Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting Held on August 22-23, 2018

August 22-23, 2018

Minutes of the Canadian Nuclear Safety Commission (CNSC) meeting held Wednesday, August 22, and Thursday, August 23, 2018, beginning at 9:02 a.m., in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, ON.

Present:

R. Velshi, President
S. Demeter
M. Lacroix
K. Penney
T. Berube

K. McGee, Assistant Secretary
L. Thiele, Senior General Counsel
S. Baskey, P. McNelles, C. Moreau, S. Smith, Recording Secretaries

CNSC staff advisors were: R. Jammal, G. Frappier, C. Moses, N. Riendeau, K. Hazelton, D. Hipson, F. Dagenais, C. Dodkin, H. Tadros, K. Murthy, C. Ducros, N. Greencorn, T. Lo, P. Burton, K. Glenn, N. Kwamena, R. Buhr, J. Thelen, C. Cianci, C. Cattrysse, R. Lane, H. Robertson, C. Carrier, S. Herstead, D. Duchesne, M. De Vos, N. Babcock, M. Broeders, J. Plante, P. Tanguay, Y. Picard, A. McAllister and C. Purvis

Other contributors were:

- Ontario Power Generation (OPG): I. Malek, L. Lemieux, B. Vulanovic, I. Edwards, R. Geofroy, J. Wight and D. Train
- Canadian Nuclear Laboratories (CNL): S. Cotnam, K. Kehler, M. Vickerd, D. Coyne, S. Parnell, A. Mahabir and S. Faught
- Bruce Power: F. Saunders and P. Thompson
- Air Canada: M. Pernitsch
- Natural Resources Canada (NRCan): D. Cameron and D. McCauley
- CANDU Owners Group: R. Calvero
- Terrestrial Energy: B. Smith
- Atomic Energy of Canada Limited: R. Sexton, M-E Pagé, and P. McClelland
- McMaster University: J. Zic and C. Heysel
- Royal Military College (RMCC): B. Lewis and P. Samuleev
- TRIUMF: J. Bagger, A. Trudel and J. Mildenberger
- University of Alberta: J. Duke
- Saskatchewan Research Council: D. Chorney
- Canadian Light Source: D. Street
- École Polytechnique Montréal: C. Chilian
- Nuclear Waste Management Organization (NWMO): P. Gierszewski

Constitution

1. With the notice of meeting CMD 18-M34 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 June 23, 2018, Commission member documents (CMD) 18-M30 to 18-M32, 18-M35, 18-M36, and 18-M41 to 18-M46, were distributed to members. These documents are further detailed in Annex A of these minutes.

Adoption of the Agenda

Chair and Secretary

3. The President chaired the meeting of the Commission, assisted by K. McGee, Assistant Secretary and S. Baskey, P. McNelles, C. Moreau and S. Smith, Recording Secretaries.

Minutes of the CNSC Meeting Held June 25, 2018

4. The Commission members approved the minutes of the June 25, 2018 Commission meeting as presented in CMD 18-M36.

STATUS REPORTS

Status Report on Power Reactors

5. With reference to CMD 18-M41, which provides the Status Report on Power Reactors (Status Report), CNSC staff provided the following updates:

   - Bruce NGS Unit 1 had returned to service on August 16, 2018 and was at 100% Full Power (FP)
   - Bruce NGS Unit 2 had commenced a planned shutdown on August 19, 2018 as part of the primary heat transport pump seal replacement and was expected to return to service by the end of August 2018
   - the Darlington NGS Unit 2 refurbishment program was generally on schedule
   - Darlington NGS Unit 4 had returned to 100% FP
   - Pickering NGS Unit 4 was at 84% FP due to fueling machine unavailability

6. Regarding potential radiation safety risks due to the unavailability of the fueling machine at the Pickering NGS Unit 4, CNSC staff stated that this occurrence did not pose any health and safety concerns in the short-term. Addressing potential long-term safety concerns, CNSC staff reported to the Commission that eventually the unit would need to be shut down for fuel burn-up considerations, and placed into shutdown cooling.

Update on the Internal Contamination Event at the Darlington NGS Refurbishment Retube Waste Processing Building

7. As part of the Status Report, CNSC staff provided a further update on the internal contamination event at the Darlington NGS refurbishment Retube Waste Processing Building (RWPB). This event was originally presented to the Commission in CMD 18-M14[1] at the March 2018 Commission Meeting,[2] and was further considered during the April 2018 and June 2018 Commission Meetings.[3,4]

8. With reference to CMD 18-M41.1, the OPG representative presented OPG's update to the Commission regarding the Darlington RWPB internal contamination event, including information on OPG's response, radiation protection enhancements, and improved reporting practices. The OPG representative added that most of the planned corrective actions had been implemented and provided additional details in that regard.

9. The Commission requested clarification regarding the Alpha level classification of work areas at the RWPB. The OPG representative confirmed that a lower alpha classification for work from one batch of pressure tubes was carried over to a second batch without being re-tested. The OPG representative informed the Commission that OPG had focused its improvements on the anticipation of potential hazards and that going forward, work area reclassification would only occur once hazards were confirmed and the proper controls were established.

[1] CNSC Event Initial Report (EIR) – CMD 18-M14, *Darlington Refurbishment – Retube Waste Processing Building – Internal Contamination Event*, March, 2018.
[2] *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on March 15, 2018*, paragraphs 25-31.
[3] *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on April 4, 2018*, paragraphs 7-9.
[4] *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on June 25, 2018*, paragraph 9.

10. The Commission noted that the work area had been reclassified from Alpha 1 (less stringent) to Alpha 3 (more stringent) following this event and enquired as to the reasoning for the original less stringent Alpha 1 classification. The OPG representative provided information regarding the classification process and the work plan for that work area. The OPG representative also acknowledged that OPG did not perform a survey of the work area in February 2018 prior to this event, and that had a survey been carried out, it would have resulted in the Alpha 3 classification for that work area and respiratory protection would have been required for the workers.

11. Addressing the protocol to reclassify a work area from Alpha 3 down to Alpha 1, the OPG representative provided a detailed explanation to the Commission regarding the considerations used for work area classifications in general, as well as those specific to the RWPB. The OPG representative stated that OPG would act conservatively with respect to any future work area reclassification and that the final determination in regard to radiological hazards would be made by the responsible health physicist.

12. The Commission expressed its dissatisfaction with respect to this event, both the fact of this event, and the delay in OPG's reporting of this event to CNSC staff. The OPG representative acknowledged that this event should have been reported to CNSC staff immediately based on the criteria in section 18 of REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.[5] The OPG representative affirmed OPG's commitment to improving its reporting protocols and provided several examples in that regard.

13. The Commission expressed concern regarding the results from OPG's root cause analysis and regarding CNSC staff's observation that it had been a lack of conservative decision-making that led to this event, noting that the root cause analysis showed clear deficiencies in the fundamentals of a good safety program. The Commission also enquired about how CNSC staff determined the need to issue the GNSCR subsection 12(2) request. CNSC staff responded that the 12(2) request had been made in order to ensure that CNSC staff obtained, in a timely fashion, the information regarding the necessary corrective

[5] CNSC Regulatory Document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, Version 2, April 2016.

actions OPG would take as a result of this event, as well as how the lessons learned from this event would be considered for the planned work activities for the Unit 2 reactor vault.

14. The Commission enquired regarding the additional delay for OPG to provide to CNSC staff the information regarding corrective actions and lessons learned from this event as requested in the 12(2) request, following OPG's report of this event. The OPG representative stated that OPG was in the process of compiling its own reports, and that the delay was due to the amount and technical nature of CNSC staff's questions. The OPG representative also reported to the Commission that OPG had responded to the 12(2) request within the required timeframe and that OPG staff was in constant communication with CNSC staff following the event. The OPG representative further confirmed that the lessons learned were applied to the radiation protection program for the facility and affirmed OPG's commitment to the safe operation of the facility.

15. The Commission asked whether CNSC staff was satisfied that the respirator-free work in the reactor vault was being carried out following conservative decision-making by OPG in regard to worker protection. CNSC staff responded that the decision to use respiratory protection rested with the licensee and that OPG had determined that worker protection, which did not include respirators, was adequate for that work environment. CNSC staff informed the Commission that it had a clear understanding of OPG's work plans, hazard analysis and control measures and of OPG's validation of its assumptions in that regard. CNSC staff also stated that it had increased its monitoring and oversight activity of work in the Unit 2 reactor vault to ensure that controls and measures implemented by OPG remained effective, and provided additional details in that regard.

16. Addressing the use of walkdowns as a compliance verification activity at Darlington NGS, CNSC staff informed the Commission that walkdowns would be set up by CNSC staff and OPG the day before the intended walkdown, and that the walkdown itself would occur the following morning. CNSC staff reported that entering the reactor vault was a significant task that involved important safety considerations; therefore a walkdown had to be thoroughly planned. CNSC staff stated that it had access to all necessary information regarding the work being carried out in the reactor vault at all times. CNSC staff reiterated its intention to do increased compliance verification in this regard.

17. Asked to provide additional details regarding a work refusal by an OPG worker in respect of work in the Unit 2 reactor vault on August 3, 2018, the OPG representative stated that the worker had concerns related to the change in respiratory protection. The OPG representative reported that, following the refusal, OPG confirmed that the level of respiratory protection remained adequate and that the Ontario Ministry of Labour (MOL) had determined that there was no undue risk to the worker. The OPG representative also reported on OPG's procedures related to worker safety, including informing the Joint Health and Safety Committee about the work refusal. CNSC staff confirmed that CNSC staff and the MOL were satisfied with OPG's work practices.

18. The Commission enquired about whether air supplied masks would be made available to workers upon request and asked if any such requests had been made. The OPG representative responded that occasional requests were made and fulfilled by OPG; however, overall the workforce was satisfied with the revised protective equipment and had transitioned to the established working conditions.

19. Upon Commission enquiry, the OPG representative confirmed to the Commission that the attributed worker doses from this event were internal doses and provided the technical details of the worker dose calculations, as well as information regarding the primary radionuclide of relevance.[6] The OPG representative stated that the dose calculation methodology and results were reviewed and accepted by CNSC staff.

20. Asked about the use of air monitoring and alarms for alpha radiation, the OPG representative confirmed that contamination monitoring was deployed throughout the vault and the RWPB, and that these monitors were continuously monitored by OPG staff.

21. The Commission expressed satisfaction with CNSC staff's use of the GNSCR subsection 12(2) request in respect of this event and expressed confidence that CNSC staff would continue to use the appropriate enforcement actions that were at their disposal.

[6] As later reported to the Commission in CMD 18-M33 on June 25, 2018, a dose assessment was carried out by OPG and submitted to CNSC on March 12, 2018. OPG reported that the two (2) workers received a committed effective dose of 0.28 and 0.31 mSv, well below the regulatory dose limit and the licensee's action level.

22. Noting past alpha contamination events at the Point Lepreau NGS, the Bruce NGS, as well as this recent event at the Darlington NGS, the Commission wishes to be clear: nuclear operators must have and implement conservative radiation protection measures. As appropriate, the Commission would appreciate updates in this regard in the context of the annual nuclear power plant regulatory oversight report, to include CNSC staff's increased regulatory vigilance and compliance verification of licensee's conservative radiation protection practices

ACTION by November 2019

Event Initial Reports (EIR)

Ontario Power Generation –Pickering Nuclear Generating Station: Unplanned Outage due to Algae Run

23. With reference to CMD 18-M44, CNSC staff presented information regarding an event involving the unplanned outage of the Pickering NGS Units 5-8 due to a higher than expected accumulation of algae on the screen that is used to catch and remove debris. As of August 2, 2018, Units 5, 7, and 8 had returned to 100% FP, whereas Unit 6 was placed into the guaranteed shutdown state, and would not return to service until repairs were completed on a switchgear circuit breaker.

24. The Commission invited OPG to provide comments regarding this event. The OPG representative informed the Commission that there were no safety or environmental impacts as a result of the outages and that procedures were in place to mitigate algae accumulation events.

25. The Commission noted the early timing and large size of the algae run, and asked whether OPG checked the emergency water intakes for algae clogs. The OPG representative responded that there were separate intakes for emergency water supplies, which were also checked as per OPG's procedures. CNSC staff added that, at all times during this event, there was sufficient water to ensure cooling during the reactor shutdowns.

26. Asked to clarify the Unit 6 loss of power during this event, the OPG representative reported that Unit 6 had experienced a loss of Class IV power and a partial loss of Class III power, but noted that the Class III power was restored after several minutes. The OPG representative added that the reactor unit could withstand an indefinite loss of Class IV power and that fuel cooling was not impacted due to this event.

27. The Commission enquired about potential preventative measures and mitigation methods for algae run events. The OPG representative provided a detailed description of both the predictive methods OPG employed in respect of algae runs as well as about the methods for their mitigation, should they occur. OPG also noted the collaborative research efforts in regard to algae runs with Fisheries and Oceans Canada (DFO), as well as national and international universities.

28. Regarding the possibility for algae to enter the intake and affect critical plant components, the OPG representative noted that, while this was a possibility, the risk of algae affecting critical components was very low and provided a description of several mitigation measures that would prevent such an occurrence. The OPG representative also provided further information regarding measures to ensure that cooling water was available for the cooling of fuel during such an event. The OPG representative noted that the cooling water for emergency systems at the Pickering NGS was taken from a different source than the regular cooling water intake, providing redundancy and diversity in design.

29. Noting the predictive and mitigation tools used in respect of algae runs, the Commission asked for more information regarding the algae run and unplanned outage that caused this event. The OPG representative provided a detailed description of the specific environmental factors that were responsible for the large flux of algae, noting the unusually strong algae-growing season. The OPG representative was of the view that OPG had taken the necessary actions in order to reduce risks and that OPG would continue to shut down reactors units during such events in order to maintain safety.

30. Regarding the potential for fish impingement due to OPG's algae harvester, the OPG representative stated that that harvester functioned at the surface of the lake and that, therefore, fish were protected.

31. The Commission enquired about why Pickering NGS A units were not affected by this algae run. The OPG representative stated that the water intake for those units was at a different location but noted that, in the past, certain Pickering A units had also been shut down due to algae conditions.

Ontario Power Generation – Pickering Nuclear Generating Station
Unit 4: Unplanned Outage due to Condenser Cooling Backpressure

32. With reference to CMD 18-M45.A, CNSC staff presented information regarding an event involving the unplanned outage of the Pickering NGS Unit 4. A manual shutdown of the reactor unit was carried out following high condenser backpressure due to a clogged debris filter. Additionally, Unit 4 experienced a partial loss of Class IV power during the shutdown, due to the failure of a circuit breaker.

33. Asked to provide clarification about whether there was a spill associated with this event, the OPG representative stated that no spill or release directly attributable to this event had occurred. The OPG representative provided further details regarding an unrelated spill of demineralized water that had occurred approximately twelve hours after the event, and noted that the spill did not cause any environmental impacts.

34. Regarding the nature of the clog in the debris filter, the OPG representative confirmed that the clog was caused by algae. The OPG representative stated that the algae involved in this event involving the Pickering NGS Units 1 and 4 was different than the one affecting the Pickering NGS Units 5 – 8, as presented in CMD 18-M44.

35. Addressing the frequency of unplanned outages due to filter clogs at the Pickering NGS, the OPG representative reported that such an event had occurred prior to this event, likely within the past two years.

36. The Commission noted that, during this event, one of the condenser cooling pumps was shut down and asked if a shutdown could damage the piping system. The OPG representative provided details regarding the condenser cooling pump functionality and stated that, since the pumps were designed to be shut down for cases such as this, no piping damage would occur.

37. Addressing the root cause of the circuit breaker failure and loss of Class IV power supply, the OPG representative provided the Commission with information regarding the extensive troubleshooting and testing that was performed following the event but noted that no root cause could be determined. Asked about the test frequency for those breakers, the OPG representative responded that those breakers were tested at every reactor outage, as per the test plan.

38. The Commission enquired about whether CNSC staff had any additional information on this event. CNSC staff stated that there were clear reporting requirements in place in respect of such events and good communication between OPG and CNSC staff. CNSC staff further stated that no safety concerns resulted from this event; however, due to the operational impact CNSC staff had determined that it was appropriate to inform the Commission about the event. The Commission expressed its appreciation for the report on this event and for the conservative approach to event reporting that was used.

Air Canada - Report on an Overexposure During Transport of Packages Containing Nuclear Substances

39. With reference to CMD 18-M43, CNSC staff presented information regarding an event involving an Air Canada Cargo worker (not designated as a Nuclear Energy Worker (NEW) under the *Nuclear Safety and Control Act*[7] (NSCA)), who was exposed to a dose of radiation of 1.06 mSv, which is in excess of the regulatory annual public dose limit of 1mSv, during the handling of transport packages.

40. Addressing the root cause of the radiation exposure, CNSC staff provided information about the potential causes that were considered, such as the mishandling of packages or damaged packages. CNSC staff explained that no damaged packages had been reported to the CNSC in 2017 and that other workers during the same shifts had not been exposed to abnormal levels of radiation, ruling that out as a cause of this event. CNSC staff reported that the source of the exposure could not be definitively determined. The Air Canada representative concurred that no definitive cause for the higher dosimeter reading had been identified.

41. The Commission enquired about the radioactive package handling limit for workers who were not NEWs. CNSC staff stated that a Transport Index[8] (TI) was required for all packages and that from studies performed by CNSC staff, it was determined that handling approximately 300 TI on an annual basis could result in an exposure of approximately 1 mSv. CNSC staff noted that this did not represent the number of packages that could be handled annually; rather, this represented the collective

[7] S.C. 1997, c. 9

[8] The transport index is the maximum radiation level in microsieverts per hour at one metre from the external surface of the package, divided by 10 (CNSC, INFO-0744, *Guidelines for Handling Packages Containing Nuclear Substances*, < *nuclearsafety.gc.ca/pubs_catalogue/uploads/I0744_e.pdf*>)

TI handled by the worker. CNSC staff provided additional information regarding Air Canada's radiation protection program and dose control.

42. Asked about the requirements for assigning and verifying the TI on a package, CNSC staff responded that the TI was determined by the consigner at the time the package was prepared for transport. CNSC staff stated that there was no regulatory requirement for carriers to verify the TI afterwards, but that most consignees would verify the TI on receipt of a package. CNSC staff added that it carried out verification and compliance activities to ensure that consignors performed the TI determination in accordance with regulatory requirements.

43. Addressing Air Canada's dosimeter reading practices, the Air Canada representative informed the Commission that dosimeters were read every quarter. The Commission further enquired about how personal doses could be differentiated from non-personal doses. CNSC staff provided details and examples of the investigative procedure that were implemented by licensees in the case of high or abnormal dosimeter readings. CNSC staff added that since the investigation could not determine the exact cause of the dose, it was ascribed to the individual as per the CNSC's conservative approach. The Air Canada representative added that the other two workers received doses of 0.4 mSv and 0.6 mSv per year, respectively.

44. The Commission enquired about whether this was the first overexposure event at Air Canada. CNSC staff stated that there was one overexposure event in the early 2000s, shortly after Air Canada implemented its radiation protection (RP) program for carriers; however, there had been no other personal dose events since then.

45. Asked about the nature of the packages that were being handled by Air Canada, CNSC staff responded that these packages usually contained medical radioisotopes and provided several examples of such radioisotopes. CNSC staff confirmed that the sources were sealed within the packages, and that the packages met the regulatory standard for transport. Therefore no radioactive material would be expected to be found outside the packages.

46. Addressing the status of the investigation into this event, CNSC staff informed the Commission that, as the personal dose was low and as Air Canada had met all reporting requirements and had implemented all corrective actions, CNSC staff considered this event to be closed.

47. The Commission asked in which quarter the high dose result was found. The Air Canada representative confirmed that the dose readings were performed quarterly based on Air Canada's reporting year and that the high dose was recorded in the first and second quarters. The Air Canada representative added that Air Canada had changed its monitoring year and that it was now in-line with the calendar year.

48. The Commission enquired about administrative triggers or actions that licensees would have to take in the event of high quarterly doses. CNSC staff clarified that, although Air Canada was not required to be a CNSC licensee, Air Canada was required to operate within the requirements of the *Packaging and Transport of Nuclear Substance Regulations, 2015*[9] (PTNSR, 2015) and provided additional details regarding Air Canada's RP program. CNSC staff also stated that the PTNSR, 2015 provided for dose limits based on a calendar year and that, in the case of this worker, the dose was the total cumulative annual average of 1.06 mSv, across two subsequent quarters. The Air Canada representative stated that the action trigger for Air Canada's RP program was a dose of 0.75 mSv per year; however, the worker's dose increased from 0.4 mSv per year to 1.06 mSv per year in one quarter, bypassing the trigger. The Air Canada representative added that the individual was removed from that work in December but Air Canada's notification to CNSC staff had been delayed due to management changes. The Air Canada representative noted that in the future, electronic personal dosimeters (EPD) would be used in the work area to manage worker doses more accurately and effectively.

49. Upon enquiry, CNSC staff informed the Commission that the minimum detection limit for EPDs was in the microsievert range. CNSC staff informed the Commission that EPDs were effective for managing low doses in real-time, however the selection of monitoring equipment was based on several factors and provided a detailed description of such factors. CNSC staff added that EPDs would be effective for the work performed by Air Canada but noted that they would not be a requirement.

[9] SOR/2015-145

50. The Commission was satisfied with the investigations performed by Air Canada and by CNSC staff, and with the corrective actions that had been implemented by Air Canada. The Commission is satisfied that this matter is closed.

McMaster University – Personal Contamination Incident

51. With reference to CMD 18-M46, CNSC staff presented information regarding an event involving a worker at McMaster University (McMaster) who had potentially exceeded the action level of 1 mSv/shift, as established in the McMaster RP Program, while setting up an experiment on pressure tube analysis in the hot cell (cell).

52. The Commission invited the McMaster representative to provide comments. The McMaster representative did so, including McMaster's commitment to safe operation, its internal investigation and the corrective actions that were implemented. The McMaster representative noted that the licensed activity that was being carried out during this event had been removed from McMaster's CNSC licence by a designated officer (DO). McMaster had discontinued all pressure tube analysis work, and this state of affairs would remain until adequate controls were in place.

53. The Commission further enquired about the removal of this licensed activity from McMaster's CNSC licence. CNSC staff stated that, under its Consolidated Studies Licence which was issued by a DO, McMaster was authorized to issue a work permit for the hot cell work. CNSC staff further explained that, following this event, the activity was removed from McMaster's licence with the result that McMaster was not authorized to issue permits for or carry out such work until such time that this authorization was reinstated by the CNSC DO.

54. Upon enquiry, the McMaster representative provided the Commission with details regarding the normal process for the decontamination and analysis of the cell. The McMaster representative noted that, in this case, the top areas of the cell had not been decontaminated. The McMaster representative also informed the Commission that equipment located at the top of the cell made it difficult to perform a full decontamination and that McMaster was developing a work plan for full cell decontamination.

55. The Commission enquired about whether this event was related to a process issue, rather than a human performance issue. The

McMaster representative confirmed that this event was the result of an inadequate process and was not due to human factors. The McMaster representative stated that McMaster was revising its processes to prevent future events.

56. Addressing the prospect of similar contamination in other areas of the facility, the McMaster representative stated that the contamination was limited to this one cell. The McMaster representative added that lessons learned from this event would be applied throughout the facility. Regarding the control of alpha radiation, the McMaster representative confirmed that alpha radiation was a known issue due to its hazard assessment, therefore full controls and monitors for alpha radiation were in place.

57. The McMaster representative informed the Commission that the affected individual did not receive a skin dose and provided an overview of the responses of the individual and of McMaster Health Physics to this event. Asked if any other individuals were contaminated, the McMaster representative stated that no other individuals were contaminated due to this event. The McMaster representative further stated that during prior work in the cell, there were only two incidents of contaminated clothing.

58. Addressing the cleanliness of the cell environment, the McMaster representative stated that the cell was considered a clean environment, therefore no protective equipment was required. The Commission noted that it was fortuitous that the individual noticed the presence of dust, reducing the time to identify the contamination. The McMaster representative concurred, and added that the contamination would have been detected by McMaster Health Physics had the worker not detected it.

59. Regarding the maximum dose that the worker could have received, the McMaster representative provided details of McMaster's internal investigation and stated that the maximum possible dose based on the most conservative assumptions would have been approximately 6.5 mSv. The McMaster representative further stated that the estimated dose to the individual following laboratory analysis was much less than the maximum possible dose.

60. The Commission is satisfied with the information and the regulatory response in this regard, and is satisfied that this matter is closed.

INFORMATION ITEMS

Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative

61. With reference to CMD 18-M30 and CMD 18-M30.1A, CNSC staff presented the first progress update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative (the Update) to the Commission. This Update was intended to summarize the progress made on current CNL decommissioning and remediation activities and did not include the licensed activities at the Chalk River Laboratories (CRL) since the Commission recently renewed CNL's operating licence for the CRL in March of 2018.[10]

62. With reference to CMD 18-M30.1, the CNL representative presented the Commission with information about the progress made on work carried out during the last two years since CNL's last update to the Commission, in September 2016, describing CNL's new strategy and plans for the decommissioning and waste management at the sites considered in this Update and managed by CNL on behalf of Atomic Energy of Canada Limited (AECL).

63. The public was invited to comment on the Update through written interventions. Six written interventions were received from:
    - Concerned Citizens of Renfrew County and Area
    - D. Rudka
    - Northwatch
    - Port Hope Community Health Concerns Committee
    - F. More
    - P. Giroul

64. The Commission noted the concerns expressed by many intervenors regarding decommissioning strategies for CNL-licensed facilities and associated environmental assessments, and emphasized in the meeting that this Update from CNL was to provide the status of activities at CNL's Prototype Waste Facilities, Whiteshell Laboratories and the PHAI and that no licensing decisions would be made during this Commission

[10] CNSC Record of Proceedings, Including Reasons for Decision – Canadian Nuclear Laboratories (CNL), *Application to Renew the Nuclear Research and Test Establishment Operating Licence for the Chalk River Laboratories*, Ontario, March 2018.

meeting. Any licensing decision, including those on environmental assessments, licence renewals and decommissioning strategies are matters for future public Commission hearings with participation from the public.

65. The Commission noted that the information presented in this Update was different from that in a regulatory oversight report (ROR) and enquired about whether there would be an ROR on CNL facilities. CNSC staff acknowledged that a ROR would have included more data on radiation and environmental protection and conventional health and safety, that the Update was intended to summarize the progress made by CNL on its current decommissioning and remediation activities, and that the 2016 waste management ROR included detailed CNL oversight data. CNSC staff further informed the Commission that 2018 data and a comprehensive performance report for CNL would be presented to the Commission in a CNL ROR at a public Commission meeting in 2019.

ACTION by December 2019

Licensing of Gentilly-1,Douglas Point and NPD

66. In regard to the intervention from the Concerned Citizens of Renfrew County and Area, the Commission wished the record to reflect details about the process which led to the 20-year licence issued by a panel of one Commission Member on July 16, 2014, without the opportunity for written public comment.[11] CNSC staff confirmed that after a hearing in writing, the Panel had authorized the transfer and amalgamation of three licenses for Gentilly-1, Douglas Point and NPD, which had been issued to AECL, into one licence issued to CNL. CNSC staff further explained that the licence periods of the three licences previously held by AECL were indefinite and that this 2014 transfer and amalgamation was for a 20-year licence period. CNSC staff also provided the Commission with additional details about the decommissioning activities, specifically storage with surveillance, which had been authorized by the original licences and had been ongoing since the 1980s.

67. Further in regard to the transfer of the three AECL licences to CNL in 2014, the Commission noted that storage with surveillance activities at those sites had been ongoing since the 1980s and enquired about whether there had been any

[11] CNSC Record of Proceedings, Including Reasons for Decision – Atomic Energy of Canada Limited (AECL), *Application to Replace the AECL Prototype Waste Management Facility Licences*, Ontario, July 16, 2014. The Waste Facility Decommissioning Licence (WFDL) solely authorises continued storage with surveillance activities. CNSC staff reported that, prior to entering active decommissioning, AECL would be required to submit detailed decommissioning plans.

opportunity for the public to comment on the decommissioning plans. CNSC staff explained that the original licences issued to AECL did not include an opportunity for the public to submit interventions, but stated that CNL's proposed decommissioning plans for the Whiteshell Laboratories and the Nuclear Power Demonstration Project, would be available for public intervention during the associated public Commission hearing process. The CNL representative added that the final end state decisions had not been made and the detailed strategy would likely not be determined until there was an adequate permanent waste management disposal facility for intermediate-level waste. The CNL representative also noted that there was discussion of changing NPD's decommissioning strategy and that an environmental assessment (EA) under *Canadian Environmental Assessment Act*, 2012[12] (CEAA 2012) was underway. CNSC staff confirmed to the Commission that the consideration and approval of this EA and associated licence would be conducted in a public Commission hearing.

68. The Commission considered the intervention from Northwatch which raised the concern that neither CNL's nor CNSC staff's CMD discussed the Near Surface Disposal Facility (NSDF). The Commission noted that the NSDF was not a CNSC-licensed facility at this time, and as such, was out of scope for the current Update. CNSC staff informed the Commission that, following the submission of a licence application for the NSDF, the public would be given an opportunity to intervene during the EA and the public Commission licensing hearing. The Commission was satisfied with the information provided on this matter.

69. Noting the concerns in the intervention from Northwatch about the changing timelines that prospective intervenors would face in regard to the environmental impact statements (EISs), EAs, and licencing hearings for Whiteshell WR-1 reactor (WR-1) and NPD decommissioning projects, the Commission asked for additional information about when the public could expect to be advised of the revised timelines. The CNL representative explained that CNL was dispositioning all comments in regard to the EIS for both the WR-1 and NPD decommissioning projects and expected that the timelines would be established thereafter. CNSC staff confirmed that the public would be able to review the administrative protocols, including the updated timelines, on the CNSC website when the hearings on applications for an EA or licence would be scheduled for each of the WR-1 and NPD

[12] Statutes of Canada (S.C.) 2012, chapter (c.) 19, section (s.) 52.

decommissioning projects. CNSC staff provided further details about the EAs being carried out under CEAA 2012 for the WR-1 and NPD decommissioning projects.

70. Further, the Commission requested information about participant funding that was or would be available to Indigenous groups and members of the public for the review of the current EAs for the WR-1 and NPD decommissioning projects. CNSC staff informed the Commission that participant funding had been offered and awarded to Indigenous groups and members of the public early in the EA processes and that additional requests from Indigenous groups to fund traditional knowledge studies were under consideration. CNSC staff also stated that, due to the changing timelines for the projects, additional opportunities for participant funding would be considered.

71. Noting that the Douglas Point, NPD and Gentilly-1 reactor facilities were in a state of storage with surveillance, the Commission requested details about the compliance activities, including inspections at those facilities. CNSC staff provided a reference to a list of inspections performed at CNL sites and facilities including Douglas Point, Gentilly-1, NPD, and Whiteshell Laboratories and described oversight activities that would be associated with the unique scope of work planned for a particular licensee's shutdown reactor site. CNSC staff also provided information about inspection planning and the associated 10-year compliance verification plans.

Environmental Protection, Monitoring and Protection of the Public

72. In regard to the concerns raised in the Concerned Citizens of Renfrew County and Area's intervention about toxic waste discharges to the Ottawa River from the NPD closure project in Rolphton, Ontario and the public's ability to access effluent monitoring data, the Commission requested information from CNL. The CNL representative explained that CNL's effluent monitoring plan was prepared in accordance with CSA N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*[13] and that discharges, which occurred once to twice a year, were sampled and validated against regulatory limits before their release. The CNL representative also stated that environmental performance information could be found on the CNL website. CNSC staff confirmed to the Commission that CNL posted a summary of environmental

[13] N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*, CSA Group, 2011.

performance information on its website and that CNL's effluents were released in small quantities. CNSC staff further provided the Commission with additional information about CNSC staff's review of CNL's environmental risk assessment activities and annual compliance reports to ensure that CNL was meeting regulatory requirements.

73. The Commission considered the intervention from D. Rudka and requested information about special protective measures that would be employed during the Highland Drive cleanup, which was part of the PHAI, since there was a school in that location. The CNL representative explained that adequate controls to protect all members of the public existed for all work being conducted. The CNL representative provided additional details about the programs in place to protect the public and the environment, including a radiation protection program and dust monitoring conducted by an independent contractor. CNSC staff informed the Commission that CNL's environmental monitoring programs had been reviewed and accepted as protective of the public and the environment. CSNC staff further explained that the activities on Highland Drive had not yet begun and that CNSC staff would be conducting compliance verification activities to ensure that the public remained protected throughout the cleanup activities.

74. Considering the photograph presented in the intervention from the Port Hope Community Health Concerns Committee of UF_6 storage cylinders stored at the Cameco Corporation's Dorset Street East site, the Commission requested additional information about the contents of the cylinders and whether they presented a risk to the abutting residential community. CNSC staff explained that the cylinders depicted in the intervention were no longer in use[14] and that due to the design of the cylinders, which were certified transport packages, they posed no radiological hazard to the public.

75. The Commission considered the concerns about health risks to Port Hope residents, as raised in the intervention from the Port Hope Community Health Concerns Committee, and enquired about peer-reviewed scientific studies in this regard. CNSC staff provided details about the environmental and epidemiological studies conducted in the Port Hope area and explained that there was no evidence of adverse health effects having occurred or being likely to occur as a result of the operations of the nuclear

[14] After the closure of the Commission meeting, CNSC staff submitted a memo to the Commission confirming that the cylinders were completely empty. August, 2018.

industry in Port Hope. CNSC staff also provided the Commission with information about peer-reviewed articles that had been written on this topic and on the international experience in respect of similar exposures.

76. Regarding concerns raised in the intervention from F. More, the Commission requested information about the sampling and triage process of residential spaces in Port Hope. The CNL representative provided the Commission with details about the different radiological surveys including interior radon sampling, exterior gamma surveys and bore holes that CNL carried out in this regard, noting that it was a risk-based process. The CNL representative also informed the Commission that sites in and around the former Eldorado processing facility were assigned first priority in this regard, but as information was compiled, work plans would be adjusted to maximize efficiency and decrease inconveniences to the city.

77. Noting that several properties in Port Hope had been remediated, the Commission enquired about whether CNSC staff, as part of their oversight activities, had verified that the properties had been adequately remediated. CNSC staff stated that independent sampling had not been conducted at the first two test sites, but that a random sampling plan of properties remediated in the community would be implemented as activities progressed.

78. Regarding the Commission's request for information about liquid wastes being collected from two buildings at Whiteshell Laboratories, the CNL representative provided details regarding a closed standalone system that treated the laundry wastes. The CNL representative also clarified that groundwater leaking into a lightly contaminated building was processed through the sump pumps.

79. Noting the occurrence of three events with hazardous substances at Port Granby, the Commission requested further details about: the dates of the events; the actions taken by CNL; and whether any such events had occurred since the May 2017 event. CNSC staff reported to the Commission that the three events occurred in December 2016, January 2017, and May 2017. The CNL representative provided information about CNL's actions following the discovery of these hazards and protective measures that were put in place for the different chemical hazards encountered. The CNL representative also informed the Commission that the protective measures put in place were exhibiting success, as potential subsequent events had been discovered but handled appropriately, preventing any incidents.

80. Concerning the planned Port Hope harbour dredging activities, the Commission asked if any other materials were anticipated to become entrained in a water column or be unable to navigate through a turbidity curtain. The CNL representative provided information about the activities being carried out to mitigate adverse effects to fish, including the installation of a wave attenuator to separate the lake and the harbour, as well as the removal and relocation of fish. CNSC staff informed the Commission that a review of CNL's proposals had been completed and it had been determined that a *Fisheries Act*[15] authorization was not required since the activities were not expected to result in serious harm to fish. CNSC staff further reported that during the technical assessment Department of Fisheries and Oceans Canada (DFO) had been kept informed of the project and that CNSC staff's findings were provided in writing to both CNL and DFO. Asked whether a permit to remove and relocate fish was required, CNSC staff reported that CNL did not require a permit to remove and relocate the fish.

81. The Commission asked CNL about the implications of not having been able to use the bioreactor in the Port Granby waste water treatment plant. The CNL representative stated that less efficient alternatives had been used to date but informed the Commission that all corrective actions had been completed in regard to the bioreactor and that CNSC staff's review of the corrective actions was pending.

82. Regarding an outflow event of untreated water in Port Hope during June of 2017, the Commission requested clarification about the timeline of reports and of the environmental sampling that was carried out. CNSC staff explained that both CNSC staff and staff from the Ontario Ministry of the Environment and Climate Change[16] (MOECC) had conducted on-site inspections immediately after the event, ahead of the August 2017[17] presentation of the event initial report.[18]

83. Regarding several questions and proposals raised in the intervention by P. Giroul, the Commission expressed its appreciation for his submission, and noted that many of those proposals were outside the scope of this information item.

ACTION by November 2018

[15] R.S.C., 1985, c. F-14.
[16] Following the June 2018 Ontario provincial election, the MOECC was renamed as the Ministry of the Environment, Conservation and Parks
[17] *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on August 16 and 17, 2017.*
[18] CMD 17-M38 Event Initial Report, Canadian Nuclear Laboratories, *Release of untreated water at Port Hope Project Long Term Waste Management Facility* e-Docs No. 5314921 August 9, 2017

However, the Commission expects CNSC staff to send, as appropriate, a response to P. Giroul regarding the questions he raised in his intervention with respect to nuclear waste at the Gentilly-1 site.

Waste Management and Decommissioning Plans

84. Noting the concerns raised by the Port Hope Community Health Concerns Committee that 93% enriched uranium had been processed at a facility in Port Hope, the Commission requested information in this regard. CNSC staff explained that uranium enrichment activities were not conducted at any facilities in Port Hope and that no enriched uranium was being cleaned up under the PHAI. CNSC staff provided additional context explaining that certain legacy activities at a former metals plant had processed small quantities of enriched material.

85. Regarding the materials being stored under a tarp at the Centre Pier of the Port Hope Harbour, the Commission requested confirmation that this was the same material that had been discussed in the CMDs on this matter and that an EA had been conducted in regard to its storage. The CNL representative confirmed that this was the same material previously presented and that the waste located at the Centre Pier was part of the 2006 Port Hope EA.

86. The Commission requested further information about CNL's resin reduction program at Douglas Point and Gentilly-1. The CNL representative explained that the goals of the resin reduction were to reduce the volume of waste and to stabilize the waste for its return to CRL. The CNL representative further explained that the program involved a third party vendor and that CNL would continue the resin reduction program until the resin wastes have been completely removed.

87. Concerning the standpipes and bunkers at Whiteshell Laboratories, the Commission enquired whether the related remediation activities were included in the scope of the EA being conducted for the WR-1 decommissioning project. CNSC staff stated that the standpipes and bunkers were being remediated in accordance with the activities authorized by the existing Whiteshell Laboratories licence, and that the EA for the WR-1 decommissioning project did not include the standpipes and bunkers.

88. Noting that CNL submitted that the bunker remediation activities at the Whiteshell Laboratories site would be highly mechanized,

the Commission enquired whether these tools had been designed and built yet, or whether they were only conceptual. The CNL representative informed the Commission that the standpipe and bunker waste retrieval system design was nearing completion, and that construction and assembly was expected to commence in 2019.

89. Noting the differences in decommissioning strategies employed between the sites being managed and decommissioned by CNL, the Commission requested information about the in-situ management of low-level waste trenches at the Whiteshell Laboratories site. CNSC staff explained the approval of in-situ decommissioning for the trenches was approved by the Commission as part of the Whiteshell Laboratories decommissioning licence issued in 2008. CNSC staff noted, however, that a detailed decommissioning plan with the new in situ approach still required consideration and acceptance by the Commission.

Aboriginal Engagement and Public Information

90. Noting the concerns around CNL's public communication that were raised in the intervention from D. Rudka, the Commission requested additional information in this regard from CNL. The CNL representative provided the Commission with details about CNL's outreach office in Port Hope, Ontario, as well as information regarding its outreach activities and public surveys.

91. The Commission enquired about CNSC staff's consultation with Indigenous groups in respect of the EAs for the WR-1 and NPD decommissioning projects. CNSC staff responded that several indigenous communities had been engaged already through methods such as face to face meetings, and that a plan for the consultation with Indigenous groups in order to address their comments in regard to those projects existed, and provided further information in this regard. CNSC staff also submitted that CNL was carrying out appropriate Indigenous engagement activities to meet the specifications of REGDOC-3.2.2, *Aboriginal Engagement*.[19]

92. The Commission noted that the Port Hope Community Health Concerns Committee obtained access to gamma survey results of municipal roads and frontages through access to information legislation and enquired about why the results were not easily accessible to members of the public. The CNL representative

[19] CNSC Regulatory Document REGDOC-3.2.2, *Aboriginal Engagement, 2016.*

explained that the municipality was a private property owner and that private information would need to be removed from the requested reports. The CNL representative further stated that while CNL did not share the municipality's private information, CNL would pass along the request to the municipality to release the requested information at its discretion.

93. Further on this topic, the Commission expressed concerns that results of radiological surveys from public roads would not be available to members of the public. CNSC staff provided the Commission with additional information about the requirements of CNL's public information disclosure program and explained that the results that were not required to be submitted to CNSC staff were still available for review during inspections. CNSC staff committed to provide the public with any future elevated radiological readings and to review the information and engage with the municipality, to determine what information could be released. The Commission expressed its satisfaction with the information provided in this regard and expects CNSC staff to facilitate the provision of information on radiation survey results to the public.

ACTION by December 2018

94. Noting the difficulties described in F. More's intervention concerning requests for information, the Commission asked for additional details in this regard. The CNL representative committed to the Commission that the requested information would be provided to the intervenor. The Commission was satisfied with the information provided in this regard.

Small Modular Reactor Update – Development, Deployment and Regulation

95. With reference to CMD 18-M31, CNSC staff presented the Commission with an update on the development, deployment and regulation of small modular reactors (SMR). CNSC staff presented a summary of the recent developments concerning SMR-related activities in Canada as well as CNSC's international engagement in this regard. CNSC staff also gave an overview of SMR technologies, the vendor design review process offered by the CNSC, as well as the CNSC's strategy for regulating future SMRs, should an application be submitted to the CNSC.

Comments from Government and Industry Representatives

96. The Commission asked for industry and government representatives to share their perspective on the CNSC strategy for the implementation and regulation of SMRs in Canada.

97. The Natural Resources Canada (NRCan) representative explained to the Commission that the work of the CNSC to prepare regulatory pathways and regulatory readiness for SMR was part of the federal government strategy that also included the *Canadian SMR Roadmap*.[20] CNSC staff further stated that this roadmap addressed the policy and the strategic framework for Canadian engagement in an emerging SMR market, and the work carried out by Atomic Energy of Canada Limited (AECL) and Canadian Nuclear Laboratories (CNL) to assess and prepare options for consideration for demonstration projects. The NRCan representative added that the approach of the CNSC was held in very high regard internationally.

98. The CANDU Owners Group (COG) representative reported that COG created the SMR Technology Forum with the goal of reviewing the CNSC's regulatory framework and helping vendors in the areas where guidance was needed.

99. The Bruce Power representative noted the opportunity that SMRs provided for the nuclear industry and provided some perspectives on the development of this novel nuclear technology. The Bruce Power representative also stated that, at this point, it was the responsibility of the industry to make an application for the authorization of the construction of SMRs, and that if an application is not made in the next several years, it could represent a missed opportunity. The Bruce Power representative added that, prior to submitting an application, Bruce Power would first need to evaluate if the power production with an SMR would be financially profitable.

100. The New Brunswick Power representative also noted the opportunity that SMRs presented to the nuclear industry and informed the Commission that New Brunswick Power had had discussions with different vendors and that two SMR vendors would establish themselves in New Brunswick with financial assistance from the New Brunswick government. The New Brunswick Power representative added that the two SMR

[20] Natural Resources Canada – *Canadian Small Modular Reactor (SMR) Roadmap*, 2018-05-03, < https://www.nrcan.gc.ca/energy/funding/icg/21084 >.

vendors would establish a way forward in regard to Advanced Reactor Technology at the University of New Brunswick, and that they would be setting up offices in Saint John.

101. The Ontario Power Generation (OPG) representative informed the Commission that OPG was of the view that SMRs would play an important role in filling future energy needs for Canada. The OPG representative also informed the Commission that OPG was participating with other industry partners in a number of industry activities, such as the NRCan *Canadian SMR Roadmap*, to help create a framework for SMR deployment in Canada. The OPG representative added that industry experts formed a Regulatory Readiness Working Group to look at the current regulatory framework within Canada from an industry perspective. The OPG representative further added that the working group's conclusion was that the framework in place today was robust and would allow for risk-informed decision-making and for the successful licensing of SMRs in Canada.

102. The CNL representative reported to the Commission that, in 2017, CNL announced its intent to site a SMR demonstration project at one of the CNL-managed sites by 2026 and that, following an April 2018 invitation for applications, CNL had received four responses so far. The CNL representative added that CNL agreed with CNSC staff's position for the deployment and regulation of SMRs and expressed satisfaction that CNSC staff had made the draft REGDOC-1.1.5 *Licence Application Guide: Small Modular Reactor Facilities*[21] open for public consultation.

103. The Terrestrial Energy representative indicated to the Commission that Phase 1 of the vendor design review (VDR) carried out by CNSC staff showed that the requirements of REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear Power Plants*[22] could be applied to Terrestrial Energy's SMR technology. The Terrestrial Energy representative added that Terrestrial Energy would probably be moving forward to Phase 2 of the VDR by the end of 2018. The Terrestrial Energy representative further added that government financing was critical to the continued development of SMR technology.

[21] Canadian Nuclear Safety Commission Draft Regulatory Document REGDOC-1.1.5, *Licence Application Guide: Small Modular Reactor Facilities*, Draft.
[22] Canadian Nuclear Safety Commission Draft Regulatory Document REGDOC-2.5.2 *Design of Reactor Facilities: Nuclear Power Plants, 2014.*

104. The Atomic Energy of Canada Limited (AECL) representative agreed with the comments that had been made by the other government and industry representatives and added that AECL supported CNL's SMR demonstration project initiative. The AECL representative also noted the positive international role that the CNSC had in the development and regulation of SMR technology.

105. Asked about the possible regulatory hurdles to the deployment of SMRs, the Bruce Power representative explained that the regulations that were currently in place were made specifically for one reactor design and that these regulatory requirements may not line up exactly with the different SMR designs.

106. Asked about the amount of electricity that would be representative of the power produced by a 200 to 300-Megawatt electrical (MWe) SMR, the New Brunswick Power representative responded that a 600-Megawatt reactor such as the one at the Point Lepreau NGS provided about a third of the electricity demands in the province of New Brunswick, for about three-quarters of a million people, and added that it was linearly scalable.

107. Asked by the Commission if the simplicity of SMR design would translate into simplicity for the licensing and regulatory processes, CNSC staff explained that the SMRs still remained to be designed, that there was limited operating experience for those reactors and that licensees would still need to demonstrate and prove their safety case. CNSC staff added that the CNSC intended to challenge the SMR new designs based on the operational experience that was documented in the regulatory documents. CNSC staff emphasized that regulatory decisions in regard to SMRs would be made through in a risk-informed decision-making process in a graduated approach intending to be fair without compromising safety.

108. Asked about a timeline for an operational SMR prototype, the Bruce Power representative indicated that timelines depended on the technology and the price that consumers were ready to pay for power. The Point Lepreau representative indicated that New Brunswick Power was looking at having a commercial demonstration reactor at Point Lepreau in the 2030 timeline.

109. The Commission asked about the VDR process and why Phase 1 and Phase 2 were performed separately for some vendors and at the same time for others. CNSC staff explained that the VDR process depended on the maturity of the design as well as the

maturity of the organization designing the reactor. CNSC staff further explained that vendors with an established design process in place could present their process and the design outcomes at the same time if they desired.

Regulatory Oversight Report for Research Reactors and Class 1B Accelerators: 2016-2017

110. With reference to CMD 18-M32, CNSC staff presented to the Commission the annual Regulatory Oversight Report for Research Reactors and Class IB Accelerators: 2016-2017 (the ROR). This report summarized the performance of research reactors and Class IB accelerator facilities in Canada in all 14 safety and control areas (SCAs) as assessed by the CNSC during the 2016 and 2017 calendar years. This ROR did not include the NRU and ZED-2 research reactors operated by the Canadian Nuclear Laboratories (CNL) at the Chalk River Laboratories (CRL) site. These facilities were assessed as part of the CRL licence renewal hearing of January 23-25, 2018,[23] and will be covered by a future ROR planned for 2019.

ACTION by December 2019

111. The public was invited to comment on the ROR through written interventions; however no written interventions were submitted. Participant funding through the CNSC's PFP was offered to assist Indigenous Groups, members of the public and other stakeholders in reviewing the ROR and submitting comments, in writing, to the Commission. One application for participant funding was received, but it was later withdrawn.

112. The Commission invited the licensees represented in the ROR to provide comments:

- The Royal Military College of Canada (RMCC) representative stated that refueling of the RMCC SLOWPOKE-2 reactor would occur in November 2018 or May 2019, based on Treasury Board approval.

- The TRIUMF representative provided the Commission with a detailed overview regarding improvements made to its safety performance, management systems, environmental protection, international collaboration and public outreach.

The remaining licensees – the University of Alberta (U of A), the Saskatchewan Research Council (SRC), l'École Polytechnique de Montréal (École Polytechnique) and Canadian Light Source

[23] CNSC Record of Decision - Application to Renew the Nuclear Research and Test Establishment Operating Licence for the Chalk River Laboratories- March 2018.

Incorporated (CLSI) – did not provide comments.

SLOWPOKE-2 Reactors

113. Addressing the reasons for decommissioning of the U of A and the upcoming decommissioning of the SRC SLOWPOKE-2 reactors, the U of A representative provided several reasons for the U of A's decision to decommission its reactor and facility, and stated the main factor was the requirement to return the highly-enriched uranium (HEU) fuel to the United States by May 2019.[24] The SRC representative also provided several reasons for SRC's decision to decommission its SLOWPOKE-2 facility, and also stated that the main factor was the deadline for HEU repatriation.

114. The Commission noted that there was no pre-determined design life for SLOWPOKE-2 reactors and enquired about what a practical design life would be. The RMCC representative stated that the practical lifespan was approximately 30 years, depending on the usage of the reactor. CNSC staff concurred that 30 years was a reasonable estimate, however no exact lifespan could be established. CNSC staff stated that design life estimates were described in the Preliminary Decommissioning Plans (PDP) for the research reactor facilities.

115. With the recent and upcoming SLOWPOKE-2 reactor decommissioning activities, the Commission asked about whether any new applications for the construction of research reactors in Canada had been made. CNSC staff informed the Commission that it had not received any applications for new research reactors in Canada.

116. The Commission expressed concern that no inspections had been carried out at the École Polytechnique in 2016 and enquired about the reason for this. CNSC staff provided the Commission with a detailed overview regarding its compliance verification activities with respect to research reactors, and noted that the inspection plan was based on a facility's risk.

117. The Commission enquired about whether the reactor vessel of the École Polytechnique SLOWPOKE-2 was inspected when last refueled. CNSC staff reported that inspections and desktop reviews were performed as per the commissioning process which had to be carried out following the refuelling of the reactor.

[24] Government of Canada, *PM announces a nuclear cooperation project with the United States to further secure inventories of spent highly enriched uranium*, Washington, DC, 12 April 2010.

CNSC staff further informed the Commission regarding the inspection frequency plans for the École Polytechnique SLOWPOKE-2 reactor vessel.

118. Upon request by the Commission, the McMaster representative and the RMCC representative provided information to the Commission regarding the waste management strategies for the non-HEU research reactor fuel for their respective institutions:

- The McMaster representative stated that its lightly enriched uranium (LEU) fuel was disposed of in the US, with the active waste disposed at appropriate facilities

- The RMCC representative stated that its samples were disposed of with hazardous waste, and its LEU was planned to be disposed of in one of CNL's licensed storage facilities

119. Asked if the spent fuel from these aforementioned facilities would be disposed of in the proposed spent fuel repository, CNSC staff responded that the repository for the Adaptive Phased Management (APM) initiative would consider reactor fuel from various kinds of reactor designs. CNSC staff further provided a detailed overview of interim waste management practices and CNSC regulatory requirements regarding waste management.

120. The Commission asked for additional details of the review process for École Polytechnique's financial guarantee. CNSC staff informed the Commission regarding the cost estimates associated with typical financial guarantees, as well as those for enduring entities such as École Polytechnique. CNSC staff stated that École Polytechnique had proposed to undertake some of the decommissioning work in-house which resulted in a lower cost estimate. The École Polytechnique representative provided further details regarding the letter of credit used as the instrument for the financial guarantee and stated that the École Polytechnique planned to decommission its SLOWPOKE-2 reactor in 2040. CNSC staff stated that it had ensured that the appropriate regulatory framework was in place for the decommissioning approach and that the École Polytechnique had provided a letter to CNSC staff assuming the full responsibility of the decommissioning costs. CNSC staff stated that once its assessments showed that the financial guarantee and instruments

were adequate, these would be brought before the Commission for its consideration and acceptance.

121. Asked by the Commission whether the letters of credit used in financial guarantees by licensees were irrevocable, CNSC staff confirmed to the Commission that CNSC Legal Services reviewed the letters of credit for accessibility and efficacy, one factor of which was irrevocability. CNSC staff also stated that it was a requirement of REGDOC-3.1.2, *Reporting Requirements for Non-Power Reactor Class I Facilities and Uranium Mines and Mills*[25] that licensees report on the status of their financial guarantees annually and report to the CNSC in advance if a letter of credit was cancelled.[26] The Commission was satisfied with the information provided in this regard.

122. Upon request for clarification from the Commission, CNSC staff reported that that all SLOWPOKE-2 facilities had operated within their Operating Limits and Conditions as stated in the ROR. CNSC staff added that as the McMaster Reactor was not a SLOWPOKE-2, the Fission Products Monitor incident was not included as part of that reporting.

123. Asked about the risk presented by SLOWPOKE-2 and research reactor facilities, CNSC staff clarified that all SLOWPOKE-2 and research reactors had been consistently assessed at the low end of risk in the baseline compliance program.

Class IB Accelerators

124. The Commission noted the severity of the potential consequences of the CLSI Lockout Tagout (LOTO) event that occurred on October 12, 2016 and asked for additional details of that event. The CLSI representative informed the Commission regarding the lessons learned and the corrective actions implemented due to that event, including revised procedures and improved training. CNSC staff stated that it reviewed and accepted the root cause analysis and corrective actions that were submitted by CLSI regarding this matter.

125. The Commission expressed concern with the number of Lost-Time Injuries (LTI) at the TRIUMF facility and asked for additional details regarding TRIUMF's performance in the conventional health and safety SCA. CNSC staff confirmed that, in future RORs, additional details regarding LTIs, including root causes and corrective actions, would be provided to the Commission. CNSC staff informed the Commission that after

ACTION by August 2020

[25] CNSC REGDOC-3.1.2, *Reporting Requirements for Non-Power Reactor Class I Facilities and Uranium Mines and Mills*, 2018.
[26] The terms of letters of credit usually require the issuing institution to inform the beneficiary (CNSC) if the instrument is cancelled.

the ROR in 2016, it compared the data to WorkSafe BC statistics and found that the LTI rate at TRIUMF was lower than the industry average, and lower than in similar facilities in the US. CNSC staff provided to the Commission a detailed overview of its compliance verification work and collaboration with other government organizations regarding this SCA. CNSC staff added that it did not find systematic problems regarding licensed activities at TRIUMF. The TRIUMF representative added that TRIUMF would strive to continually improve upon its conventional health and safety programs.

126. The Commission noted that TRIUMF had recently regained a "satisfactory" rating for its performance in the waste management SCA and enquired about how TRIUMF would ensure that its performance remained at that level. The TRIUMF representative provided to the Commission a detailed description of its implemented improvements and corrective actions in that regard such as improved waste descriptions and signage at the waste storage location, the addition of secondary containment for waste materials, and a proactive waste management program. The TRIUMF representative further described its updated waste management program and detailed the four streams of waste as well as the disposal of all waste generated at the facility. CNSC staff stated that TRIUMF's corrective actions were effective and would mitigate future concerns.

127. The Commission enquired about the composition of TRIUMF's radiation safety committee. The TRIUMF representative informed the Commission regarding the personnel responsible for the radiation safety committee, as well as the personnel responsible for safety reviews of certain activities. The TRIUMF representative added that the radiation safety committee met quarterly to review doses with management.

128. Regarding CNSC staff's review of the governance structure of TRIUMF's radiation safety committee, CNSC staff noted that currently there was no specific regulatory guidance regarding governance structures for those committees. CNSC staff informed the Commission that licensee governance models were based on the complexity and risk of the licenced activities and that CNSC staff had performed inspections and desktop reviews of licensee RP programs, which ensured that those governance structures were effective. CNSC staff stated that REGDOC-2.7.1, *Radiation Protection*[27] was under development and would include guidance on the management oversight of RP programs.

[27] Draft CNSC REGDOC-2.7.1, *Radiation Protection* (Under Development).

CNSC staff provided its view that TRIUMF had the appropriate personnel as part of its radiation safety committee.

129. The Commission enquired regarding the inspection frequencies for the Class 1B accelerators. CNSC provided information to the Commission regarding the risk ranking, as well as the inspection processes, frequencies and durations for the Class IB accelerator facilities.

General Comments

130. Addressing the environmental performance of the SLOWPOKE-2 reactors and the TRIUMF facility, CNSC staff reported that the environmental performance of those facilities was assessed to be satisfactory and that CNSC staff had verified the findings of the environmental risk assessments (ERA) on an annual basis for the relevant facilities.

131. The Commission expressed the view that the implementation deadline for recently published REGDOCs should have been included in CNSC staff's submissions. CNSC staff stated that it would revise this table in the ROR to include the implementation dates, and continue that practice in future RORs. CNSC staff further provided a detailed description of the processes that licensees would follow for the implementation of those recently published REGDOCs, as well as of CNSC staff's review of the licensees' implementation plans.

ACTION by August 2020

132. The Commission acknowledged that no written interventions were submitted regarding the facilities considered in this ROR, CNSC staff stated that public participation at Commission proceedings was of great importance to CNSC staff. CNSC staff informed the Commission that for these low-risk facilities, it would consider public interest, and the results from its public outreach activities, when determining the appropriate frequency for the presentation of this ROR at public Commission meetings. CNSC staff noted, however that the public had other avenues to remain informed about the facilities in question and provided information in this regard. CNSC staff further informed the Commission that public interest in certain topics may vary over time, and stated that CNSC staff would seek to maintain a strong awareness of the public's interests and concerns when developing reporting approaches for the facilities considered in this ROR.

133. CNSC staff also provided the Commission with information

regarding its outreach activities with several Indigenous groups and stated that there was some interest regarding the licenced activities and facilities considered in the ROR. CNSC staff added that, although participant funding was offered with respect to this ROR, the availability of participant funding for RORs was also a fairly recent initiative, therefore it would take additional time for Indigenous groups and members of the public to gain a better understanding of the PFP and what it offered.

Overview of the 6th Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

134. With reference to CMD 18-M42, CNSC staff presented the Commission with a report on the 6th Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention). The 6th Review Meeting was held at the IAEA Headquarters in Vienna, Austria, from 21 May to 1 June 2018. Sixty-nine Contracting Parties participated in the Review Meeting, and more than 850 delegates registered and took part by presenting, discussing and reviewing National Reports, which address measures taken by Contracting Parties to implement their obligations under the Joint Convention. The report provided information about the international agreement governing all aspects of spent fuel and radioactive waste management, the level of participation in the 6th Review Meeting, as well as the outcomes and conclusions from this meeting. CNSC staff explained that the Canadian delegation was composed of members of CNSC staff, as well as representatives from other government departments and members of industry.

135. CNSC staff explained that the Joint Convention did not apply to military applications, but that generally military entities had their own plans for the management of waste. In this regard, CNSC staff offered as an example that, in Canada, the Canadian Forces and Department of National Defence (DND) were excluded from the operation of the NSCA under section 5 of the NSCA, but had their own structure in place for nuclear waste management, which as a condition of the exclusion under the NSCA must be similar to the CNSC's regulatory requirements.

136. The Commission invited CNSC staff, industry and other government stakeholders to address how Canada and the health of the Canadian nuclear industry compared to other signatories to the Joint Convention. CNSC staff stated that Canada compared

favourably on the world stage in this area, owing largely to the presence of a strong independent regulator, and that other countries regularly consulted the Canadian delegation regarding the CNSC's regulatory processes. The Atomic Energy of Canada Limited (AECL) representative added that, based on AECL's experience, Canada was highly regarded, particularly in the areas of transparency and public participation in regulatory processes. The Nuclear Waste Management Organization (NWMO) representative stated that, in terms of planning for the long-term management of used nuclear fuel, Canada was at a comparable phase of development to peer countries.

137. The Commission also asked for comments on the areas where the Canadian nuclear industry and regulator's performances were weaker in the context of the Joint Convention and as compared to other countries. The AECL representative agreed that the challenges for Canada included those that had been identified in CNSC staff's presentation, namely, finding an acceptable site in a willing host community for a used fuel repository, developing an integrated strategy for non-OPG low- and intermediate-level waste disposal, and the continuing accelerated decommissioning and remediation of CNL sites. CNSC staff stated that the largest challenge going forward would likely be political acceptance and social acceptability of nuclear waste disposal strategies and that this would likely be a significant challenge in other countries as well. Both CNSC staff and the AECL representative also agreed that continued openness and transparency about nuclear waste disposal in Canada would remain an important focus for both the CNSC and the nuclear industry in the future.

138. The Commission requested clarification as to why the second identified challenge in Canada's report specified an integrated strategy for non-OPG low-and intermediate-level waste disposal, rather than all low- and intermediate-level waste. CNSC staff informed the Commission that this was due to the ongoing project to construct a Deep Geological Repository (DGR) for OPG's low- and intermediate-level waste on the Bruce NGS site. CNSC staff noted that, although there were some ongoing challenges regarding this project, a path forward had been identified for this waste, which was why it had not been included in the identified challenge.

139. The Commission invited CNSC staff and industry to address the third challenge identified in Canada's report, which was to continue accelerated decommissioning and remediation of CNL sites. The AECL representative reported that the third challenge

had originated at the 5th Review Meeting of the Joint Convention, at which time the government-owned contractor-operated (GoCo) model was being implemented, and that one of the objectives of the GoCo model was to accelerate the decommissioning of legacy liabilities and historic waste for which AECL was responsible. The AECL representative further explained that, while there was recognition that much decommissioning work was underway at the Whiteshell Laboratories and Chalk River Laboratories sites, significant work remained, and that this challenge remained open in recognition of this.

140. The Commission noted that the remaining challenges identified in Canada's report all appeared long-term and enquired as to whether there was an identified timeline to address them. CNSC staff explained that there was not a specific timeline associated with closing the challenges identified for Canada as part of the Joint Convention, but that certain challenges had timelines that had been set through other processes. For instance, CNSC staff made reference to the timeline identified by the NWMO to identify a willing host community for a repository for used nuclear fuel. CNSC staff also clarified that Canada would continue to report on its challenges through its reports submitted every three years under the Joint Convention, and that the decision on whether or not a challenge could be closed would be made by the Country Group that Canada was part of at review meetings.

141. The Commission asked for additional information about the accountability mechanisms under the Joint Convention. CNSC staff reported that the Joint Convention was an incentive convention and explained the mechanisms that were employed in order to ensure that signatories to the Joint Convention remained in compliance with the convention, noting that Contracting Parties (CPs) held other CPs accountable during the triennial review meetings. CNSC staff further stated that, since the Joint Convention was an incentive convention, the convention did not include any sanction mechanism for non-compliance.

142. The Commission asked for comment on how Canada compared to other countries in its handling of legacy waste issues and whether there were lessons to be learned in this area. CNSC staff stated that Canada was frequently cited as a positive example in the cleanup of legacy waste, making reference to examples such as Port Hope and Port Granby sites. CNSC staff noted that several other countries that had legacy waste sites were not taking action to remediate those sites. CNSC staff also clarified that Canada

was unusual compared to some of its peers in that Canada regulated uranium mining as a nuclear activity, which was not a common practice internationally. CNSC staff stated that Canada had made significant progress in the remediation of former uranium mines and that certain other countries with a history of uranium mining viewed Canada as a leader in this regard. CNSC staff also identified the use of financial guarantees in Canada as a good practice that not all CPs were implementing with the same rigour. The Natural Resources Canada (NRCan) representative added that Canada had been successful at finding a mechanism to fund the clean-up of historic wastes where the original owner was either unable to fund or for which it could no longer be held responsible.

143. The Commission asked for details about how the Joint Convention review meeting process handled the mix of countries in each Country Group, which included a mix of developing and developed countries, and countries with large and small nuclear programs. CNSC staff explained that this mix could be beneficial, as countries could share expertise and best practices. CNSC staff also stated that countries were not limited to participating within their own Country Group and provided details about the comments given and received by the Canadian delegation to and from countries in other Country Groups during the 6th Review Meeting.

144. The Commission asked about the benefits for Canada that were obtained by being a signatory to the Joint Convention. CNSC staff stated that Canada benefitted from being a CP to the Joint Convention through identifying challenges for and ensuring the accountability of other countries with nuclear programs and in decreasing the global radiological risk associated with nuclear waste. CNSC staff added that this was of particular interest for Canada as the largest exporter of radioactive sources in the world and helped ensure that a Canadian nuclear substance that was exported internationally would not be mishandled.

145. Making reference to the recent success in terms of public acceptance of a deep geological repository in Finland, the Commission asked whether there were lessons to be learned for Canada. The NRCan representative provided details about a recent trip taken by senior NRCan and NWMO representatives to Finland to learn about Finland’s recent progress in this area, noting that significant public trust in the regulator appeared to be a significant factor.

146. The Commission commended CSNC staff and the other members of the Canadian delegation on a successful meeting and thanked them for the presentation, and expressed support for the CNSC's international activities.

Closure of the Public Meeting

147. The meeting closed at 12:59 p.m.

Charles Moreau — Recording Secretary — 10 octobre 2018 — Date

Recording Secretary — 11 October 2018 — Date

Recording Secretary — 11 octobre 2018 — Date

Recording Secretary — October 11, 2018 — Date

Secretary — 11-10-2018 — Date

APPENDIX A

CMD	Date	e-Docs No.
18-M34	2018-07-26	5594273
Notice of Commission Meeting		
18-M35	2018-08-09	5590181
Agenda of the Meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, August 22 and 23, 2018, in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
18-M35.A	2018-08-16	5610351
Updated Agenda of the Meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, August 22 and 23, 2018 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
18-M36	2018-08-10	5608879
Draft Minutes of the Meeting of the Canadian Nuclear Safety Commission held on June 25, 2018		
18-M41	2018-08-14	5611060
Status Report Status Report on Power Reactors and update on the internal contamination event at the Darlington NGS refurbishment Retube Waste Processing Building (presented at the March 2018 Commission meeting under CMD 18-M14) Submission from CNSC Staff		
18-M41.1	2018-08-15	5612001
Status Report Status Report on Power Reactors and update on the internal contamination event at the Darlington NGS refurbishment Retube Waste Processing Building (presented at the March 2018 Commission meeting under CMD 18-M14) Presentation from Ontario Power Generation		
18-M44	2018-08-09	5608857
Event Initial Reports Ontario Power Generation – Pickering Nuclear Generating Station: Unplanned outage due to algae run Submission from CNSC Staff		
18-M45.A	2018-08-13	5610346
Event Initial Reports Ontario Power Generation – Pickering Nuclear Generation Station Unit 4: Unplanned outage due to condenser cooling backpressure Submission from CNSC Staff		

CMD	Date	e-Docs No.
18-M43	2018-07-09	5594881
Event Initial Reports Air Canada – Report on an overexposure to a member of the public during transport of package containing nuclear substances Submission from CNSC Staff		
18-M30.1	2018-08-15	5612005
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Presentation from the Canadian Nuclear Laboratories		
18-M30	2018-06-22	5554206
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from CNSC Staff		
18-M30.A	2018-08-22	5611996
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Presentation from CNSC Staff		
18-M30.2	2018-07-23	5595685
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from the Concerned Citizens of Renfrew County and Area		
18-M30.3	2018-07-20	5595805
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from Dan Rudka		
18-M30.4	2018-07-23	5595821
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from Northwatch		

CMD	Date	e-Docs No.
18-M30.5	2018-07-23	5596694
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from the Port Hope Community Health Concerns Committee		
18-M30.6	2018-07-23	5596713
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from Faye More		
18-M30.7	2018-08-15	5611900
Information Items Canadian Nuclear Laboratories (CNL) – Progress Update for CNL's Prototype Waste Facilities, Whiteshell Laboratories and the Port Hope Area Initiative Submission from Philippe Giroul		
18-M31	2018-08-22	5605405
Information Items Update on the Development, Deployment and Regulation of Small Modular Reactors Presentation from CNSC Staff		
18-M46	2018-08-15	5612354
Even Initial Report McMaster University: Personal Contamination Incident Submission from CNSC Staff		
18-M32	2018-05-18	5536665
Information Items Regulatory Oversight Report for Research Reactors and Class IB Accelerators: 2016-2017		
18-M32.A	2018-08-23	5610129
Information Items Regulatory Oversight Report for Research Reactors and Class IB Accelerators: 2016-2017		
18-M42	2018-08-23	5611329
Information Items Overview of the 6th Review Meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management Presentation from CNSC Staff		