview of the radiation protection process used by the shift workers at these facilities and stated that there are electronic dosimeter alarms that would trigger at a dose that is lower than the action levels.

31. Regarding the monitoring of cumulative doses for shift workers, the OPG representative provided additional information about OPG's radiation monitoring program for shift workers. The OPG representative stated that cumulative doses for workers are monitored, and that OPG maintains exposure control levels and administrative dose limits, both of which are below the CNSC regulatory limit.

32. The Commission asked whether this annual report should better reflect the careful monitoring and dose control process for cumulative doses. CNSC staff explained that licensees typically have a system of administrative limits that are comprised of early warnings or indicators that would indicate a potential loss of control. CNSC staff added that all licensees have to submit their radiation safety programs for assessment and approval by CNSC staff specialists. CNSC staff added that they requested OPG to review their action levels for these facilities, and that review will be completed in time for the Western Waste Management Facility (WWMF) and Pickering Waste Management Facility (PWMF) renewal hearings, scheduled for April 2017.

Waste Storage

33. Asked about the storage of intermediate-level radioactive waste (ILW) at the Darlington Waste Management Facility (DWMF), CNSC staff clarified that there is no ILW currently stored at the DWMF. CNSC staff added that, following the refurbishment of the Darlington NGS, the ILW will be stored at this facility at the recently constructed re-tube storage building.

34. Asked if the WWMF stores both ILW and low-level waste (LLW) from the Darlington, Pickering and Bruce NGSs, CNSC staff confirmed that both ILW and LLW from these NGSs are stored at that facility.

Release Limits

35. Addressing the selection of units for the release limits of the licences, CNSC staff explained that the licence limits are the Derived Release Limits (DRL) associated with the release of radionuclides that are set at levels which, if respected, ensure that members of the public do not receive a dose greater than 1 mSv per year, which is the regulatory limit. CNSC staff provided an overview of the pathways and calculation procedures for airborne and liquid releases, and explained that these DRLs are calculated using the CSA N288.1[2] standard.

36. The Commission enquired on the potential use of toxicity limits alongside radiological limits for substances like uranium. CNSC staff responded that the use of radiological release limits is well established and is done to ensure the safety of the public and the environment.

Management System SCA

37. On the potential inclusion of the management system SCA as one of the SCAs chosen for detailed review, CNSC staff explained that the management system SCA is considered as an all-encompassing area from a safety culture perspective and provides a view into how the operations at the facilities are being designed, implemented and corrected (if necessary). CNSC staff stated that the radiation protection, environmental protection, and conventional health and safety SCAs are chosen as they provide key metrics and data indicators across all of the facilities in this section of the ROR and can be traced back to elements in the management systems SCA. CNSC staff provided an example where an issue with the

[2] CSA Group – N288.1, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*, 2014.

management system SCA was identified through an environmental protection issue.

38. CNSC staff confirmed that the selected three SCAs are the SCAs most likely to provide data and information on changes from year to year. CNSC staff will report to the Commission if there are any major deviation or non-compliance, enforcement actions or events. The Commission is satisfied with the response from CNSC staff.

Third Party Audits and Reviews

39. Asked about findings and recommendations from third-party audits and reviews, the OPG representative responded that OPG does have third-party audits performed on its environmental management system. The OPG representative added that there have been no significant environmental findings from these reviews. The OPG representative stated there has not been a wide variation in terms of the program deficiencies identified by CNSC staff and OPG reviews or inspections. The Commission was satisfied with the OPG representative's response on this matter.

40. On the issue of non-compliance at the WWMF due to the issue of the tracking system with respect to the LLW containers, the OPG representative provided a summary of the issue and stated that, in some cases, the waste bins were not located in the exact spot indicated by the electronic tracking system. The OPG representative added that OPG has started a project to update this tracking system and to verify that all of the information in the database is correct. The Commission was satisfied with the OPG representative's response on this matter.

Reported Events

41. The Commission asked about the high number of events related to the failure of the emergency lighting units to meet the requirements of Section 3.2.7.4 of the National Building Code. The Commission also asked about the possibility of a common cause. The OPG representative responded that that the rigorous testing performed on these emergency lighting units uncovered this issue. The OPG representative stated that the lights were stored in buildings without heating, and the cold winters at the WWMF site caused issues with the batteries after prolonged exposure to the cold. The OPG representative added that new emergency lights have been designed that provide heat to the battery compartment, and the installation of the new emergency lights is scheduled to be completed by the end of 2016.

Section II. Waste Processing Installations

42. Section II of this ROR focuses on the eight waste processing installations in Canada. With regards to these facilities, CNSC staff reported that, through its evaluation, it was of the opinion that these facilities operated safely in 2015 and met the performance expectations for the health and safety of workers, the protection of the environment, and Canada's international obligations. All of these licensed sites received at least a satisfactory performance rating in each of the 14 SCAs that were applicable to the respective licensed sites. The paragraphs below provide additional information regarding six of these licensed sites.

Energy Solutions Canada Corp.

43. Addressing the issue of the thermoluminescent dosimeter (TLD) from an airport x-ray, CNSC staff stated that the Energy Solutions staff member left his TLD in his luggage when it went through the airport x-ray, whereas the typical policy is that the TLD would be passed around the x-ray machine to be scanned independently. CNSC staff stated that Energy Solutions could contact the National Dose Registry (NDR) to correct the dose. The Energy Solutions representative stated that, based on the information available, the company was able to calculate the worker's true dose. The Energy Solutions representative added that the company will make a submission to correct the dose record. CNSC staff explained the process for making changes to the dose record. The Commission was satisfied with the responses from CNSC staff.

44. Regarding the relation of the bioassays with the action levels in the Energy Solutions internal dosimetry program, CNSC staff stated that tritium concentrations in the urine are measured and then compared to the ALARA level, investigation level and action level. CNSC staff noted that ALARA levels are set at a level which the licensee specifies is as low as reasonably achievable for workers doses for the planned work. On the numerical results of the bioassays, CNSC staff stated that that there were a few exposures exceeding the ALARA level and one exposure exceeding the investigation level. However, overall, the exposure results were very low. The Commission commented that the ALARA level is close to the limit for drinking water, and CNSC staff explained that the concentration of tritium excreted in the urine cannot be directly compared to the levels in drinking water standards. CNSC staff added that the tritium-in-urine concentrations equate to a dose to the worker and that none of the measurements show any regulatory or health concern.

45. Asked about air emissions from the Energy Solutions site, CNSC staff responded that there are currently no air emissions from this site. However, air emissions will occur during future planned activities. CNSC staff stated that there are annual emission limits in place, and that weekly monitoring will occur. CNSC staff added that the data tables regarding these emissions will be clearer in future reports.

Mississauga Metals and Alloys

46. CNSC staff confirmed that Mississauga Metals and Alloys (MMA) is not allowed to receive any additional nuclear substances, or recover or process any remaining nuclear substances. CNSC stated that the current licence allows MMA to continue to neutralize their existing asset inventory, which does produce small quantities of nuclear substances which are then appropriately disposed of. Regarding the reasoning for not allowing MMA to accept more radioactive material, CNSC staff explained that MMA's decontamination of scrap metal produced a volume of waste that was too large, prompting CNSC staff to add a licence condition to stop additional material from being brought in and for MMA to start processing the waste. The MMA representative stated that the waste processing is expected to be completed by the end of 2018.

47. On the potential for MMA to receive new material in the future, CNSC staff stated that MMA could decide to remain in this business, provided that its entire current inventory is removed and that the company demonstrates that it would operate within the bounds of its safety case.

Richmond Metals Recycling Inc.

48. CNSC staff clarified that an order was issued to Richmond Metals Recycling Inc. (Richmond Metals) disallowing them from receiving any additional inventory until CNSC staff was satisfied that the company could operate safely. CNSC staff noted that, following that order, the company made a business decision to exit this field of work.

49. On the revocation of its licence by a Designated Officer, CNSC staff stated that this organization was successfully able to decontaminate and remove its inventory of metal tubes and, without this inventory, there was no reason for the company to continue to hold a CNSC licence.

50. The Commission asked for lessons learned with regards to monitoring LLW issues at companies that are exiting the business. CNSC staff explained that all of the licensees considered in this

section of the ROR are evaluated on a risk-informed basis, using a risk-informed inspection plan that is developed based on the activities of each facility. CNSC staff stated that this plan is revisited on an ongoing basis based on the licensees' activities and compliance.

51. Regarding the reasons for CNSC staff to take action against this licensee, CNSC staff provided an overview of the non-compliance history of the licensee. CNSC staff was not satisfied with the response of the licensee to the order to move them back into compliance, which resulted in an additional order to cease operations. CNSC staff added that the regulatory oversight was appropriate, and CNSC staff took action when the licensee was not operating safely. CNSC staff noted that the licensee had a financial guarantee and preliminary decommissioning plan in place. The financial guarantee amount was sufficient to complete the clean-up and release of the site. The Commission is satisfied with the actions taken by CNSC staff in relation to this licensee in order to ensure safety.

Unitech Services Canada Ltd.

52. Regarding the waste nuclear substances that are possessed and transported by Unitech, CNSC staff stated that the primary materials are contaminated clothing and protection gear, as well as small tooling and other equipment.

53. The Commission suggested that CNSC staff reconsider the classification of licences given to companies such as Unitech. CNSC staff noted that there are other licensees that possess nuclear substances but do not have a physical location in Canada.

Central Maintenance and Laundry Facility

54. The Commission asked why the Central Maintenance and Laundry Facility (CMLF) was on a separate licence than the Bruce NGS. CNSC staff stated that the current licence will expire in August 2017, and CNSC staff is planning to include the authorization of these activities within the Power Reactor Operating Licence (PROL). The Bruce Power representative stated that Bruce Power maintains several different licences, all operating under the same programs and systems, and has plans to consolidate them all under the PROL.

CANDU Energy Inc.

55. Asked about the inaccurate reporting of worker doses for certain CANDU Energy employees, the CANDU Energy representative

responded that there were sixteen identified inaccuracies, the majority of which occurred while the employees were deployed internationally. The CANDU Energy representative stated that these inaccuracies were related to internal processes, and that CANDU Energy maintains a good reporting culture. The CANDU Energy representative added that dose adjustments were made. CNSC staff added that these dose inaccuracies were not related to the CANDU Energy facility discussed in this ROR.

Section III. Status Update on Waste Management Initiatives

56. Section III provides an overview of OPG's Deep Geological Repository (DGR) and the Nuclear Waste Management Organization (NWMO)'s Adaptive Phased Management (APM) Project. As of 2015, these projects had not been issued licences from the Commission. They are therefore included in this section for information purposes only. In addition, Section III provides information on the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.*

Comments From the NWMO

57. The NWMO representative explained the mandate of the NWMO and stated that the site selection process is currently underway. The NWMO representative added that a briefing will be provided to the Commission in 2017.

Interventions – Written Submission from Northwatch (CMD 16-M50.2)

Outreach Activities

58. Regarding issues raised by Northwatch on the effectiveness of the CNSC outreach strategy, CNSC staff explained that the APM project is in the pre-licensing stage, as no licence application has been submitted by the NWMO. CNSC staff stated that they will travel to the communities at their request, and have not refused any requests so far. CNSC staff provided an overview of its outreach program, including the role of the CNSC with regards to topics such as licensing and environmental protection.

59. Addressing the results of the Northwatch survey, CNSC staff explained that the survey specifically considered the APM initiative, for which outreach is the responsibility of the NWMO. CNSC staff added that the CNSC does maintain a comprehensive website on the APM initiative, including information on public outreach, independent research, technical reviews and summary statements.

60. The Commission asked for comments on the outreach activities survey performed by Northwatch. The NWMO representative stated that they do not have any specific comments with regards to that survey, and that more information on the NWMO's outreach program will be presented at a Commission meeting in 2017. Asked if the NWMO encouraged communities to request CNSC visits, the NWMO representative responded that they do encourage communities to reach out to the CNSC if they wish. The NWMO representative added that they may provide some funding to the communities to facilitate this.

Accessibility of NWMO Reports and CNSC Research

61. The Commission asked if CNSC staff would provide Northwatch with the full NWMO reports, such as the pre-project report for crystalline rock[3] and the pre-project report for sedimentary rock. CNSC staff responded that, if requested, the full reports would be made available once it has been reviewed. CNSC staff provided an overview of the pre-licensing review process, including their interactions with the NWMO on this matter. The NWMO representative stated that all NWMO reports are posted on the NWMO website, and then passed to the CNSC for their review and comments. CNSC staff added that the CNSC staff reviews of the NWMO reports were completed and posted on the CNSC website on December 5, 2016, and that the NWMO reports themselves were posted as soon as they were received.

62. Regarding the role of the Independent Advisory Group (IAG), CNSC staff provided an overview of this group and its goals, and stated that it is an advisory body to the CNSC and the NWMO regarding research being performed by those two organizations. Addressing the matter of independent research performed by the CNSC, CNSC staff stated that research is performed and published in peer-reviewed journals and also published on the CNSC website. CNSC staff added that the research results are continually disseminated in a transparent manner. The Commission is satisfied with the clarification provided by CNSC staff.

NWMO and International Collaboration

63. The Commission commented that CNSC staff's outreach programs were impressive, and that CNSC staff should take the intervenor's comments, regarding, among others, relationship between CNSC staff and the NWMO, under advisement.

[3] Nuclear Water Management Organization – NWMO-TR-2016-03, *Thermal Response of a Mark II Conceptual Deep Geological Repository in Crystalline Rock*, March, 2016.

64. Addressing the CNSC collaboration with the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) with respect to nuclear waste disposal, CNSC staff stated that the IAEA will not include industry participation. However, the NEA will include industry participation.

Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015

65. With reference to CMD 16-M49 and 16-M49.A, CNSC staff presented its annual report of the performance of uranium mines and mills in Canada in 2015 (UMM Report). In addition to operating uranium mines and mills, the scope of this report was expanded to include low-risk historic and decommissioned sites. CNSC staff evaluated the performance of licensees with ratings in all 14 safety and control areas (SCAs), with a key focus on radiation protection, environmental protection, and conventional health and safety. The ratings were derived from the results of ongoing CNSC regulatory oversight activities. All operating, historic and decommissioned uranium mines and mills were rated as satisfactory in all SCAs, with the exception of one site which was rated as below expectations in the management system SCA.

66. The presentation of this report was divided into two sections:

    - Part 1: Operating Uranium Mines and Mills
    - Part 2: Historic and Decommissioned Sites

    The Commission's consideration of licensee submissions and written interventions was divided into these two sections.

67. The public was invited to comment on the UMM Report through written interventions and four interventions were received. Through the CNSC's Participant Funding Program, participant funding in the amount of $19,672 was granted to two participants:

    - the Saskatchewan Environmental Society and the Athabasca Chipewyan First Nation
    - Rodney Gardiner

68. The Commission is satisfied that all action items arising from previous Commission proceedings and related to this meeting item were appropriately addressed in the UMM Report, licensee submissions and associated presentations.

Part 1: Operating Uranium Mines and Mills

69. Representatives from Cameco Corporation (Cameco) and AREVA Resources Canada Inc. (AREVA) provided the Commission with their general comments about CNSC staff's findings in the UMM Report. The Cameco representative stated that the health and safety of Cameco's workers and the public, the protection of the environment and the quality of Cameco's processes were the foundation of Cameco's work and key measures of its success. The Cameco representative also provided information about operational highlights from 2015, noting that Cameco remained fully compliant with its CNSC licences. The AREVA representative stated that the UMM Report accurately summarized AREVA's performance at the McClean Lake operation and the Cluff Lake decommissioning project. The AREVA representative also provided information about some of AREVA's milestone achievements in 2015, with an emphasis on its strong radiation protection performance.

70. With reference to CMDs 16-M49.5 and 16-M49.5A, Cameco presented its *Cigar Lake Operation Commissioning Status Report 5*. In this final commissioning status update for the Cigar Lake Operation (Cigar Lake), Cameco stated that Stage 4 commissioning was successfully completed. Cameco provided background information about the project, highlights about the transition of Cigar Lake from a project to an operating uranium mine and information about Cameco's performance in key SCAs. Cameco also provided detailed information about the advantages of the Jet Boring System mining method used at Cigar Lake.

Interventions – Part 1

71. The Commission requested additional information on the issue of clarifying the methodology used for establishing performance expectations that was raised in the intervention from the Saskatchewan Environmental Society and the Athabasca Chipewyan First Nation. CNSC staff explained that the CNSC had implemented best international practices for performance evaluation and provided additional details on its performance evaluation methodology, including that performance expectations were based on licence requirements, as well as specifications in regulatory documents and other regulatory instruments.

72. The Commission noted that all five currently operating uranium mines and/or mills had satisfactory ratings in all 14 SCAs and that additional context about the ratings, such as information about a licensee's progress towards a fully satisfactory rating, may be helpful in the future. CNSC staff provided details about how a

rating of fully satisfactory could be achieved, explaining that a satisfactory rating represented that the licensee was in regulatory compliance. The Cameco representative stated that Cameco recognized that there was room for improvement in its operations and was working towards achieving that higher rating.

73. Further considering the topic of performance ratings, the Commission noted that, of the 10 environmental events at the McClean Lake operation that were reported to the CNSC in 2015, seven events were caused by the same issue involving the release of anhydrous ammonia to the atmosphere due to failed condenser coils. Asked about how a recurrent issue is factored into the determination of performance ratings, CNSC staff provided information about the events in question and noted that they were appropriately reported to the CNSC and investigated and resolved by Cameco. CNSC staff explained that all of these factors, and not just the events themselves, would be considered in determining licensee performance ratings. The Commission was satisfied with the explanation on this matter.

74. The Commission expressed the view that additional transparency in the evaluation of performance ratings and the demonstration of continuous improvement by licensees was required. The Commission expects CNSC staff to include licensee performance trending information to provide better context to the overall performance ratings in future RORs.

75. The Commission requested clarification from CNSC staff in regard to the concern expressed by the Saskatchewan Environmental Society and the Athabasca Chipewyan First Nation that Canadian uranium could be exported for use in nuclear weapons. CNSC staff provided details about the CNSC's role in providing technical advice to Global Affairs Canada (GAC) in the administration of Canada's Nuclear Non-Proliferation Policy. CNSC staff confirmed to the Commission's satisfaction that Canada would not ship uranium to any country without the assurance of peaceful end use. CNSC staff further stated that it would bring the recommendations made by the intervenor to GAC in order to improve public information and outreach on Canada's Nuclear Non-Proliferation Policy.

General Questions – Part 1

76. Commenting on conventional health and safety in the uranium mining industry, the Commission noted that uranium mines did not compare favourably against other mining industries in terms of lost-time injuries (LTIs) and severity rates. CNSC staff explained that, although the frequency rate of LTIs was similar across the

Saskatchewan mining sector, the higher severity rate could be attributed to the remoteness of uranium mining sites, requiring more frequent evacuation of an injured employee. The Cameco representative added that many different metrics were used to evaluate Cameco's safety performance, and that, over the past several years, Cameco's performance had improved six-fold. The AREVA representative further stated that AREVA and Cameco had been working with the Saskatchewan Mining Association to improve safety in this sector.

77. On the issue of a discrepancy in the LTI and severity rate statistics in the UMM Report, CNSC staff noted that the information in the UMM Report was based on statistics collected by both the CNSC and the Province of Saskatchewan. CNSC staff further explained that, since the Province of Saskatchewan had reclassified a 2015 injury as an LTI in May 2016, it did not appear in the province's safety statistics until 2016. The Commission also noted a discrepancy in LTI and injury severity rates at Key Lake in 2013. The Cameco representative explained that, although the employee was injured in 2012 and the LTI was attributable to that year, the employee also lost time for the injury in 2013, thus creating a situation whereby a severity rate existed for a year without an LTI. The Commission was satisfied with these explanations.

78. Asked to comment on the first aid capacity at its uranium mine and mill sites, the Cameco representative stated that Cameco had health centres staffed by registered nurses at all of its Saskatchewan facilities. The Cameco representative also provided information about the new model of specialty practices in Saskatchewan allowing nurses to perform medical functions that would generally be outside of a registered nurse's scope of practice. The Cameco representative confirmed to the Commission's satisfaction that Cameco was implementing these specialty practices at its sites.

79. On the topic of action notices and CNSC inspections at McClean Lake, and how these were considered in performance ratings, CNSC staff explained that all inspection findings were analyzed in relation to their risk and safety significance. The Commission further noted that the statistics provided in the UMM report did not provide context about the nature of the action notices. CNSC staff agreed that including context about inspections and criteria for meeting regulatory requirements in future UMM Reports would increase clarity and transparency of the licensee performance ratings.

80. Asked about the correlation between uranium production levels and radiation doses, the AREVA representative explained that the average dose rate at McClean Lake was more often affected by

events rather than by ore grade and production levels. The Cameco representative concurred with this statement, noting that incidents were generally the cause of maximum annual doses.

81. The Commission further enquired about the increase in average and maximum annual dose at Cigar Lake from 2014 to 2015, noting that this increase may be attributable to higher production levels in the UMM Report. The Cameco representative explained that, although production levels increased from less than a half million pounds in 2014 to 12.8 million pounds in 2015, the dose increase was more likely attributable to the transition of Cigar Lake from a project to an operating mine. The Cameco representative further stated that, because of the Jet Boring System used at Cigar Lake, the mining process at that site was low-contact and not conducive to high exposures. The Commission was satisfied with the information provided on the radiation dose rate increase at Cigar Lake.

82. The Commission expressed satisfaction with the information provided about the Eastern Athabasca Regional Monitoring Program (EARMP) and enquired about future plans for the program. A representative from the Saskatchewan Ministry of Environment responded that the next EARMP report was scheduled for 2018, with sampling of various country foods conducted every year. CNSC staff added that the CNSC was working with both the Province of Saskatchewan and with Health Canada to find ways that the CNSC Independent Environmental Monitoring Program could be coordinated with the EARMP and HC's country foods monitoring program.

83. The Commission further asked whether the EARMP contributed to increased public confidence in the safety of country foods. The Public Health Physician and Medical Health Officer for three Northern Saskatchewan Health Authorities provided detailed information on how community engagement in the EARMP had increased the confidence of northern communities in the safety of country foods and helped counter misinformation.

84. The Commission noted the difference between the 2.5mg/L provincial limit and the CNSC's significantly lower 0.1 mg/L objective for the annual average concentration of uranium in effluent released to the environment. CNSC staff explained that, although 2.5 mg/L was the provincial limit for uranium in effluent, Environment and Climate Change Canada (ECCC) had determined that uranium was a toxic substance under the *Canadian Environmental Protection Act.*[4] Through the CNSC's work with

[4] S.C. 1999, c. 33.

ECCC, the objective of 0.1 mg/L of uranium in effluent was determined. CNSC staff stated that this limit was specific to the uranium mining sector and was included in CNSC licences for uranium mines and mills.

85. Addressing the issue of the radon levels in uranium mines, CNSC staff provided the Commission with information on the daily measurement of radon inside, as well as outside, uranium mines. CNSC staff explained that, in terms of dose control, the most important element was to remove the radon from the mine through ventilation. The Cameco representative concurred with this information and provided additional details on radon concentrations inside uranium mines and how these were controlled through radiation protection programs. The Commission was satisfied with the information provided on this matter.

Part 2: Historic and Decommissioned Sites

86. With reference to CMDs 16-M49.4, 16-M49.4A and 16-M49.4B, AREVA presented the *Cluff Lake Project Mid-Term Update*. AREVA provided information about milestones achieved for the Cluff Lake decommissioning project from 2009 to 2015. AREVA also reported details on decommissioning progress including future Cluff Lake project activities and a summary of conventional health and safety performance and stakeholder engagement. In its supplemental submission, CMD 16-M49.4A, AREVA provided responses to questions and issues raised by intervenors. The Commission expressed its appreciation for the inclusion of "before and after" photographs of the areas being decommissioned at the Cluff Lake site in AREVA's presentation.

87. A representative from the Ontario Ministry of Environment and Climate Change (MOECC) provided the Commission with comments in regard to the Deloro site. The MOECC representative acknowledged its below expectations rating in the management system SCA, noting that the MOECC's management system for the Deloro site had since been greatly improved, with these changes approved by CNSC staff. The MOECC representative also provided information on remediation progress and enhancements at the Deloro site, stating that this work continued successfully during 2016. Commenting on the current state of the site, the MOECC representative confirmed that radiological assessments had shown that nuclear substances at the Deloro site had been effectively remediated and were greater than, but close, to conditional clearance levels as specified in the *Nuclear Substances and Radiation Devices Regulations*.[5] On this basis, the MOECC

[5] SOR/2000-207.

indicated the intent to request that the Commission exempt the Deloro site from CNSC licensing under the NSCA and provided the Commission with information about the MOECC's future plans for site remediation and monitoring.

88. The Cameco representative provided the Commission with comments regarding the Beaverlodge decommissioning project, including the history of the Beaverlodge site and current status of the project, noting that Cameco was meeting with local communities on a regular basis to discuss the Beaverlodge project. The Cameco representative also explained that Cameco had applied to have 14 of the Beaverlodge properties exempted from CNSC licensing under section 7 of the NSCA and be accepted into the Province of Saskatchewan's Institutional Control Program (ICP).

Interventions – Part 2

89. The Commission noted several concerns expressed by the Saskatchewan Environmental Society and the Athabasca Chipewyan First Nation (CMD 16-M49.1) about the transfer of decommissioned sites into the Province of Saskatchewan's ICP and requested clarification from CNSC staff on these points. CNSC staff explained that a site would have to meet the conditions as specified in the *General Nuclear Safety and Control Regulations*[6] to be exempt from CNSC licensing under section 7 of the NSCA and for the subsequent transfer into the ICP. CNSC staff further noted that, as part of the ICP, the Province of Saskatchewan would have to maintain the site in a safe state and ensure sufficient financial guarantees for future maintenance and monitoring. CNSC staff also stated that land use restrictions could be applied to a site in the ICP and confirmed to the Commission's satisfaction that regulatory control could be retaken by the CNSC, should the conditions change to merit the removal of an exemption. The representative from the Saskatchewan Ministry of the Economy confirmed the information provided by CNSC staff, noting that a site in the ICP must meet maintenance and monitoring requirements established by both Saskatchewan Environment and the CNSC to remain in the ICP.

90. On the topic of the CNSC's role after a site is exempted from CNSC licensing under section 7 of the NSCA, the representative from the Saskatchewan Ministry of Economy explained that, once in the ICP, site monitoring and maintenance reports would be available for review by CNSC staff, as well as by the public. CNSC staff confirmed that these annual status reports would be

[6] SOR/2000-202.

reviewed by CNSC staff, and that CNSC staff would remain available to assist the site owner anytime, if required.

91. The Commission asked for additional information on how the public could participate during licensing exemption hearings. CNSC staff explained that any decision on this matter would require a Commission decision and that the hearing process would apply, which could allow for public participation.

92. Asked about whether information about the Saskatchewan ICP was publicly available, the representative from the Saskatchewan Ministry of the Economy stated that this information, as well as annual funding reports and 5-year ICP status reports, is available on the Government of Saskatchewan's website.

93. The Commission further enquired about whether the CNSC had publicly available information regarding the exemption of decommissioned sites from CNSC licensing under section 7 of the NSCA. CNSC staff responded that the CNSC did not have this information available and explained how the Province of Saskatchewan's ICP differed from the request put forth by the MOECC for the Deloro site, since Ontario does not have a formal ICP. CNSC staff noted, however, that in revising the CNSC's regulatory framework document with respect to waste and decommissioning, general information about exemptions of these sites from CNSC licensing could be included. The Commission directed CNSC staff to include in the updated CNSC regulatory framework information on the requirements that would have to be met under the NSCA and its regulations for a site to be granted an exemption from CNSC licensing.

ACTION
by
June 2018

94. In regard to the concern from intervenors regarding the sufficiency of the tailings cover at the Cluff Lake site, CNSC staff stated that CNSC inspections had shown that the tailings cover was performing as designed and was sufficient. The AREVA representative concurred with this information, noting that the monitoring of the cover system was an important element of AREVA's decommissioning follow-up plan. The AREVA representative provided information on cover subsidence that had been observed and remediated, but explained that, overall, the cover was performing well and that AREVA did not have any concerns in this regard. Based on the information provided, the Commission was satisfied that the tailings cover at the Cluff Lake site remained sufficient.

95. The Commission noted concerns from Mr. R. Gardiner regarding the storage of exploratory core samples at the Cluff Lake site and requested information on this matter. The AREVA representative

provided detailed information about the core samples, stating that AREVA had developed best management practices for core sample storage in Saskatchewan and that AREVA exceeded those requirements at the Cluff Lake site. The AREVA representative also explained that there was minimal risk associated with the materials at the core storage site and noted that AREVA had the necessary approvals from the Province of Saskatchewan for its exploration program. The Commission was satisfied with the information provided on this matter.

96. The Commission asked about how the results from the moose tissue analysis submitted in Mr. R. Gardiner's intervention compared to the tissue from moose from other parts of Canada. The Public Health Physician and Medical Health Officer for three Northern Saskatchewan Health Authorities provided detailed information on moose tissue analysis data that was currently available, noting that, in general, the levels of the various constituents in the Cluff Lake moose were very comparable to those of moose from other areas. The Public Health Physician and Medical Health Officer for three Northern Saskatchewan Health Authorities further explained that local communities had been advised that the moose in the areas around Cluff Lake were safe to eat.

97. The Commission further enquired about how often moose tissue analyses were conducted in the Cluff Lake area and whether the results were shared with the local communities. The AREVA representative stated that the EARMP conducts moose and caribou testing on a yearly basis. The Public Health Physician and Medical Health Officer for three Northern Saskatchewan Health Authorities also stated that the EARMP reports were publicly available, but that additional community outreach on this matter could be conducted.

98. On the topic of the moose tissue analysis, the AREVA representative noted that AREVA's ecological risk assessments were based on modelled moose tissue, and that Mr. Gardiner's analysis validated these models. The AREVA representative stated, however, that the results in the analysis were provided to the intervenor without context and that this may have added to community concern regarding the safety of local moose meat. The AREVA representative stated to the Commission's satisfaction that AREVA had communicated with the intervenor to provide him and local communities with additional information on the moose tissue analysis.

General Questions – Part 2

99. Asked to comment on its community engagement activities, the AREVA representative provided details on its long-standing relationship with the Athabasca Chipewyan First Nation, noting that AREVA encouraged local communities, as well as the Saskatchewan Environmental Society, to participate in matters regarding the Cluff Lake site. CNSC staff confirmed this information, noting that CNSC staff maintained regular contact with the Athabasca Chipewyan First Nation and the Saskatchewan Environmental Society, and that CNSC staff would continue to ensure that local communities remained informed about, and engaged in, the Cluff Lake project. The Commission was satisfied with the information provided on this matter.

100. In regard to questions about limits for uranium levels in surface run-off at decommissioned sites, CNSC staff provided detailed information about the various limits for levels of uranium and other contaminants, and the significance of the different limits. The Commission stated that increased transparency on this matter would be beneficial and requested that future reports include a better explanation of how these limits were derived and their applicability.

101. Addressing the issue of exceedances in Canadian Council of Ministers of the Environment water quality guidelines for levels of aluminum, copper, iron and selenium at the Rayrock site, CNSC staff provided information about the adequacy of the monitoring program proposed by the licensee, Indigenous and Northern Affairs Canada (INAC). The INAC representative confirmed this information, noting that INAC was currently assessing the exceedances and would be revising the human health risk assessment in 2017, and that this work would determine the frequency of monitoring required. The Commission was satisfied with the information provided by CNSC staff and the licensee.

102. The Commission requested that future reports on decommissioned and historical sites include information on target contaminant concentrations, radiation levels and other relevant site conditions in order for a site to be eligible for an exemption from CNSC licensing. **ACTION** by December 2017

Report on Possible Overexposure to Members of the Public During Transportation of Packages Containing Nuclear Substances

103. With reference to CMD 16-M69, CNSC staff informed the Commission about the incident reported by a Quebec City hospital based on suspicions by a member of the public regarding potential

overexposure. It was reported that members of the public may have been exposed to radiation, receiving a dose in excess of the regulatory annual limit of 1 mSv (milliSievert). The exposure occurred during the transportation of packages containing nuclear substances, where the driver was inappropriately driving passengers at the same time as he was carrying radioactive packages. This practice is not authorized under the *Packaging and Transport of Nuclear Substances Regulations*[7], and involves a number of non-compliances with the *Transport of Dangerous Goods Regulations*[8]. CNSC staff provided details of the event and informed the Commission about actions taken by the carrier and by the CNSC. A representative of the carrier company stated that the company had not been aware of the driver's actions, and that they were retraining all their drivers involved in transportation of nuclear materials to make sure that, under no circumstances, the drivers would be carrying unauthorized passengers.

104. The Commission enquired about the number of passengers, the distance travelled, and their positions in the vehicle. The Commission affirmed that any level of exposure is not acceptable. CNSC staff responded that there were five passengers, travelling from Montreal to Chandler, QC and pointed out that there had been a number of non-compliances. The carrier representative agreed that there should not have been any unauthorized passengers in the vehicle.

105. The Commission enquired about the external complaint process and the way it was used in this case. CNSC staff explained CNSC's external complaint process and stated that, whenever a report of non-compliance is received from a third party, it is treated in accordance with the whistleblower process to ensure that the identity of the complainant is appropriately protected. The matter is directed to the appropriate official. CNSC staff described in detail this particular case, and submitted that the passenger in the vehicle had contacted the hospital where the packages were destined. The hospital referred that call to the CNSC and also contacted the Sécurité de transport du Québec.

106. The Commission enquired whether this incident was unique or was a recurrence. CNSC staff responded that they had interviewed the driver who has admitted having transported other passengers on a few other occasions while transporting nuclear substances. However, there were only one or two passengers at a time and the information provided led CNSC staff to conclude that there were not any radiation exposure risks to these passengers since they

[7] *Packaging and Transport of Nuclear Substances Regulations*, S.O.R./2015-145.
[8] *Transportation of Dangerous Goods Regulations*, S.O.R./2001-286.

would not have been in close proximity to any nuclear substances that would be low energy beta emitters. CNSC staff explained that the driver had been advertising on a website of a local radio station that had a webpage for ridesharing, and had been aware that this is not appropriate and of the associated risks. The carrier representative added that the driver had been immediately suspended and terminated shortly after.

107. The Commission is satisfied with the information provided on this event and confirms that no further update is required, unless new information is available.

DECISION ITEM ON A REGULATORY DOCUMENT

Regulatory Document REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*

108. With reference to CMD 16-M70 and CMD 16-M70.A, CNSC staff presented to the Commission the draft REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*[9], for the Commission to consider authorizing this document to be published. This document sets out proposed requirements and guidance with respect to managing worker fatigue for workers at high-security sites, as defined in the *Nuclear Security Regulations*[10]. The implementation of REGDOC-2.2.4 would aim to establish a modern regulatory framework for managing worker fatigue and provide a risk-informed, transparent, consistent basis for assessing the acceptability of fatigue management provisions and for enforcing compliance.

Comments From Licensees

109. The Énergie NB Power (NB Power) representative expressed concern about the proposed REGDOC in their written intervention. The NB Power representative stated that NB Power accepts responsibility for the safety of the facility and presented alternatives to the requirements proposed in REGDODC-2.2.4, such as cognitive function comparisons and phased implementation plans.

110. The CNL representative commented that CNL accepts the responsibility for nuclear safety, and that the proposed REGDOC would not significantly affect the operations of the NRU due to the March 2018 shutdown date. However, the CNL representative stated that the new REGDOC would affect the shift schedules of the nuclear security officers and recommended that the REGDOC

[9] Canadian Nuclear Safety Commission Regulatory Document REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue* (Draft)
[10] Nuclear Security Regulations (SOR/2000-209)

allow licensees to establish their own shift schedules, provided that they are scientifically demonstrated to be safe.

111. The Bruce Power representative submitted that the REGDOC is too prescriptive with regards to some of the requirements and guidance regarding the limits of work, and that the REGDOC should focus less on detailed requirements and provide only the high-level requirements. The Bruce Power representative added that certain obvious limits on hours of work are needed, but that the use of cognitive analysis should be allowed in order to determine those hours. The Bruce Power representative stated that they were appreciative of the consultation and outreach opportunities provided by CNSC staff, which led to improvements to this REGDOC.

112. The OPG representative concurred with the issues raised by the Bruce Power representative and submitted that the draft REGDOC should provide for more flexibility and allow for the licensees' analysis to demonstrate a safe shift schedule, if future shift scheduling needs were to change.

General

113. Responding to the concerns raised by the licensees, CNSC staff noted that this document considered the limits set by other national and international regulatory bodies, as well as the studies and models in the scientific literature, which all recommend specific limits on hours of work since human performance will be impaired due to worker fatigue.

114. CNSC staff commented that the implementation of the "Guidance" sections of the REGDOC is not required. The Commission stated that the "Guidance" sections of the REGDOCs are important as that information provides a way to benchmark compliance by the licensees.

115. On the requirements listed in section 4.2 of the draft REGDOC, CNSC staff explained that these requirements are applicable only to safety-sensitive positions where impaired performance could pose a risk to the public or the environment. CNSC staff stated that work schedules contribute to worker fatigue. Therefore, it is important that a regulatory body has work limits in place. CNSC staff stated that the choice of a fixed period or rolling period was added based on consultation with the licensees in order to allow for more flexibility in the work limit requirements.

116. The Commission commented that it would have been beneficial for CNSC staff to include a full picture of the total regulatory

framework surrounding the different elements of the fitness for duty area in their presentation. The Commission notes that CNSC staff will present to the Commission REGDOC-2.2.4, *Fitness for Duty: Alcohol and Drug Testing*[11] for its consideration for authorization at the March 2017 Commission meeting.

Shift Turnover

117. Regarding the shift turnover period, the Bruce Power representative stated that the duration of the shift turnover will depend on the position of the employee and the circumstances of the plant at that time. The Bruce Power representative noted that Bruce Power is in agreement that shift turnover should not be used as an excuse to arbitrarily increase shift lengths for workers; however, in certain circumstances, extended shift turnovers may be warranted. The Bruce Power representative commented that, in his opinion, aspects including hours of work, shift turnover, plant equipment, etc. are all important and must be considered together, and that one aspect should not be given greater importance than the others, as in the case of the hours of work in this REGDOC. The Bruce Power representative noted that hours of work limits should be implemented, but there should be more flexibility to allow for other shift schedules.

118. The Commission notes the importance of shift turnover with regards to shift practices and recognizes that the information in the REGDOC regarding shift turnover is guidance. Addressing the effects of this guidance on long-term shift handover practices, CNSC staff explained that the purpose of the new REGDOC is to improve upon the existing practices and that shift turnover guidance is important for keeping workers fit for duty. CNSC staff stated that the importance of shift turnover with regards to nuclear safety is recognized, and that the REGDOC provides for a buffer in the requirements to allow for longer shift turnover if needed.

119. The Commission commented that the REGDOC should directly state the importance of shift turnover. CNSC staff stated that the daily hours of work have increased from thirteen to sixteen hours to alleviate the administrative burden of non-compliance issues from employees working longer than thirteen hours. CNSC staff added that the guidance on shift turnover does not undermine the capacity of the licensee to retain certified workers and that this guidance allows for the worker to stay beyond the new sixteen-hour limit in exceptional circumstances.

[11] Canadian Nuclear Safety Commission Regulatory Document (Draft) – REGDOC-2.2.4, *Fitness for Duty: Alcohol and Drug Testing*, CMD 17-M11.

120. The Commission noted that the term “exceptional circumstances” was used in the REGDOC but was not explicitly defined. CNSC staff explained that the guidance on shift turnover should be understood within the context of the entire shift. CNSC staff stated that shift turnover is considered in other REGDOCs that discuss training and management issues. CNSC staff added that caveats to the guidance on shift turnover could be added at the request of the Commission without altering the requirements of the REGDOC.

121. The Commission recommended that CNSC staff include guidance around the flow of information during the shift turnover period. CNSC staff responded that this recommendation will be taken into consideration. The Commission also recommended modifications to the REGDOC to reflect the importance of shift turnover and provide guidance for a longer shift turnover period if circumstances warrant it.

Worker Populations

122. The Commission asked about concerns regarding the treatment of the broad worker population by this REGDOC. The Bruce Power representative responded that most of the crews work the same schedules as certified staff, that the REGDOC does allow for different schedules for different populations if necessary, and that Bruce Power is accepting the requirements for the broad population. The Bruce Power representative added that their main issue is the ability of the licensee to demonstrate that they have a safe work schedule and the ability to change schedules to meet the licensee’s needs. The NB Power representative concurred with the comments from the Bruce Power representative regarding the REGDOC requirements for the broad population.

123. The NB-Power representative stated that it will take until 2021 to certify enough staff to move to a five-crew complement.

124. Asked if the licensees were clear about what worker positions fall under the broad population based on the REGDOC, the OPG representative responded that the REGDOC is clear on what constitutes safety-sensitive workers and what counts as the broad population. The OPG representative noted that the minimum shift complement at the nuclear power plant may be very large, and that the licensees will keep track of the safety-sensitive population.

125. CNSC staff clarified the difference between workers who are part of the safety-sensitive or broad population and workers who do not fall into either of these populations. CNSC staff noted that licensees would have to identify which workers fit into each population using their own individual analyses. The Commission is

satisfied with the clarification provided by CNSC staff regarding the distinction between worker populations.

126. Asked if a cognitive analysis will be applied to establish work hour limits for the broad population, CNSC staff responded that the licensees may perform additional work using cognitive analysis. However, in many cases, the licensees could rely on their current procedures in order to establish limits on hours of work.

Work Environment

127. On the practicality of licensees modifying their work environment to satisfy the requirements of the new REGDOC, the Bruce Power representative explained that their organization already meets most of the requirements and provided examples of the use of proper lighting and sleep areas. The Bruce Power representative stated that supervisors are trained to identify workers who are not fit for duty, and shift controls that comply with provincial statutes are in place for all staff.

128. Addressing the guidance provided in the REGDOC, the Bruce Power representative submitted that the guidance in the REGDOC that states the schedule safety-critical tasks outside of peak fatigue periods is impractical, as the licensee may not always be able to schedule safety-critical tasks outside of this period,. The Bruce Power representative provided reasoning for this claim. The OPG representative stated that their maintenance schedule is aligned with the guidance in the REGDOC, except during outages when a 24/7 schedule is necessary and the reactor is in a safe shutdown state. CNSC staff noted that this point reflects the importance of the circadian rhythm, and that this point was amended to include the “when possible” caveat based on feedback during the consultation process.

Benchmarking and International Best Practices

129. The Commission asked about the alignment of the REGDOC with international best practices. CNSC staff explained that data from international organizations and best practices were used for benchmarking, and that the limits on work hours are based on CNSC staff’s own research into work hours and fatigue management. CNSC staff stated that the work-hour limits were revisited starting in 2014 based on the most recent science and feedback from external consultants, confirming that the work-hour limits remained reasonable.

Scientific Research and Evidence

130. The Commission asked if the current shift practices of Bruce Power and OPG were in compliance with the REGDOC requirements. The Bruce Power and OPG representatives replied that their respective organizations are currently in compliance with the new requirements, based on current shift work. The Bruce Power representative noted that the benchmarking data was well done. However, cognitive analysis should still be performed for each shift. The Bruce Power representative added that cognitive analysis performed using a certified, approved program, should be allowed to analyze and propose appropriate shifts.

131. The Commission noted that few of the scientific papers from the literature review were published after 2010 and enquired if there had been no developments in this field since 2010. CNSC staff responded that the science has advanced since then and that CNSC staff is keeping informed of all recent developments. CNSC staff added that the scientific research considered was used to create the current REGDOC and as such it may not contain the entire body of science around worker fatigue. CNSC staff noted that it would be relevant to emphasize the most recent research, and that the literature review could be revised to more strongly reflect the most recent research.

132. The Bruce Power representative noted that their organization does use science to manage worker fatigue, and commented that the REGDOC restricts the use of science by not allowing alternative methods to develop shift schedules.

133. On the computer model used to define the worker fatigue profile, CNSC staff explained that the model was developed in the 2000s and is able to differentiate the levels of fatigue between different shift schedules. Asked if there were any recent updates to that model, CNSC staff responded that they would report back to the Commission on the most recent model update[12].

Flexibility of REGDOC Requirements

134. Asked about the flexibility of the REGDOC with regards to the hours of work limits, CNSC staff responded that, to create this REGDOC, CNSC staff started with the existing licence requirements and worked through extensive benchmarking, reviews of the scientific literature, and international standards and best practices, including hours of work limits from other regulatory

[12] After the conclusion of this Commission Meeting, CNSC staff provided the information that this computer modelling software is known as FAID Version 2.2.0.210, and that this version of the software was released in 2014.

bodies. CNSC staff stated that the licensees have the flexibility to return to an eight-hour shift if they prefer, as it would be less problematic from a fatigue management standpoint. CNSC staff added that this REGDOC is intended to regulate the potential for human error due to fatigue. The Commission was satisfied with this explanation from CNSC staff.

135. Addressing the potential for the licensees to use additional controls and analysis to demonstrate that alternative shift schedules are equally safe as the schedules proposed in the REGDOC, the Bruce Power representative clarified their position that the work-hour limits should not be entirely removed from the document, and that the limits should exist unless evidence is presented that proves alternative shift schedules are safe. CNSC staff stated that they are often open to licensees making a proposal with the equivalent level of safety.

REGDOC Implementation

136. Clarifying the implementation plan for this REGDOC, the NB Power representative confirmed that the long-term timeframe is a five-year period. CNSC staff stated that NB Power will require additional certified staff, for which training takes three to five years, and that the training program cannot be compromised. CNSC staff added that they expect a detailed plan from all licensees regarding the implementation of the REGDOC to ensure that safety is not compromised.

137. The Commission commented that NB Power may have to find innovative ways to implement the REGDOC after approval, as there is the expectation that licensees will implement those limits. The NB Power representative stated that the organization will work to ensure it will meet the intent of the REGDOC. The CNL representative confirmed that CNL will also determine a plan to meet the REGDOC requirements. The Commission is satisfied with the responses from the two licensees.

DECISION on REGDOC-2.2.4

138. After considering the recommendations submitted by CNSC staff and the submissions from licensee representatives, the Commission approves regulatory document REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*, for publication and use, after modifications are made according to the following:

- The guidance in section 4.2 regarding shift turnover is amended to say, “Shift turnover should normally be less than 30 minutes per shift. However, it is acknowledged that the transfer of

information and responsibilities between individuals or work units during shift turnovers is important for ensuring nuclear safety. For this reason, depending on the circumstances, the duration of shift turnover may vary and go beyond 30 minutes." **DECISION**

- The guidance in section 4.3 regarding licensee propositions for alternative shift schedules is amended to say, "Licensees can propose alternative equivalent limits to those contained in sections 4.2 and 4.3. Proposed changes to the limits must demonstrate an equivalent level of safety, be science-based, and need to be approved by the Commission before being implemented."

139. The Commission expects to be provided with an update on the licensees' implementation plan as part of the next annual NPP ROR. **ACTION** by August 2017

Closure of the Public Meeting

140. The meeting closed at 9:02 p.m.

Recording Secretary	Feb. 1, 2017 Date
Recording Secretary	Feb. 1, 2017 Date
Recording Secretary	Feb. 1. 2017. Date
Secretary	01/02/2017 Date

APPENDIX A

CMD	Date	File No
2016-M-05	2016-05-11	6.02.01
Notice of Participation at a Commission Meeting and Participant Funding – Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015		
2016-M-06	2016-05-12	6.02.01
Notice of Participation at a Commission Meeting and Participant Funding – Regulatory Oversight Report for Waste Management, Storage and Processing Facilities in Canada: 2015		
16-M66	2016-11-18	6.02.02
Agenda of the meeting of the Canadian Nuclear Safety Commission to be held on Wednesday and Thursday, December 14 and 15, 2016 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
16-M66A	2016-11-24	6.02.02
Updated Agenda of the meeting of the Canadian Nuclear Safety Commission to be held on Wednesday and Thursday, December 14 and 15, 2016 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
16-M66B	2016-11-30	6.02.02
Revised Agenda of the meeting of the Canadian Nuclear Safety Commission to be held on Wednesday and Thursday, December 14, 2016 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
16-M66C	2016-12-12	6.02.02
Agenda of the meeting of the Canadian Nuclear Safety Commission to be held on Wednesday and Thursday, December 14, 2016 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
16-M68	2016-12-09	6.02.04
Status Report on Power Reactors		
16-M64	2016-12-12	6.02.04
Canadian Nuclear Laboratories Limited: Status Report on Fitness for Service for the Chalk River Laboratories Submission from CNSC Staff		
16-M50	2016-10-13	6.02.04
Information Item: Regulatory Oversight Report for Waste Management, Storage and Processing in Canada: 2015 Submission from CNSC Staff		

CMD	Date	File No
16-M50.A	2016-12-07	6.02.04
Information Item: Regulatory Oversight Report for Waste Management, Storage and Processing in Canada: 2015 Presentation by CNSC Staff		
16-M50.1	2016-11-14	6.02.04
Information Item: Regulatory Oversight Report for Waste Management, Storage and Processing in Canada: 2015 Submission from the Canadian Nuclear Workers' Council		
16-M50.2	2016-11-18	6.02.04
Information Item: Regulatory Oversight Report for Waste Management, Storage and Processing in Canada: 2015 Submission from Northwatch		
16-M70	2016-11-21	6.02.04
Decision Item on Regulatory Document REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue Submission from CNSC Staff		
16-M70.A	2016-12-07	6.02.04
Decision Item on Regulatory Document REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue Presentation by CNSC Staff		
16-M70.1	2016-12-07	6.02.04
Decision Item on Regulatory Document REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue Submission from Énergie NB Power		
16-M70.2	2016-12-09	6.02.04
Decision Item on Regulatory Document REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue Submission from Canadian Nuclear Laboratories		
16-M49	2016-10-14	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from CNSC Staff		

CMD	Date	File No
16-M49.A	2016-12-07	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Presentation by CNSC Staff		
16-M49.4	2016-11-15	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from AREVA Resources Canada Inc.		
16-M49.4A	2016-12-07	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Supplementary Information from AREVA Resources Canada Inc.		
16-M49.B	2016-12-07	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Presentation by AREVA Resources Canada Inc.		
16-M49.5	6.02.04	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from Cameco Corporation		
16-M49.5A	2016-12-07	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Presentation by Cameco Corporation		
16-M49.1	2016-11-14	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from the Saskatchewan Environmental Society and the Athabasca Chipewyan First Nation		

CMD	Date	File No
16-M49.2	2016-11-14	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from Rodney Gardiner		
16-M49.2A	2016-11-24	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Supplementary Information from Rodney Gardiner		
16-M49.3	2016-11-14	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from the Canadian Nuclear Workers' Council		
16-M49.6	2016-11-25	6.02.04
Information Items Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2015 Submission from Edward Flett		
16-M69		6.02.04
Report on an overexposure to members of the public during transport of packages containing nuclear substances Submission from CNSC Staff		
16-M72		6.02.04
Event Initial Report Vancouver Coastal Health Authority – Exceedance of a regulatory dose limit by a nuclear energy worker during a therapeutic nuclear medicine procedure Submission from CNSC Staff		