Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting Held on December 12-13, 2018

Minutes of the Canadian Nuclear Safety Commission (CNSC) meeting held Wednesday, December 12 and Thursday, December 13, 2018, beginning at 1:01 p.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

M. Leblanc, Secretary
L. Thiele, Senior General Counsel
D. Saumure, Senior Counsel
M. Hornof, P. McNelles and C. Moreau, Recording Secretaries

CNSC staff advisors were: R. Jammal, H. Tadros, C. Moses, S. Faille, N. Riendeau, H. Robertson, C. Carrier, K. Glenn, P. Fundarek, L. Sigouin, K. Sauvé, C. Ducros, J. Schmidt, A. Viktorov, A. McAllister, C. Cianci, W. Stewart, D. Pandolfi, J. Truong, A. Levine, K. Lange, R. Goulet, M. Langdon, R. Snider, M. McKee, P. Lahaie, G. Giobbe, J. McManus, M. Broeders, D. Whitby, A. Licea, D. Hipson, B. Thériault, C. Morin, D. Miller, R. Rashapov, M. Jones, M. Young, J. Amalraj, N. Ringuette and D. Estan

Other contributors were:

- Cameco Corporation: L. Mooney, K. Nagy, J. Switzer and T. Smith
- Orano (Canada) Inc.: D. Huffman
- Rio Algom Limited: A. Lambert
- Denison Mines: J. Lowe
- Saskatchewan Research Council: I. Wilson
- Bruce Power: M. Burton
- Ontario Power Generation: R. Manley, I. Edwards, Z. Khansaheb, M. Knutson and J. Lehman
- BWXT Nuclear Energy Canada Inc.: J. MacQuarrie, T. Richardson, D. Snopek and S. Forsey
- SRB Technologies (Canada) Inc: S. Levesque and J. MacDonald
- Nordion (Canada) Inc.: K. Brooks and R. Wassenaar
- Best Theratronics Limited: M. Soleimani
- Isologic Innovative Radiopharmaceuticals Ltd.: A. Gagnon and V. Phelan
- Saskatchewan Ministry of Environment: T. Moulding
- Ministry of Environment and Climate Change Canada: N. Ali and D. Kim
- Indigenous and Northern Affairs Canada: R. Breadmore
- Ministry of Energy, Northern Development and Mines (Ontario): E. Cobb
- Saskatchewan Health Authority: J. Irvine

- Ontario Ministry of Environment, Conservation and Parks : K. Faaren, D. Bradley, K. Andreoli and C. Castro
- Saskatchewan Ministry of Environment: T. Moulding
- Municipality of Clarington: F. Langmaid
- Municipality of Port Hope: S. Bernardi

Constitution

1. With the notice of meeting CMD 18-M56 having been properly given and all permanent Commission members being present, the meeting was declared to be properly constituted.

2. Since the Commission meeting held November 8, 2018, Commission member documents (CMD) 18-M47, 18-M48, 18-M55, and 18-M62 to 18-M68 were distributed to members. These documents are further detailed in Annex A of these minutes.

Adoption of the Agenda

3. The revised agenda, CMD 18-M60.B, was adopted as presented.

Chair and Secretary

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

Minutes of the CNSC Meeting Held October 3 and 4, 2018

5. The Commission noted that a change was proposed for paragraph 82 of the minutes of the October 3 and 4, 2018 Commission meeting, in order to better reflect the contribution of the Nuclear Regulatory Group (NUREG) representative's response to the Commission on the CNSC's Open Door Policy, as part of the discussion regarding the CNSC's Regulatory Oversight Safety Culture. With that amendment, the Commission members approved the minutes as presented in CMD 18-M61.

Minutes of the CNSC Meeting Held November 8, 2018

6. The minutes of the November 8, 2018 Commission meeting will be submitted for approval secretarially in January 2019. These minutes will be made available to the public before the February 2019 Commission meeting.

UPDATES ON ITEMS FROM PREVIOUS COMMISSION MEETINGS

Commission Enquiry Regarding Residual Heat of Hydro-Québec Used Fuel Bundles

7. During the November 2018 Commission Meeting, the Commission enquired about the residual heat from the Hydro-Québec's used fuel bundles.[1] CNSC staff provided the Commission with the necessary information in CMD 18-M67. The Commission was satisfied with the information provided in this regard. This matter is closed.

Follow-up to the Heavy Water Spill at the Point Lepreau NGS

8. During the November 2018 Commission Meeting, the Commission asked for additional information regarding the heavy water spill at the Point Lepreau NGS, which occurred on November 5, 2018.[2] The Commission was supplied with the requested information in CMD 18-M68 and was satisfied with the information provided on this matter. This matter is closed.

STATUS REPORTS

Status Report on Power Reactors

9. With reference to CMD 18-M63, which provides the Status Report on Power Reactors (Status Report), CNSC staff provided the following updates:

    - Bruce NGS Unit 3 started a two-month planned outage on December 9, 2018, in order to implement corrective actions regarding the primary heat transport pump seals. The return to service for the unit was planned for February 2019 and this was the final unit to undergo such corrective actions.
    - A correction was made to the update for Bruce NGS Unit 4, to state that the governor valve closed fully, as opposed to slightly, when the unit was de-rated.
    - CNSC staff was following up with OPG's investigation into the radioactive particulates detected in Personal Air Samplers at Darlington NGS Unit 2 which was undergoing feeder

[1] *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on November 8, 2018,* paragraph 73.
[2] *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on November 8, 2018,* paragraph 13.

replacement. OPG had implemented several corrective actions, including the mandate for all work to be performed in plastic suits. CNSC site inspectors confirmed that work was conducted in plastic suits, that CNSC staff was monitoring air survey results, and that CNSC staff had met with OPG to discuss OPG's investigation and plans for detailed dose assessments. CNSC staff will issue a formal request pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations*[3] (GNSCR) for OPG to perform *in-vitro* bioassays to ascertain worker doses.

- Pickering NGS Unit 4 was de-rated to 92% of Full Power (FP) due to fuelling machine unavailability.
- Pickering NGS Units 6 and 7 were operating at 100% FP.

10. The Commission requested additional details regarding the malfunction of the inverter at Darlington NGS Unit 3. The OPG representative reported that this occurrence was discovered during a walk-down of the equipment and that the circuit board had failed, which prevented the alarm from actuating as per its design. Addressing the corrective actions that were performed, the OPG representative informed the Commission that the circuit board was repaired and that it was tested to ensure that it functioned correctly, before the unit was returned to 100% FP. The OPG representative added that these inverters would be replaced as part of the Bruce NGS aging management program, and that the operational walk-downs were regularly performed to ensure that all equipment was functioning properly.

11. The Commission requested information regarding OPG's response to the loss of Class II power at the Darlington NGS Unit 3 during that event. The OPG representative informed the Commission that one of the two divisions of Class II power system was lost, causing a setback of the unit to approximately 94% FP. Asked by the Commission if there were additional effects due to this loss of Class II power, the OPG representative provided the Commission with an overview of its post-transient review meeting, which had determined that the remaining systems had operated as per their design, and that the workers reacted appropriately to this occurrence.

[3] SOR/2000-202

Alpha Particles in Personal Air Samplers at Darlington NGS Unit 2

12. The Commission enquired if OPG had anticipated the alpha hazards in respect of the Darlington Unit 2 refurbishment feeder replacement project. The OPG representative provided a detailed overview of the refurbishment work being carried out and stated that OPG had anticipated radiological hazards, including alpha hazards. The OPG representative also provided information about the mitigation measures that had been implemented for this project including pre-job training, radiological exposure permits, dosimetry, fit-tested personal protective equipment, as well as alpha particle contamination monitoring, detection and alarms. The OPG representative informed the Commission that the estimated potential doses to the affected workers were lower than regulatory limits, action levels, the internal OPG administrative level, and the dose recording level.

13. Noting that OPG had anticipated an alpha hazard in relation to the feeder replacement project, the Commission asked why OPG had changed protective equipment from personal respirators to plastic suits part way through the project. The OPG representative stated that plastic suits were implemented as a conservative measure after alpha contamination was detected in the workers' personal air samplers. The OPG representative reported that the use of the plastic suits was not initially used in this project because overuse of such protective equipment could slightly increase hazards including tripping hazards and gamma dose hazards, because they were more encumbering and could slow down workers. The OPG representative added that after OPG had further assessed this event, OPG may return to the use of personal respirators, should they be shown to be the most effective protection measure for the work being carried out, noting that specific protective equipment did not represent a one-size-fits-all solution.

14. The Commission requested additional information regarding the use of personal respirators and the plastic suit as protective equipment in regard to alpha hazards. The OPG representative informed the Commission that plastic suits were primarily used to protect workers from tritium oxide, that they provided a strong barrier against airborne particulate alpha, beta and gamma emitters, and that they provided a higher protection factor than a negative pressure respirator. The OPG representative also provided an overview of the functionality of the respirator, including that it was intended to protect against particulates in aerosols. The OPG representative informed the Commission that the choice of protective equipment was based on the hazard assessment of the work area, and that the plastic suit would be used in work areas

with higher airborne particulate hazards.

15. The Commission requested information about how OPG had assessed the doses of the potentially-affected workers. The OPG representative provided details on beta and gamma dosimetry and explained OPG's alpha dosimetry calculation process, noting that dosimetry for alpha particle uptakes was more difficult than for beta and gamma exposure. The OPG representative stated that isotopic analysis and fecal analysis could be performed to further refine the worker dose, but OPG was of the view that those analyses were unnecessary, as the calculated dose was already conservative and below the dose recording level.

16. The Commission noted that OPG's dose calculation more appropriately constituted dose modelling and requested information about CNSC staff's decision to issue a 12(2) request for an *in-vitro* bioassay of the potentially affected workers. CNSC staff stated that OPG's performance in respect of the characterization of alpha hazards during the refurbishment project had not been satisfactory. CNSC staff acknowledged the science behind OPG's dose calculation methodology, as well as the difficulties that workers could encounter with respect to fecal sampling; however CNSC staff stated that OPG's dosimetry modelling should be proven via bioassay. CNSC staff further stated that its previous concerns over alpha events, the amount of time that had passed before the event was detected by OPG, OPG's decision not to perform a dosimetric analysis, as well as CNSC staff's position that OPG should use the most accurate method to confirm the potential doses, all contributed to the issuance of the 12(2) request.

17. The Commission noted that the exact worker doses resulting from this exposure event were not known and requested details in this regard. CNSC staff reported that, as part of the 12(2) request, a swipe test would be performed in order to identify the nuclear substance and to ascertain the potential level of contamination in the work area, as per OPG's radiation protection program procedures. CNSC staff informed the Commission that OPG was in the process of providing swipe results to the CNSC, that it had received swipe results from some components of the heat transport system. CNSC staff added that it was also reviewing the swipe data collected during the relevant time period.

18. The Commission requested clarification from CNSC staff on its request for the *in-vitro* bioassay for the affected workers. CNSC staff stated that the bioassay would be done primarily to get confirmation of the potential worker doses. Asked by the

Commission if the *in-vitro* bioassay could detect doses at the levels of OPG's calculated doses based on the personal air sampler, CNSC staff responded that the detectable levels would depend on the calculated dose level based on the International Commission on Radiological Protection (ICRP) biokinetic model,[4] the radioisotope that was absorbed by the worker, and the time that had passed since the exposure. CNSC staff stated that the worker who received the lowest calculated dose of 0.003 mSV would be below the detectable limit for the fecal bioassay. However the worker who received the highest calculated dose of 0.04 mSv could have absorbed radioisotopes, such as plutonium-239, that were above the detection limit for approximately 90 days above intake. The Commission suggested that, based on the results of the *in-vitro* bioassays, OPG may consider a review of its dosimetry program.

19. The Commission asked if the workers who were affected by this event had expressed any concerns regarding the potential doses received. The OPG representative reported that all of the affected workers were interviewed, informed that they had received a dose that was below the recording level, briefed on OPG's preliminary dose assessment, and were offered the option for the *in-vitro* (fecal) bioassay. The OPG representative further stated that all of the affected workers had declined the bioassay but, if a worker changed their mind in this regard, OPG would have it performed. Asked by the Commission if CNSC staff had interviewed the affected workers, CNSC staff responded that it did not have the information regarding whether CNSC site inspectors had interviewed those workers; however, it would verify that OPG had provided the workers with the opportunity for the bioassay, and that the workers had the ability to independently determine if they wanted the bioassay performed. In any event, CNSC staff would not force the bioassay for the workers. The Commission directed OPG to make it clear to the workers why the CNSC had requested the samples for the *in-vitro* bioassay.

20. The Commission enquired if OPG had decontaminated the headers to reduce the source of the contamination. The OPG representative informed the Commission that the headers had not been decontaminated, as that would expose workers to a significant radiation dose which would be higher than the dose that would be prevented from decontaminating the headers, noting that this was not in line with the ALARA principle.

[4] International Commission on Radiological Protection – *Dose Coefficients for Intakes of Radionuclides by Workers* Publication 68, Vol.24 No. 4, Pergamon Press, 1995.

21. The Commission noted the previous alpha exposure events that had occurred during the Darlington refurbishment project where alpha contamination was detected after the exposure of workers and enquired about OPG's hazard assessment of these work areas. The OPG representative provided the Commission with an overview of the welding work that was performed on the feeder pipes, which may have stirred up the contamination, noting that this was identified as a localized low-level release. The OPG representative informed the Commission that although the personal air sampler showed localized alpha contamination, this did not necessarily mean that the workers had received a dose, noting that OPG was satisfied during this event that it was able to detect a dose in the air sampler that was below the dose recording level.

22. Further on the potential contamination related to feeder pipe welding work, the Commission enquired whether this release of radionuclides was a function of the welding process. The OPG representative informed the Commission that OPG had significantly strengthened its alpha particle controls in recent years. The OPG representative provided the Commission with information regarding the surveys and sampling performed by OPG in the work area, which showed no radioactive contamination, therefore OPG had concluded that this work could have been safely performed at the Darlington NGS with the personal respirators. The OPG representative added that OPG believed that the removal of the feeder header was the cause of the positive alpha result.

23. The Commission directed CNSC staff to provide an update on this event, as well as the previous Darlington NGS retube waste processing building alpha contamination event during the February 2019 Commission meeting.

ACTION by February 2019

Update on the Potassium Iodide Pill Working Group

24. CNSC staff provided an oral update on the formation of the Potassium Iodide Pill Working Group (KI Working Group), which was a commitment that was made by CNSC staff during the June 2018 hearing for the licence renewal for the Pickering NGS. The commitment from CNSC staff to form the KI Working Group was later reflected in the *Record of Decision* for that hearing[5].

    - The Terms of Reference (ToR) had been drafted, and would be translated and posted on the public CNSC website in December

[5] CNSC Record of Decision – Ontario Power Generation Inc., *Application to Renew the Nuclear Power Reactor Operating Licence for the Pickering Nuclear Generating Station*, published December 2018.

2018 for a 30-day public review and comment period
- CNSC staff coordinated with other KI Working Group members including the Office of the Fire Marshal and Emergency Management, the Ontario Ministry of Health and Long-Term Care, and OPG, and would finalize and post the ToR following the public consultation
- CNSC staff was drafting the operating procedures for the CNSC Advisory Committee and was confirming the membership of that committee
- CNSC staff committed to carrying out a workshop with stakeholders on this matter, to ensure clarity and transparency

25. CNSC staff explained that the KI Working Group would establish a work plan as part of the ToR, which would include the dates for the deliverables. CNSC staff also stated that it would present the final version of the ToR to the Commission prior to the end of the fiscal year.

Event Initial Reports (EIR)

Transformer Fire and Mineral Oil Leak at Unit 8 of Bruce B Nuclear Generating Station

26. With reference to CMD 18-M62, CNSC staff presented information regarding an event involving a transformer fire and mineral oil leak at Bruce NGS Unit 8. The fire occurred at the Unit 8 station service transformer on December 6, 2018, while the unit was in a safe shutdown state during a maintenance outage. Bruce Power had set up a containment boundary in order to protect the environment from the mineral oil leak. The transformer fire was fully extinguished on December 9. There was no impact on the Unit 8 nuclear systems, no radiological releases due to the fire, and there was no impact on the public as a result of this event. The Ontario Ministry of the Environment, Conservation and Parks (OMECP) inspected the site on December 7 and informed the CNSC that it was satisfied with Bruce Power's containment actions.

27. With reference to CMD 18-M62.1, Bruce Power presented additional details regarding this event, as well as the response of the Bruce NGS emergency response team (ERT) and the activation of its Emergency Management Centre to support that response. Bruce Power provided information about its ongoing clean-up and corrective actions noting that, at the time of this presentation, most of the spilled mineral oil had been collected, the Bruce B demineralized water plant was fully restored, and a root cause

investigation into this event, as well as an extent-of-condition review of all site transformers, were underway.

28. The Commission requested additional information regarding Bruce Power's oil containment system (SorbWeb system). The Bruce Power representative provided an explanation of the design and functionality of the SorbWeb system, and stated that as the mineral oil had congealed at the bottom of the system following the spill, water could no longer permeate through it, preventing contamination. The Bruce Power representative stated that Bruce Power had continued to pump out the SorbWeb system to ensure sufficient capacity, until the system could be replaced. Addressing the disposal of the oil mixture, the Bruce Power representative reported that it would be collected by a contractor, moved to a treatment facility for oil-water separation, and then the oil would be disposed of in an approved facility.

29. The Commission requested confirmation that there was no contamination or adverse environmental effects to Lake Huron due to the oil spill. The Bruce Power representative stated that drone overflights, boat exercises, shoreline walk-downs and sampling were performed, with no oil contamination in the lake detected. CNSC staff responded that it had focused its regulatory oversight on ensuring that Bruce Power had implemented appropriate containment systems in place. CNSC staff added that Bruce Power's approach was meeting regulatory expectations and that CNSC staff would continue its oversight of the containment measures that were put in place until the SorbWeb system could be replaced.

30. The Commission noted that the affected transformer was not operating at full load at the time of the event and enquired about the class of power supplied by that transformer. The Bruce Power representative responded that this transformer supplied Class IV power to the station and that many of the large loads were offline at the time of the fire since Unit 8 was in a guaranteed shutdown state.

31. The Commission enquired regarding Bruce Power's root cause analysis into this event. The Bruce Power representative stated that Bruce Power had not completed its assessment of this event and that work in this regard was ongoing but noted that, in the case of transformer fires, the evidence regarding the exact cause may have been destroyed in the fire.

32. The Bruce Power representative advised the Commission that the main lesson learned was that a safe state for the transformer should

be established to allow the firefighters to extinguish the coils in the internal components of the transformer, noting that in this event, those components smouldered for several days. The Bruce Power representative added that Bruce Power would review its maintenance and monitoring of the transformers, to prevent a reoccurrence of this event.

33. The Commission asked if Bruce Power had experience with a previous instance of a transformer fire. The Bruce Power representative stated that the main output transfer (MOT) for Unit 6 failed and caught fire in 2004. However, at that time the SorbWeb system was not in place, therefore there would have been an impact on the environment.

34. The Commission requested additional details regarding the design and operation of the transformers at the Bruce site. The Bruce Power representative stated that there were 40 large transformers at the site, and stated that these transformers were near their end of life and would all be replaced in the next ten years as part of Bruce Power's asset management program. The Bruce Power representative also stated that interconnections between units allowed units on the site to power one another.

35. The Commission noted the scorching of the powerhouse wall, and enquired if the wall was damaged. The Bruce Power representative reported that an engineering assessment had determined that there was no structural damage to the building. The Bruce Power representative added that this assessment would determine if the siding clamps needed to be replaced, to ensure that they did not become a projectile during high wind events, as discussed in the probabilistic risk assessment for the Bruce Power site.

Isologic Innovative Radiopharmaceuticals: Exceedance of the Regulatory Dose Limit for Extremities by a Nuclear Energy Worker

36. With reference to CMD 18-M65, CNSC staff presented information regarding an event involving an exceedance of a regulatory dose limit for extremities by a nuclear energy worker (NEW) at an Isologic Innovative Radiopharmaceuticals Limited (Isologic) facility in Burlington, Ontario. CNSC staff reported that, on November 9, 2018, Isologic notified CNSC staff that a NEW had exceeded the equivalent dose limit to the skin of the hand. CNSC staff informed the Commission that the NEW had found contamination on his gloves and sleeve covers and, after removing these, left the Isologic facility without re-monitoring himself or informing the Isologic radiation safety officer (RSO). Upon return

to work the following day and following contamination monitoring, the worker found that he had iodine-131 (I-131) contamination on his hand and, at this point, informed the Isologic RSO who initiated appropriate response actions. CNSC staff added that, to date, no health effects had been noted and no physical effects of the exposure, evaluated at a 1.7 Sv total equivalent dose to the skin of the hand and approximately 0.6 mSv for the thyroid dose, were expected. CNSC staff further added that Isologic had discontinued the processing of therapeutic iodine doses at the Burlington facility while a review of the potential causes of the event was underway.

37. Further on this subject, CNSC staff informed the Commission that Isologic had identified several deficiencies after this event and noted that the deficiencies were similar to those identified through a CNSC staff inspection performed in 2017. CNSC staff added that, while Isologic had made progress since the 2017 inspection, CNSC staff remained concerned about the effectiveness of Isologic's radiation safety program, with respect to its worker training programs, operating procedures and management oversight of work practices.

38. CNSC staff also informed the Commission that on December 11, 2018, Isoligic notified CNSC staff that an elevated level of short-lived I-131 was detected on Isologic's stack monitoring filters. CNSC staff added that although it was not clear at this time whether this was related to the personal contamination event, Isologic decided to cease all operations involving iodine processing during the investigation.

39. Noting the employee went home with I-131 contamination on his hands, the Commission enquired about the possibility of contamination in the employee's home. The Isologic representative indicated that there were delays in the testing of the employee's home and vehicle and that, by the time Isologic tested the NEW's vehicle one week after the contamination event, no traces of I-131 could be found. The Isologic representative acknowledged, however, that the negative swipe tests may have been due to the delays in the testing for cross-contamination.

40. Asked by the Commission for details about thyroid monitoring for the contaminated employee, the Isologic representative stated that the contaminated employee's highest intake was 6.2 kBq and that daily monitoring after the employee was removed from work in the lab was showing the typical decrease from the residual thyroid iodine.

41. Asked by the Commission if Isologic had a documented procedure in regard to contamination monitoring and dosimeter return at the end of the day, the Isologic representative explained that its procedures required every employee exiting the restricted area to return their dosimeters at the end of the day and to initial that they had monitored themselves before going home. The Isologic representative added that the other NEWs present at the time of the contamination event were also monitored and did not show any thyroid uptake. The Isologic representative further added that an alarm detector would be installed to detect future contamination on people leaving the restricted area and that additional monitoring procedures had been implemented at the facility.

42. The Commission expressed its concern regarding the possibility of an employee leaving a nuclear facility while being contaminated or without adequate monitoring, and requested additional details about how this could have happened. The Isologic representative presented to the Commission that there was a procedure in place describing what to do when a monitor alarm went off but that the newly-trained employee, who was alone at the time of this event, did not follow it. The Isologic representative acknowledged that, had there been a senior person supervising the employee, the employee could have relied on that individual to ensure that all procedures were implemented appropriately. Addressing this issue, CNSC staff indicated that the focus of its investigation following this event was on the lack of procedural adherence, weaknesses in the training programs and weaknesses in management oversight at Isologic, in order to ensure that Isologic implemented corrective actions to address issues symptomatic of broader program management issues.

43. Further on this topic, CNSC staff reported that, after interviewing the employee, CNSC staff noted that the employee was not sure why he was not monitored, that he believed the contamination was on his sleeve and by removing the sleeve he thought he had dealt with the issue. CNSC staff added that its investigation confirmed that no senior staff members were present at the time of the event.

44. The Commission requested additional information about the calculation of the dose to the skin of the left thumb and of the thyroid dose. CNSC staff informed the Commission that the calculations were performed by the licensee and then validated by CNSC staff from the Radiation Protection Division. CNSC staff explained that the skin dose was calculated using Varskin software created by the US Nuclear Regulatory Commission (USNRC) requiring the input of the appropriate skin thickness and that the

thickness was based on ICRP-89.[6] The Isologic representative explained that the dose for the thyroid was based on a measurement done externally with a sodium iodide detector and the result converted to an internal dose by using conversion factors of Sieverts per Becquerel.

45. Further on the dose calculation, the Commission asked how the time between the contamination and the measurement was accounted for, and if any contamination would be washed off during that time period. The Isologic representative stated that the worst case scenario was used for the calculation where the individual would have been contaminated for the last 48 hours and no contamination washed off.

46. Addressing the reason for the 3-day delay in notifying CNSC staff of the contamination, the Isologic representative informed the Commission that the first reason was that the employee reported the contamination to the site RSO only at the end of the following day. The Isologic representative added that time was also required to calculate the actual dose to determine whether the event was reportable to the CNSC. The Isologic representative further added that the information was sent only to the CNSC project officer at first and then to the duty officer, noting that Isologic's usual practice was to have the corporate RSO inform the CNSC duty officer instead of the site RSO and that in this event, there was some confusion in this regard.

47. The Commission expressed concerns about the absence of a site RSO at the facility during the day shift, noting that Isologic was in the radiopharmaceuticals business. The Isologic representative confirmed that there was no site RSO at the Burlington facility during the day shift and that the duties of the RSO were assigned to the technicians working in the lab during the day. The Isologic representative also explained that its corporate RSO was based out of the Burlington facility and was available during many day shifts as well. CNSC staff specified that this was the case only at the Isologic Burlington facility, where all the iodine production was located, and that the absence of RSO during the daytime was also a concern that CNSC staff had raised with Isologic during its investigation.

48. The Commission asked if CNSC staff had identified any other practices that raised concerns at Isologic facilities during its investigation. CNSC staff reported that some issues with Isologic's overall program integrity with respect to its oversight of radiation

[6] International Commission on Radiological Protection (ICRP) Publication 89, *Basic Anatomical and Physiological Data for Use in Radiological Protection Reference Values*, 2002.

safety activities had been identified. CNSC staff added that several CNSC Type 1 inspections identified deficiencies in Isologic's oversight at its sites and that CNSC staff was reviewing Isologic's resources dedicated to overseeing the radiation safety program across all Isologic's operations. CNSC staff also stated that Isologic had undertaken a restructure action in this regard and that this was an area of increased oversight for CNSC staff.

49. Asked about the suspension of Isologic's iodine production and the effect that this suspension would have on Canadian patients, the Isologic representative stated that Isologic produced between 30% and 40% of the Canadian I-131 supply and that the production would resume when the identified issues were resolved. CNSC staff added that Isologic notified CNSC staff of its decision to cease operation and that Isologic had made arrangements with other suppliers of radioiodine to ensure that there was sufficient supply for Canadian patients. The representative further informed the Commission that, at this time, patients in Canada should not be affected, as there was another supplier in Canada used by Isologic to supply I-131 to Isologic customers. The Isologic representative added that Isologic would not resume iodine production without the CNSC's approval.

50. Commenting on the next steps of this investigation, CNSC staff explained that it was reviewing Isologic's responses to CNSC staff's questions on the detailed event report. CNSC staff added that it was supportive of Isologic's decision to shut down iodine production until the source of the release was identified. CNSC staff further added that, at this point, approval by the Commission was not required to restart the iodine production because the shutdown was not mandated by CNSC staff. CNSC staff indicated that CNSC staff was also evaluating other appropriate enforcement actions.

51. The Commission enquired about whether this event had been assigned an International Nuclear and Radiological Event Scale (INES) rating. CNSC staff stated that it would validate whether the event warranted an INES rating and would provide the Commission with this information when available.

ACTION
by
February
2019

52. The Commission enquired whether I-131 diffused through the skin. The Isologic representative explained that I-131 was a very volatile compound and hazardous to inhale. The Isologic representative added that the pH of the iodine solution was relatively high, between 7 and 10, and that it would also react with the skin, acknowledging the risk of contamination with open source radiopharmaceuticals.

53. Asked by the Commission why contamination was still present on the worker after hand washing, the Isologic representative explained that, after cleaning the skin as much as possible, continued washing could damage the skin in the attempt to remove all contamination and increase its absorption. The Isologic representative also noted that although employees are reminded to wash their hands multiple times, Isologic was unsure about whether the contamination occurred prior to or after the removal of the protective sleeve, and about whether the employee washed his hands after its removal. CNSC staff indicated that in some cases the contamination can become fixed on the skin, as was the case in this event. CNSC staff added that by the time Isologic started measuring the contamination on the employee's hand, all of the contamination was fixed on the skin and decaying as per the eight-day half-life of Iodine-131.

54. The Commission enquired about CNSC staff's recommendation for future actions to be taken by Isologic following this event. CNSC staff stated that Isologic would be required by the CNSC to look at the resources that Isologic provided to effectively oversee its programs, that Isologic would have to review the effectiveness of its training program and its staff monitoring procedures and that Isologic should deliver improved training to all its employees. CNSC staff added that it would work with Isologic to better understand the causes of the December 11, 2018 event whereby elevated levels of I-131 were detected in Isologic's monitoring stacks. The Isologic representative commented that Isologic was committed to allocate staff to the iodine production relative to the level of risk of the activity. The Isologic representative added that Isologic would deliver training to every employee when the new procedures were approved and finalized. The Isologic representative further added that on-the-job training would be provided during dry runs with no radioactive material during the start-up of its new production facility, planned for the end of January of 2019.

55. Addressing the status of the employees affected by the iodine production shutdown, the Isologic representative explained that the affected employees were presently working on updating operating procedures and other administrative work.

56. The Commission enquired about the radiation doses to workers performing other activities at Isologic. CNSC staff indicated that the whole body doses and the extremity doses to workers were reviewed quarterly by Isologic and CNSC staff. CNSC staff added that Isologic exceeded a number of action levels regarding the

extremity dose and that Isologic was putting in place certain measures to track and reduce doses. The Isologic representative explained that work rotation had increased in order to distribute the dose across a larger number of employees. The Isologic representative added that Isologic was now performing dose comparison between workers executing the same task and looking at the reason for the higher dose of some workers. The Isologic representative also explained that a shielding tungsten pot with a slightly narrower opening for the vial septum had been introduced to reduce exposures to the hands.

57. The Commission expressed concern regarding the significant amount of work remaining to be completed by Isologic in regard to its radiation protection program. The Isologic representative stated that the radiopharmacy services were a dynamic business and a work in progress. The Isologic representative added that Isologic was investigating the use of robots in order to protect its employees.

58. The Commission expressed satisfaction with the information in CNSC staff's EIR. However, based on the information received during this meeting, the Commission requested an update on this subject at a future Commission proceeding.

ACTION
by
June 2019

INFORMATION ITEMS

Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017

59. With reference to CMD 18-M48, CNSC staff presented to the Commission the annual Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites: 2017 (the UMM ROR). CNSC staff reported that this report includes a summary of CNSC staff's regulatory oversight at uranium mines and mills for 2017 and at historic and decommissioned sites for 2016 and 2017. The UMM ROR focusses on the radiation protection, conventional health and safety and environmental protection safety and control areas (SCA), while providing an overview of licensee performance for all 14 SCAs and an update on all licensed activities at these sites.

60. CNSC staff reported that all operating uranium mine and mill sites in Canada operated safely in 2017 and that all decommissioned uranium mine and mill sites remained safe throughout 2016 and 2017. All SCAs for operating uranium mines and mills were rated as "satisfactory," except radiation protection at Orano's McClean Lake facility which was rated as "fully satisfactory." All SCAs for

historic and decommissioned sites were rated as “satisfactory” in 2016, with the exception of radiation protection which was rated as “below expectations” at the Rayrock, Port Radium and Agnew Lake sites. In 2017, CNSC staff rated all SCAs for historic and decommissioned sites as “satisfactory,” with the exception of environmental protection at the Elliot Lake historic sites which was rated as “below expectations.” CNSC staff confirmed that, despite the noted “below expectations” the safety of persons and the environment remained protected at decommissioned and historic sites during 2016 and 2017.

61. The Commission noted that the Agnew Lake site had a “below expectations” rating in the radiation protection SCA in 2017 and enquired why the rating had increased to “satisfactory” when the licensee had not yet fully completed the corrective action plan. CNSC staff explained that, through its review of the implementation of a revised radiation protection program and associated documentation, CNSC staff was of the view that the licensee’s performance in regard to radiation was, and would continue to be, “satisfactory.” The Commission was satisfied with the information provided and with CNSC staff’s assessment.

62. In regard to CNSC staff’s focus on the radiation protection, environmental protection and conventional health and safety SCAs in the UMM ROR, CNSC staff explained that those three SCAs provided key performance indicators for uranium mine and mill sites in respect of ensuring the health and safety of workers and the environment. Addressing the Commission’s question about why the management system SCA was not reported on as it had been done for the *Regulatory Oversight Report on the Use of Nuclear Substances in Canada: 2017*, CNSC staff clarified that all SCAs were reviewed by CNSC staff in licensee performance assessments and that key performance indicators varied amongst the facilities and sectors regulated by the CNSC. CNSC staff confirmed that the SCAs reported on in RORs would be considered during CNSC staff’s project to review the effectiveness, structure and content of RORs, and that the Commission would have the opportunity to provide feedback in regard to the way ahead on this project as well.

63. Noting that safety and security were an integral part of the Commission’s mandate, the Commission enquired about why the security SCA was not reported on in the UMM ROR. CNSC staff confirmed that security measures at CNSC-regulated sites were an integral component of CNSC staff’s technical assessment and compliance verification activities. CNSC staff further confirmed that all elements of the CNSC’s mandate were considered in compliance verification activities for all licensees, noting that if an

applicant did not have adequate security measures in place, a CNSC licence would not be issued. A Commission member noted that additional transparency in respect of the security SCA in future RORs would be appreciated.

64. The public had been invited to comment on the UMM ROR through written interventions and 12 interventions were received. Upon request by Indigenous groups, and in the spirit of reconciliation and in recognition of the important role of Indigenous oral traditions, the Commission allowed Indigenous groups intervening in this meeting item to provide the Commission with oral interventions, in addition to their written submissions. The Commission is of the view that this practice should be continued in the future, with the CNSC actively offering Indigenous groups the opportunity to present orally in addition to their written interventions.

65. Through the CNSC's Participant Funding Program (PFP), participant funding had been offered to assist Indigenous peoples, members of the public and other stakeholders in reviewing the UMM ROR and submitting comments, in writing, to the Commission. A Funding Review Committee (FRC) – independent of the CNSC – had recommended that up to $108,253 in participant funding be provided to eight applicants including:

- Ya'thi NéNé Land and Resource Office (Ya'thi NéNé)
- Algonquins of Ontario (AOO)
- Sagamok Anishnawbek (Sagamok)
- Prince Albert Grand Council (PAGC)
- English River First Nation (ERFN)
- Athabasca Chipewyan First Nation (ACFN)
- Saskatchewan Environmental Society (SES)
- Northwatch

Comments from Industry Representatives

66. The Commission invited comment from the licensees whose facilities and sites were considered in the UMM ROR. The Cameco Corporation (Cameco) representative emphasized Cameco's commitment to safety and the environment, and provided details regarding the decision to place the McArthur River, Key Lake and Rabbit Lake operations into a state of care and maintenance due to a challenging global uranium market. The Cameco representative emphasized that approximately 270 Cameco employees continued to work at these facilities to ensure their continued safety and the maintenance of infrastructure. The Cameco representative stated

that, recognizing that 50% of its total workforce was from northern Saskatchewan, Cameco had put measures in place to ensure adequate supports for the workers that were temporarily laid off and provided information about Cameco's information and engagement framework to ensure continued communication with communities and community partners.

67. The Orano Canada (Orano) representative provided information about the McClean Lake Operation and the Cluff Lake Project, noting that Orano had applied for a licence renewal for the Cluff Lake Project, with a CNSC public hearing scheduled for May 2019. The Orano representative reported that its operations at McClean Lake continued to produce and process high-grade ore slurry while keeping worker average doses near the public 1 mSv per year dose limit. The Orano representative also detailed Orano's efforts in the area of transparency and public engagement.

68. The remaining licensees of facilities and sites considered in the UMM ROR – Saskatchewan Research Council (SRC), the OMECP, Indigenous and Northern Affairs Canada (INAC), the Ontario Ministry of Energy, Northern Development and Mines, Rio Algom and Denison Mines – were available to answer the Commission's questions but did not provide comments.

Indigenous Engagement

69. The Commission asked for more information about the ERFN's recommendations regarding the improvement of the CNSC's communication with the ERFN. The ERFN representative stated that, although the EFRN had a good relationship with Orano and Cameco, regulatory information was typically filtered through the licensees and that the EFRN would like to see that information provided to them directly by the CNSC. CNSC staff expressed its commitment to the establishment of a formalized engagement mechanism with the ERFN, noting that CNSC staff had met with the EFRN in this regard the day prior to these proceedings. CNSC staff also provided information about the proposed way ahead to ensure that a regular flow of information from the CNSC to the EFRN was established.

70. The Commission further enquired about the EFRN's preferred format for the provision of regulatory information. The ERFN representative responded that, due to the comprehensive and technical nature of the CNSC's RORs, these may not be easily understandable by members of the ERFN whose first languages are Dene and Cree, and who may not have a technical background.

The EFRN representative stated that, through the PFP, the EFRN was able to retain a technical specialist who disseminated information from the UMM ROR to ERFN communities. The EFRN representative suggested that future RORs include an executive summary using only reader-friendly and easily-understandable terminology that could be translated into Cree and Dene.

71. Asked about its engagement activities with the Ya'thi NéNé, CNSC staff provided information about upcoming planned meetings with the Ya'thi NéNé that had the aim of tackling long-standing issues, as well as the preferred method for the provision of regulatory information to community members. The Cameco representative provided information about Cameco's engagement activities with the Ya'thi NéNé, including the use of mechanisms such as the Athabasca Joint Environmental Subcommittee (AJES). The Cameco representative stated that, through the AJES, Cameco had established an engagement plan with the Ya'thi NéNé, including four meetings a year with community members.

72. Addressing the concerns expressed by intervenors about CNSC staff's communications with Indigenous groups, CNSC staff informed the Commission that methods by which CNSC staff could improve communication of regulatory information with Indigenous groups, including the use of mechanisms such as Northern Saskatchewan Environmental Quality Committee (EQC) and the Eastern Athabasca Regulatory Monitoring Program (EARMP), were being investigated. The Commission expressed appreciation in respect of the suggestion made by the EFRN and the Ya'thi NéNé for a plain-language executive summary, as appropriate, in future RORs. The Commission directed CNSC staff to include such a plain-language summary, as appropriate, in future RORs in order to highlight the most important regulatory information and to facilitate its translation into Cree, Dene, and other Indigenous languages, as applicable.

ACTION
by
December
2019

73. The Commission requested additional information about the various committees and programs that provided for the dissemination of information to Indigenous groups. The Northern Saskatchewan Medical Health Officer provided information about how the EARMP engaged Indigenous groups in environmental monitoring activities and disseminated information to Indigenous groups through its website and presentations in their communities. CNSC staff stated that information about the CNSC's Independent Environmental Monitoring Program (IEMP) was provided to Indigenous groups through presentations in their communities, as well as through the CNSC website. The Cameco representative

stated that results from Cameco's community-based environmental monitoring program were disseminated through community meetings which included translators and through pamphlets.

74. Noting the information provided by the AJES about its meetings and information sharing with Indigenous groups, the Commission enquired about whether CNSC staff participated in those meetings. CNSC staff stated that it did not participate in AJES meetings, explaining that the AJES was created through collaboration between industry, First Nations and municipalities. CNSC staff confirmed that regulatory information was, however, contributed by the CNSC when required and that CNSC staff would participate if the opportunity presented itself.

75. Further on this topic, CNSC staff also provided details about its active participation in various groups and committees, including the EQC which represents over 30 Indigenous communities and meets three to four times a year, as well as about engagement activities that were carried out, such as community visits when invited by Indigenous communities. CNSC staff also stated that, since increased engagement was requested in all interventions from Indigenous groups, CNSC staff would strive to ensure this engagement is carried out and noted that Indigenous groups could contact the CNSC at any time with questions, concerns or regulatory information requests.

76. In considering the intervention from the Sagamok and a proposed Indigenous citizens committee, the Commission enquired about whether Indigenous groups in Ontario also had the opportunity to participate in community advisory groups such as those in northern Saskatchewan. The Cameco representative stated that, because of the geographical concentration of uranium mines and mills in northern Saskatchewan, a need for such community groups was identified and these were implemented in collaboration with the Saskatchewan Government. The Cameco representative further stated that, while such groups were not planned for the sparser and smaller facilities in Ontario, facility tours and other engagement activities were available to Indigenous groups.

77. The Sagamok representative explained that, although First Nations in Ontario worked with industry independently of each other, a protocol agreement had been established between themselves and other Ontario First Nations in this regard. The Sagamok representative also stated that the Sagamok was of the view that the proposed Indigenous citizens committee would facilitate engagement activities with licensees. CNSC staff informed the Commission that CNSC staff would meet with Indigenous groups

in Ontario in the coming months to work on a collaborative way ahead on this issue that would be acceptable to the communities.

78. The Commission enquired about how Indigenous communities were informed of reportable events. CNSC staff explained that, as part of their public information and disclosure programs (PIDP), licensees were required to provide information to the public about reportable events, their impact and the corrective actions taken. CNSC staff added that regulatory exceedances were included in licensee annual compliance reports, which were disseminated through licensee websites and through RORs, but acknowledged that informing Indigenous communities on a proactive basis would be preferable and that CNSC staff would work with the communities in this regard.

79. Further on this issue, the Cameco representative stated that information about reportable events and exceedances was shared with Indigenous communities through environmental subcommittees, such as the EARMP, noting that significant exceedances had not recently occurred at Cameco uranium mine and mill facilities. The Saskatchewan Ministry of Environment (MOE) representative informed the Commission that, in addition to information sharing through the licensee, the province had implemented an advisory system which issued advisories in the event of reportable discharges.

80. On the topic of disseminating information to Indigenous communities via the internet, the EFRN representative explained to the Commission that this was not always an effective means of communication for northern Saskatchewan Indigenous communities due to the unreliability of electricity and the internet. The EFRN representative also stated that in-person meetings with CNSC staff would be more effective and consistent with the oral history and tradition of EFRN communities. The Commission appreciated the information provided by the EFRN, noting that CNSC staff had committed to ensuring adequate engagement activities with northern Saskatchewan Indigenous communities. The Commission will continue monitoring progress in this regard.

81. The Commission requested additional information in respect of the questions raised by the EFRN about financial guarantees and whether these included future Indigenous consultation and engagement activities. CNSC staff explained that some licensee decommissioning plans were required to consider stakeholder engagement, noting that operating uranium mines and mills all considered Indigenous engagement and consultation activities within their preliminary or detailed decommissioning plans. CNSC

staff also stated that related CNSC REGDOCs and CSA Group standards were under revision and that an update specific to requiring that a part of a licensee's financial guarantee be earmarked for Indigenous engagement activities was planned. The Cameco representative stated that Cameco always considered Indigenous consultation and engagement activities when developing a decommissioning plan, noting that environmental assessments and other project planning activities also provided engagement opportunities.

82. The Commission expressed its appreciation for the survey carried out by the Sagamok in respect of knowledge about the CNSC and its regulatory activities, and enquired about the concerns expressed by respondents about the CNSC's SCA rating system. The Sagamok representative explained that some of its community members had expressed the view that the rating of "satisfactory" seemed akin to a rating of "barely passed," and that, as stewards of the land, this did not give the Sagamok members a feeling that the lands were being taken care of appropriately. Noting that dissatisfaction with the CNSC's rating system had been raised by previous interventions, the Commission expects CNSC staff to review the SCA rating system as part of its review of the format of RORs.

83. The Commission expressed its appreciation for the presentations provided by Indigenous groups in respect of the UMM ROR. The Commission also noted that, in addition to the questions asked during this proceeding, all interventions were carefully considered by the Commission.

84. The Commission noted that several interventions from Indigenous groups expressed the view that insufficient notice was provided in respect of their request for participant funding and the interventions deadline. The Commission directs CNSC staff to review the PFP timelines to ensure that sufficient time is provided to Indigenous groups to prepare their interventions after learning that PFP will be provided.

Environmental Protection

85. The Commission requested additional information in regard to the questions raised by the ERFN about arsenic levels in the sediment in Seru Bay of Waterbury Lake. The Cameco representative acknowledged that arsenic concentrations in the 2011 environmental risk assessment (ERA) were predicted to be 4.7µg/L but, when measured in 2016, the arsenic concentration was at 7.9

µg/L. The Cameco representative explained that, through a testing program, Cameco discovered that there was an organic form of methylated arsenic associated with the Cigar Lake ore body, leading to the increasing concentration trend identified in 2016. The Cameco representative reported that Cameco had implemented several measures, such as the optimization of the water treatment circuit, to address these higher arsenic levels, as reflected in the updated 2017 ERA. The Cameco representative stated that Cameco was on track to meeting the predictions of the 2017 ERA.

86. The Commission considered the information about caribou conservation efforts submitted by the PAGC and requested additional information in this regard. The Cameco representative clarified that barren ground caribou were a migratory species, whereas woodland caribou were much more broadly dispersed, moving in herds of 6 to 10 animals, and that this species was the focus of the recovery strategy initiated by Environment and Climate Change Canada (ECCC)[7] under the *Species at Risk Act*.[8] The Cameco representative provided information about a three-year collaring program developed via the recovery strategy with participation from Cameco to assess the woodland caribou populations, noting that results from the SK1 territory[9] in which Cameco operated its facilities. The Cameco representative explained that the collaring study showed a sustainable and healthy population of woodland caribou, and that the results of this study updated the national recovery strategy. The ECCC representative confirmed the information provided by Cameco, noting that the study was led by the University of Saskatchewan; ECCC was working on identifying the critical habitat within the SK1 territory, including recommendations resulting from Indigenous consultation activities, and this information would inform amendments to the recovery strategy.

87. The Commission enquired about how Indigenous traditional knowledge was considered in the CNSC's regulatory framework. CNSC staff provided information regarding the gathering of Indigenous traditional knowledge in relation to projects such as the Gunnar Mine Remediation, noting that the EARMP included the gathering of traditional knowledge, and provided examples about how traditional knowledge was used to inform the remediation strategies. CNSC staff also stated that Cameco had undertaken an

[7] Environment and Climate Change Canada, *Recovery Strategy for the Woodland Caribou* (Rangifer tarandus caribou*), Boreal Population, in Canada*. *Species at Risk Act* Recovery
[8] S.C. 2002, c. 29
[9] Saskatchewan has been divided into the SK1 (Boreal Shield) and SK2 (Boreal Plain) territories within the provincial conservation strategy and the federal recovery strategy.

Indigenous knowledge study for the reclamation of the Beaverlodge sites. In respect of CNSC staff's inclusion of traditional knowledge in its environmental programs, CNSC staff submitted that the IEMP was informed in part through CNSC staff's engagement with Indigenous communities, with participant funding having been offered to Indigenous communities to provide the capacity to facilitate traditional knowledge information sharing.

88. Noting the concerns about barium chloride concentrations in the environment as raised by the Sagamok, the Commission asked for information in this regard. CNSC staff explained that barium chloride was used at uranium mines to absorb radium-226 and that, in the case of barium chloride concentrations near the Elliot Lake site in Ontario, the concentration in the receiving environment was an order of magnitude below the water quality guidelines of 1,000 µg / L. CNSC staff also explained that barium chloride did not bioaccumulate and that the environment near the Elliot Lake site remained protected, with the fish being safe to eat.

89. The Commission enquired about the source of the increased radium-226 in the effluent from Rio Algom's Stanleigh Tailings Management Area. CNSC staff explained that the tailings were the source of the radium-226, and that Rio Algom had identified its form and concentration and was effectively controlling radium-226 in the effluent at the Stanleigh site. The Rio Algom representative stated that elevated radium-226 concentrations at the Stanleigh site were related to an interferant, likely humic acid, and that water treatment processes had been modified on this basis, lowering radium-226 concentrations in effluent to acceptable levels.

90. The Commission examined the intervention from the ACFN, which submitted that Orano had not provided adequate confirmation that water and food were safe to consume outside the Cluff Lake site perimeter, and requested additional information in this regard. The Orano representative confirmed that water at the Cluff Lake site was meeting water quality objectives and was safe to drink. The Orano representative also stated that Orano's environmental monitoring program confirmed that the site was safe for traditional Indigenous uses including hunting, trapping, fishing and the harvesting of plants and berries. CNSC staff added that 2017 IEMP off-site sampling of air, water, vegetation and soil showed that the Cluff Lake site remained protected, with no observed adverse effects to the environment. The Cameco representative stated that this information was disseminated through the EARMP and other environmental monitoring programs in northern Saskatchewan. Following its consideration of the information provided, the Commission requests that the way this information is presented to

Indigenous groups and members of the public be reviewed by CNSC staff and licensees to ensure accurate and explicit messaging regarding the safety of water and foodstuffs in the vicinity of licensee sites.

91. The Commission enquired about anhydrous ammonia releases at uranium mine and mill sites that were referred to in the intervention from the SES. CNSC staff explained that follow ups in regard to ammonia spills at Cameco's McArthur River and Key Lake sites were done during January 2018 inspections and that all action notices in this regard had since been closed. CNSC staff also stated that event reports from Cameco had been reviewed for a common cause associated with the releases, with none identified. The Cameco representative provided information about the additional corrective actions that had been implemented at the McArthur River, Key Lake and Cigar Lake sites to prevent ammonia releases and noted that the releases were small and posed no risk of adverse effects to the environment or workers.

92. The Commission requested clarification on how spills were reported in the UMM ROR and how the categorization of spills reflected an impact on the environment. CNSC staff explained that all spills were assessed on an individual basis, with the impact on the environment based on several factors including the substance involved and the area and size of the spill. CNSC staff also stated that regulatory oversight considered the quantity of spills, and preventive and corrective action measures being taken by licensees.

93. Referencing the intervention from CELA, the Commission enquired about the status of the review in respect of the inclusion of radionuclides in the National Pollutant Release Inventory (NPRI). CNSC staff responded that the CNSC had assisted with ECCC's initial review of the proposal that radionuclides be considered a reportable substance in the NPRI. CNSC staff acknowledged that, although the decision was made to not include radionuclides in the NPRI, some of the information requested by the intervenors was difficult to obtain. CNSC staff had committed to work with the NPRI to ensure that information about releases of radionuclides be more easily accessible by the public.

94. Further on this issue, CNSC staff provided the Commission with information about the terms of reference established in regard to its work with the NPRI and about the progress to date, including the establishment of a link between the CNSC and NPRI websites with comprehensive and searchable environmental monitoring results planned to be available in the 2018-2019 timeframe. CNSC staff also stated that it had discussed the possibility of including other

regulatory elements in this searchable database, noting that it had begun discussions with other government agencies in this regard.

95. Asked about regulatory limits for radiological and non-radiological substances, CNSC staff explained the CNSC's regulatory approach to release limits and how this approach was applied in consideration of the *Metal and Diamond Mining Effluent Regulations*[10] (MDMER). CNSC staff also stated that releases of radionuclides had to be translated into terms of dose consequences and agreed with the view expressed by a Commission Member that challenges existed in the reporting of radionuclides in effluent as compared to the reporting of hazardous substance concentrations.

96. Further on the MDMER, the Commission enquired about how CNSC staff confirmed compliance with the MDMER and the *Fisheries Act*[11] (FA). CNSC staff explained that section 36 of the FA addresses the release of deleterious substances, including those deleterious substances contemplated by the MDMER and regulated by ECCC. CNSC staff also stated that, since uranium mines and mills were captured by the MDMER, CNSC staff worked with ECCC to ensure that the MDMER were complied with through monitoring programs, emphasizing the CNSC's comprehensive monitoring requirements.

97. The Commission enquired about why water quality was reported as an annual average which could mask seasonal effects, as raised in the intervention from Northwatch. CNSC staff explained that, although annual averages for the concentration of hazardous substances were reported in the ROR, licensees reported this data on a monthly basis, and stated that licence limits were based on monthly limits. The Commission suggested that future RORs provide clarity in respect of licensee reporting frequency.

General Questions

98. The Commission noted that several intervenors requested CNSC inspection reports as well as clarity on how non-compliances were assessed to be of low significance, and requested additional information in this regard. CNSC staff informed the Commission that following its review of these interventions, additional information regarding CNSC staff's assessment of non-compliances would be added to future RORs in order to improve regulatory transparency and accessibility.

[10] SOR/2002-222
[11] R.S.C., 1985, c. F-14

99. In respect of the public availability of inspection reports, CNSC staff stated that making the reports public had been assessed by CNSC staff in 2016 and that the assessment showed that, since the intended audience for inspection reports was licensees, the information may not be of high value to members of the public. CNSC staff further noted that other outreach tools may be more appropriate for engaging with the CNSC's stakeholders, though the reports are available to the public upon request. The Cameco representative agreed that some information from inspection reports could be provided to the public more easily but noted the concern that inspection reports often contained confidential or proprietary information. The Commission stated that, before the CNSC took any decision to disseminate such information more broadly, it should ensure that all stakeholders are consulted.

100. The Commission asked for additional details about concerns expressed by the Ya'thi NéNé regarding the transport of yellowcake on Saskatchewan roadways near its communities. The Saskatchewan MOE representative stated that the Saskatchewan Ministry of Highways and Infrastructure was responsible for the maintenance of northern Saskatchewan roadways and that no major highway-related incidents related to mining operations had recently been reported. The Cameco representative informed the Commission that Cameco maintained the roads between Cameco mine and mill sites and contributed to a heavy haul agreement for the maintenance of roads with the Saskatchewan Ministry of Highways and Infrastructure.

101. The Commission considered the intervention from the SES regarding CNSC licences with indefinite licence periods, such as those for the Elliot Lake, Stanrock and Denison Mines sites, and requested additional information in this regard. CNSC staff explained that, when the *Nuclear Safety and Control Act*[12] (NSCA) came into force in 2000, several sites that were stable and decommissioned had been granted indefinite licences by the Commission due to the low risk of those sites. CNSC staff also stated that, since the sites were licensed by the CNSC, they were subject to CNSC regulatory oversight and programs in accordance with their licence conditions. In regard to public information about these sites, CNSC staff stated that CNSC reported on these sites through RORs and that the public could provide input in respect of these sites through interventions during the presentation of RORs and other CNSC regulatory activities.

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

102. In its intervention, Northwatch referenced closed uranium mines and mine waste areas in northeastern Ontario that were not licensed by the CNSC and the Commission requested information about these sites. CNSC staff explained that some of the sites noted in the intervention had been granted an exemption under section 7 of the NSCA by the Commission and provided information about why these exemptions were granted, emphasizing the low risk presented by these sites and that oversight at a provincial level continued for those sites. CNSC staff noted that other sites referenced in the intervention, such as the Beaucage site, were not part of the nuclear fuel cycle and had never been regulated by the CNSC or its predecessor, the Atomic Energy Control Board.

103. The Commission, noting the questions raised by the SES about radon gas in ambient air at uranium mine and mill sites, requested clarification about radon concentration in ambient air which would lead to a dose of 1 mSv / year above background. CNSC staff provided information about the latest dose coefficient for radon from the International Commission on Radiological Protection (ICRP) which provided for an upper bound of 30 Bq / m^3 to reach the dose limit of 1 mSv / year above background. CNSC staff further clarified that the overall upper bound for radon in ambient air of over 50 Bq / m^3 presented by CNSC staff included the regional background upper boundary for radon in ambient air plus the ICRP upper bound of 30 Bq / m^3 and represented a person (non-NEW) at the end of the site perimeter boundary.

104. The Commission enquired about how dose to workers correlated with the uranium ore grade. CNSC staff explained that higher grade uranium ore contained higher levels of radium-226 and radon, leading to the potential of a higher dose to workers and provided information about the technology controls that were implemented to keep doses ALARA.

105. Asked to address the comments raised by Northwatch in regard to regulatory terminology used in the ROR, CNSC staff explained the requirements imposed by regulations and licence conditions. In respect of the term “expectations,” CNSC staff stated that licensees were at all times required to comply with regulations and licence conditions and emphasized that compliance with the licensing basis was a requirement and not voluntary. CNSC staff also provided information about requests made of licensees as provided for by the GNSCR, as well as recommendations which were akin to guidance information. To improve clarity about licensee requirements as compared with guidance, and taking into

consideration terminology in the NSCA and its regulations, the Commission directs CNSC staff to review the terminology used when reporting licensee non-compliances in future Commission proceedings and related documentation.

106. The Commission considered the accommodation requested by the AOO in relation to the provision of dose exposure estimates for small mammals and ungulates in the vicinity of the Madawaska Legacy Uranium Mine, the Bicroft Tailings Storage Facility and the Dyno closed mine site, and enquired about whether this information was available in ERAs. CNSC staff responded that a 2012 ERA carried out for the Madawaska Legacy Uranium Mine provided dose estimates, and provided dose estimates showing that fish, berries, wild game and water were safe to consume in that area. CNSC staff also stated that, in regard to the Bicroft Tailings Storage Facility and the Dyno site, no specific ERAs had been carried out but that the OMECP had carried out work which is currently informing the long-term monitoring and maintenance program implemented by the licensee for these sites. CNSC staff added that sampling at those two sites showed that adequate measures were in place to protect the public and the environment.

107. Asked about the reporting of injuries at licensed sites, and the use of the Total Recordable Injury Frequency Rate (TRIFR) rather than the lost time injuries (LTI), the Cameco representative explained that, since conventional health and safety was in the province's authority, licensees were required to report in the rates requested by the province. The Cameco representative also stated that the reporting of injuries varied greatly across provincial and territorial authorities, adding complexities to the reporting of this information. CNSC staff informed the Commission that, from a regulatory perspective, the interpretation of what a licensee's statistics meant in respect of injuries and safety at a site was of the greatest importance. The Commission, recognizing provincial and territorial authority in respect of conventional health and safety, requests that CNSC staff work with licensees in the provision of the TRIFR in future RORs.

108. Noting that several interventions included information requests, the Commission enquired about how these requests would be filled. CNSC staff explained that, during the review of interventions, CNSC staff also took note of any information requests, such as inspection reports, and tried to address any of these requests ahead of the proceeding. The Commission was satisfied with CNSC staff's approach in this regard.

Update on the Port Hope Harbour Wall Collapse

109. CNSC staff provided an oral update regarding the collapse of a section of the west wall of the Port Hope Harbour on October 9, 2018, as detailed in CMD 18-M66. This section of the wall is outside of, and immediately adjacent to, Cameco Corporation's Port Hope Conversion Facility (PHCF) which is licensed by the CNSC. The wall is the property and under the jurisdiction of the Municipality of Port Hope (the Municipality). ECCC is responsible for the regulation of deleterious substances in the harbour pursuant to section 36 of the Fisheries Act,[13] while the OMECP has regulatory authority over water quality in the harbour. After the collapse, the Municipality installed a second silt curtain around the affected area and Cameco installed an inner security fence in the event that erosion compromised the existing PHCF perimeter fence. The work to replace the wall commenced on December 11, 2018.

110. The Commission enquired if the wall collapse posed a risk to the adjacent CNSC-licensed facility. The Cameco representative stated that there were no impacts on operations or security at the PHCF. CNSC staff explained that the site was stabilized and confirmed that the wall collapse should not cause any issues with respect to the licensed activities at the PHCF. Asked to comment, the Municipality representative stated that work to repair the harbour wall was on target to be completed by the end of the week.

111. Asked by the Commission to comment on whether there was evidence of contamination in the harbour water, the ECCC representative stated that ECCC had reviewed the CNSC's sampling results and concluded that due to the presence of the silt curtain, sedimentation in the harbour was prevented and the ECCC was satisfied that there were no deleterious effects as a result of the wall collapse.

112. The Commission also asked the OMECP to provide information on the environmental status of the harbour. The OMECP representative informed the Commission that after its review of the analysis results of the CNSC samples, it had determined that the Provincial Water Quality Objectives[14] (PWOQ) were met in the inner harbour, with a slight exceedance of uranium, and that all of the PWOQ were met outside the harbour beyond the silt

[13] R.S.C., 1985, c. F-14

[14] Province of Ontario – *Water Management: Policies, Guidelines, Provincial Water Quality Objectives*, 1994. <https://www.ontario.ca/page/water-management-policies-guidelines-provincial-water-quality-objectives>

curtain. The OMECP representative agreed with the ECCC findings that the silt curtain had performed as designed.

Mid-Term Report on Results of Compliance Activities and Performance of OPG's Darlington New Nuclear Project

113. With reference to CMD 18-M55.1, OPG presented the mid-term report for the Darlington New Nuclear Project (DNNP). OPG has a Nuclear Power Site Preparation Licence for that project, which will expire August 17, 2022. As part of the *Record of Decision*[15] for the issuance of that licence, the Commission had directed OPG to prepare a mid-term report on OPG's licensed activities and the status of the commitments that OPG had made during the public hearing and the environmental assessment (EA), which was conducted under the *Canadian Environmental Assessment Act*, 1992 (CEAA 1992).[16] In light of the December 2013 decision by the Government of Ontario to defer construction of new nuclear units, OPG did not commence any construction activities on the site, and maintains the site in accordance with the licence conditions. OPG provided several examples of the work that was performed, including:

    - The completion and provision of excavation reports regarding archeological considerations to the province
    - Completion of the cost-benefit analysis and assessment report for the proposed cooling system
    - Progress on environmental protection and public engagement activities

114. With reference to CMD 18-M55, CNSC staff presented its mid-term report for OPG's DNNP. As per the 2012 *Record of Decision*, the Commission had directed CNSC staff to prepare a mid-term report on items of regulatory interest, including:

    - OPG's conduct of licenced activities
    - Status of commitments made during the EA
    - Actions to address findings from the CNSC Fukushima Task Force report
    - Information on the control of the land use around the site for the intended operating life of a nuclear generating station
    - Details on the environmental monitoring and follow-up

[15] CNSC Record of Proceedings, Including Reasons for Decision, Ontario Power Generation Inc., - *Application for the Issuance of a Licence to Prepare Site for a New Nuclear Power Plant at the Darlington Nuclear Site*, Decision issued August 17, 2012.
[16] S.C. 1992, c. 37

program

CNSC staff reported that OPG had complied with the licence conditions for the site and had followed-up on the commitments it had made during the licensing process and the EA. CNSC staff reported that, in September 2018, OPG had informed CNSC staff of its intention to apply for a licence renewal prior to its expiry date in 2022.

115. The Commission requested additional details regarding OPG's consideration of cooling towers for the DNNP. The OPG representative reported that both cooling towers and once-through condenser cooling would be acceptable from the perspective of OPG and the EA. The OPG representative stated that after its consideration of design options, and engineering and efficiency factors, OPG decided that the once-through condenser cooling would be the preferred cooling option. The OPG representative added that the final technology choice would depend on the type of nuclear technology that was selected for the NGS.

116. The Commission enquired if there was any design work that had been performed for the DNNP, and the OPG representative confirmed that there was no project plan for the site. The OPG representative informed the Commission that the EA included a plant parameter envelope that bounded future work at the site within the EA, therefore any potential plant design would have to be within the bounds of that envelope.

117. The Commission noted OPG's intention to apply for a licence renewal and asked CNSC staff about requirements that would have to be met by OPG as part of the licence renewal process and if the EA would be reconsidered. CNSC staff responded that the EA process was completed. Addressing the permit process for species covered under section 73 of the *Species at Risk Act*[17] (SARA), the ECCC representative informed the Commission that under a Memorandum of Understanding (MOU) between the CNSC and ECCC, both the CNSC and the proponent of a project had the responsibility to inform Canadian Wildlife Services (CWS) of a potential permit requirement and provided the Commission an overview of the permit process under the SARA.

118. Further on the licence renewal process for the DNNP, CNSC staff informed the Commission that OPG would be required to update its documentation with respect to any changes in bounding conditions for the licence and the EIS, and review the licence renewal application for gaps with respect to modern regulatory

[17] S.C. 2002, c. 29

instruments such as CSA N286-12, *Management Systems for Nuclear Facilities*,[18] and REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*.[19] CNSC staff also stated that OPG would have to consider factors such as climate change and the Fukushima Action Items that were relevant to site preparation and beyond.

119. Asked by the Commission if the province of Ontario had provided any further direction regarding the DNNP, the OPG representative informed the Commission that the project was currently on hold.

120. The President requested comments from municipal representatives about the municipal land use plans near the DNNP site. The Municipality of Clarington representative informed the Commission that its official land use plan was reviewed and approved by council in November 2016, approved by the Region of Durham in 2017, and was in line with the 2014 provincial policy statement. The Region of Durham was also working to bring its land use official plan in line with the provincial policy.

121. The Commission further enquired about the municipal by-laws in respect of zoning around the DNNP. The Municipality of Clarington representative stated that the municipality was in the process of reviewing and updating its zoning by-laws for urban and rural regions to be in compliance with the Municipality of Clarington's new official land use plan and that the zoning review would be completed by June 2020.

2017 Regulatory Oversight Report on Uranium Processing and Nuclear Processing Facilities

122. With reference to CMD 18-M47, CNSC staff presented the annual Regulatory Oversight Report on the Uranium and Nuclear Substance Processing Facilities in Canada: 2017 (the UNSPF ROR). This report summarized the performance of all uranium and nuclear substance processing facilities in all 14 SCAs, as assessed by the CNSC staff during the 2017 calendar year. The highlights of the 2017 UNSPF ROR included:

    - An assessment of the 14 SCAs with a focus on the radiation protection, environmental protection and conventional health and safety SCA, which reflected the overall effectiveness of licensee programs and the safety performance of facilities

[18] CSA N286-12, *Management Systems for Nuclear Facilities*, CSA Group, 2012.
[19] CNSC REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*, 2018.

- Confirmation that, with the exception of a "below expectations" rating for the management system SCA for the Cameco Corporation Port Hope Conversion Facility (PHCF), uranium processing facilities were rated as "satisfactory" or better in all 14 SCAs for 2017
- Confirmation that the performance of all nuclear substance processing facilities in Canada were rated as "satisfactory" or better in all 14 SCAs for 2017

123. The public was invited to comment on the UNSPF ROR through written interventions. Four interventions were received. Through the CNSC's participant funding program funding was offered to assist Indigenous Groups, members of the public and other stakeholders in reviewing the UNSPF ROR and submitting comments, in writing, to the Commission. A Funding Review Committee – independent of the CNSC – recommended that participant funding in the amount of $30,716 be granted to two intervenors:

- CELA
- Sagamok Anishnawbek First Nation

Comments from Licensee Representatives

124. The Commission invited licensee representatives to provide comments regarding the UNSPF ROR. The Cameco representative emphasized to the Commission that Cameco's priority was the safety and protection of its workers, the public and the environment. The Cameco representative stated that Cameco was proud to have a "fully satisfactory" rating in conventional health and safety at its Blind River Refinery facility for the 5th year and that it had been over 11 years since that facility had experienced a lost time injury (LTI). The Cameco representative also addressed public engagement activities that Cameco had carried out in 2017 and expressed its commitment to continued safe operation of its facilities amidst challenging market conditions.

125. The BWXT Nuclear Energy Canada (BWXT) representative informed the Commission that no LTIs occurred, and radiation or environmental action levels were not exceeded, in 2017, which was the first full year of operation for BWXT since the transfer of ownership from General Electric Hitachi.[20] The BWXT

[20] Canadian Nuclear Safety Commission, Record of Decision – GE-Hitachi Nuclear Energy Canada Incorporated – *Application to Transfer and Amend Licence, Request to Accept Financial Guarantee*, December 9, 2016.

representative also stated that BWXT had a good conventional health and safety record and highlighted the company's effective public engagement and outreach program.

126. The Best Theratronics representative reported that, in 2017, Best Theratronics maintained its radiation protection, health and safety and environmental protection program in compliance with regulatory requirements.

127. The Commission notes that industry representatives from SRB Technologies (Canada) Inc. (SRBT) and Nordion (Canada) Inc. (Nordion) were available to answer questions during the proceeding but did not provide opening comments.

128. With reference to the written submission from the CELA, the Commission President noted that, as in CELA's intervention filed for the November 8, 2018 public Commission meeting,[21,22] the intervenor had commented on procedural matters that were unrelated to the UNSPF ROR. The Commission President made it clear that interventions were invited to allow for the review of and provision of comments on the UNSPF ROR, not procedural issues, and that the Commission's consideration of the UNSPF ROR was not the appropriate forum for a discussion on such procedural matters. The Commission also stated that the CNSC was considering the intervenor's November 2018 submission in this regard during the its review of the format of RORs, and of the CNSC's processes and procedures.

129. The President added that the Commission did not have any concerns that its treatment of intervenors gave rise to a reasonable apprehension of bias, perceived or real, on the Commission's part, or that the duty of fairness has been breached as a result of the structure of the Commission public meeting process.

Written Interventions

130. In considering the intervention from Northwatch, the Commission enquired about the potential for tritium contaminated water to migrate into the environment and the municipal water system in Pembroke. The SRBT representative informed the Commission that tritium contamination at SRBT resulted mainly from historical air emissions that were deposited onto the ground from the beginning of SRBT operations in 1990 to the early 2000s. The

[21] Canadian Nuclear Safety Commission, *Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting Held on November 8, 2018*.
[22] CMD 18-M39.5, *Submission from the Canadian Environmental Law*, November 2018.

SRBT representative added that tritium emissions had since been reduced by 97% and that the underground water flow was slow enough for the tritium to decay below the Ontario drinking water guideline of 7,000 Bq/L[23] by the time the groundwater reached the boundary of the SRBT property. The SRBT representative also stated that only two of the 50 on-site monitoring wells were over the Ontario drinking water guideline for tritium, compared with 10 in 2007. CNSC staff indicated that the contaminated monitoring wells highlighted in the intervention were not used for drinking water and were strictly for monitoring purpose, and that environmental monitoring had confirmed that the environment near SRBT and the Muskrat River remained protected.

131. Further on the tritium contamination around SRBT, CNSC staff informed the Commission that the tritium found in the monitoring wells outside of the licensed property that were highlighted in the intervention from Northwatch also resulted from historical airborne deposition rather than migration of contaminated groundwater. CNSC staff also summarized the findings from the tritium synthesis studies that were presented to the Commission in November 2017.[24] CNSC staff confirmed that it was satisfied with the groundwater monitoring in place around SRBT and that the monitoring showed that the public and environment in the vicinity of SRBT remained protected.

132. The Commission enquired about the cancellation of the environmental objective to assess an alternate location for the incinerator sampling point at the Cameco's Blind River Refinery, as raised in the intervention from Northwatch. The Cameco representative explained that moving the sampling location was no longer required after Cameco successfully made modifications to improve the analyzer performance.

133. Regarding the comment made by Northwatch about CNSC staff making conclusions based on the Independent Environmental Monitoring Program (IEMP) sampling results, CNSC staff explained to the Commission that a licensee's compliance with environmental protection requirements was verified by reviewing the licensee environmental monitoring data and by performing site inspections. CNSC staff added that the IEMP was the CNSC's own program, not part of licensee compliance activity, and involved taking samples outside the licensed area for

[23] Schedule 3, Table 2, item 59. of the *Ontario Drinking Water Quality Standards* (O. Reg. 169/03 under the *Safe*
Drinking Water Act, 2002, S.O. 2002, c. 32.) provides for the drinking water limit for tritium in Ontario.
[24] CNSC document CMD17-M48, *Update on the implementation of recommendations from the Tritium Studies Synthesis Report*, November, 2017.

confirmation of licensee results.

134. The Commission enquired about whether there was a requirement of waste minimization for licensees, noting that in its intervention, Northwatch indicated that waste minimization was discretionary. CNSC staff indicated that waste minimization was a criterion that was assessed in considering the effectiveness of a licensee's waste management program, noting that CSA Groups standards and a licensee's Licence Conditions Handbook (LCH) provide specifications in this regard. CNSC staff also noted that CNSC staff did not impose a level of waste minimization or the way by which a licensee should minimize the waste. CNSC staff added that waste minimization would be included in a new waste management REGDOC presently being drafted.

135. In relation to the production level information for the Blind River Refinery requested by Northwatch, the Commission noted the proprietary nature of this information but asked if there was a correlation between the production level and the emission levels. The Cameco representative indicated there was not a direct relationship, but that there was some relationship between the production and emission levels.

136. With reference to the intervention from CELA, the Commission enquired about the proprietary nature of the licensees' environmental protection programs, waste management programs and preliminary decommissioning plans, noting that SRBT was the only licensee to have provided the requested program information to CELA. The Cameco representative explained that the market was very competitive and that many resources were required in developing those. The Cameco representative also stated that using the Access to Information and Privacy (ATIP) request process enabled the licensees to respond to information requests and redact documents, but acknowledged that it might not be ideal for the intervenors. The Cameco representative noted that Cameco had developed summaries of some key program documents and posted them on its corporate website in an effort to provide intervenors with additional information.

137. Further on the public availability of the licensee program documents, the Commission asked whether there was a way for intervenors to understand the environmental protection approach of the licensee without obtaining the program documents. CNSC staff explained that, before recommending that the Commission issue a licence, CNSC staff reviewed and carried out an in-depth technical assessment in regard to an applicant's environmental protection program, waste management programs and preliminary

decommissioning plans. CNSC staff added that supporting program information, like the environmental risk assessment (ERA), could inform the public and that the ERAs for six facilities had been provided to the intervenor in preparation for this meeting.

138. Further on this topic, the BWXT representative explained that BWXT also considered some of the information in those program documents proprietary and added that BWXT was ready to answer specific questions and meet with concerned parties if that was requested. The Nordion representative noted that some of the program documents contained proprietary information and that Nordion's preference was to share the specific information sought by intervenors as opposed to sharing the general documents. The Best Theratronics representative informed the Commission that CELA's request was not received but noted that the ERA had been provided to CNSC staff, as requested.

139. Noting the comments about the IEMP, including monitoring frequency, submitted in the intervention from CELA, the Commission enquired about whether CNSC staff published in advance which facilities would be monitored by the IEMP in the upcoming year. CNSC staff explained that IEMP site selection was a risk-based decision based on multiple factors such as upcoming licensing hearings, the creation of a baseline for all the facilities or Indigenous engagement requests. CNSC staff added that the IEMP site selection was usually performed around December or January for the upcoming year and that notifications were sent to Indigenous communities and municipalities before samples were taken, but that these dates were not included on the CNSC website. CNSC staff further added that the monitoring results were on an IEMP-dedicated page on the CNSC website with links where members of the public could request technical reports.

140. Asked for comments about licensee-specific action levels as raised in the intervention from CELA, CNSC staff explained to the Commission that action levels were set by the licensees and were based on operational considerations. CNSC staff added that CNSC staff reviewed all licensee action levels.

141. The Commission considered the intervention from the Sagamok Anishnawbek (Sagamok) and noted that, during the presentation of the UMM ROR (CMD 18-M48), the Commission had discussed many of the issues raised by the Sagamok at that time. In regard to the UNSPF ROR, the Commission asked about CNSC staff's plan to strengthen its relationship with the Sagamok

about USNPF licensed activities. CNSC staff explained that CNSC staff planned to meet with the Sagamok in the coming months to discuss a specific work plan based on this intervention and the Sagamok's priorities. The Commission thanked the Sagamok for the survey carried out in regard to awareness of the CNSC and CNSC-licensed activities in its communities and suggested that CNSC staff should consider doing similar before and after engagement activities to gauge any improvement in awareness.

General Questions

142. Asked by the Commission about processing uranium from other countries at the Blind River Refinery, the Cameco representative explained that the Blind River Refinery processed uranium ore concentrates from around the world, such as from Kazakhstan and Australia and that 30 to 40 percent of the Blind River Refinery throughput was from outside Canada.

143. The Commission asked for details regarding the gamma dose exceedance at the fence line of the Cameco Fuel Manufacturing facility. The Cameco representative explained that a dosimeter mounted on the fence line of the facility registered an increasing trend in gamma radiation due to a nearby fuel bundle storage facility. The Cameco representative added that Cameco had constructed a berm to effectively shield the radiation and that gamma levels had dropped significantly and below action levels since the remediation work.

144. In relation to the Administrative Monetary Penalty (AMP) issued to Cameco in 2017 for non-compliance with the PHCF management system,[25] the Commission asked for details concerning the two root causes and the corrective actions. CNSC staff informed the Commission that the root causes were related to permit identification and safety clearance processes. CNSC staff added that the corrective actions included the development of an improved maintenance practice for assigning work to shift maintenance employees, the improvement of the task cards and the assessment of the PHCF's audit program. CNSC staff further added that CNSC staff verified and was satisfied of the implementation of the corrective actions.

145. Further on this matter, the Commission enquired about the relationship between Cameco's non-compliances in management system since 2014 and the current event. CNSC staff presented

[25] http://www.nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-action/cameco.cfm

that CNSC staff issued non-compliance enforcement action with every non-compliance found, tracked the corrective actions that Cameco implemented and followed up to ensure that the corrective action had been implemented.

146. The Commission enquired about whether Cameco's performance in regards to management systems was representative of the rest of the industry. CNSC staff commented that across various industries regulated by the CNSC, non-compliances to procedures were occasionally observed and required corrective actions in this regard.

147. The Commission asked for comments on the actions taken by SRBT following the three lost time injuries (LTI) in 2017. The SRBT representative stated that the 2017 LTIs were related to a lacerated hand from an individual changing a blade on a knife, back pain resulting from improper lifting technique and shoulder strain related to repetitive tasks. The SRBT representative also provided information about the corrective actions that were implemented following the injuries, such as training and coaching.

148. The Commission asked about the guideline for uranium in ambient air of 0.03 µg/m^3 and for groundwater of 0.2 µg/m^3. CNSC staff indicated that the ambient air guideline was a guideline from the Ontario Ministry of the Environment and Climate Change[26] that the CNSC had adopted and that it represented the point of impingement. Regarding the water concentration guidelines, CNSC staff informed the Commission that it did not have detailed information on this issue but would prepare and provide an answer to the Commission at a later time. The Commission expects a memo to be provided to it on this topic at a later date.

ACTION
by
April 2019

DECISION ITEM: Establishing New Classes of Licences for the Regulation of Hadron Therapy Facilities

149. With reference to CMD 18-M64, CNSC staff presented to the Commission a proposal to establish, under subsection 24(1) of the *Nuclear Safety and Control Act*[27] (NSCA), new classes of CNSC licences to facilitate the licensing of hadron therapy facilities[28] by

[26] Ontario Ministry of the Environment and Climate Change, *Ontario's Ambient Air Quality Criteria - Sorted by Contaminant Name*, December 2016.
[27] S.C. 1997, c.9
[28] Hadron therapy is a form particle accelerator external beam radiotherapy which, in the Canadian setting, will primarily use protons to treat patients with certain types of cancer.

specific CNSC Designated Officers (DOs), including the Executive Vice-President and Chief Regulatory Operations Officer and Directorate of Nuclear Substance Regulation (DNSR) staff. Dedicated hadron therapy facilities, which are not yet operated in Canada, operate with a beam energy above 50 MeV. As such, these facilities would be regulated as Class IB facilities under the *Class I Nuclear Facilities Regulations*[29] (Class I Regulations). Although the Commission has, pursuant to section 37 of the NSCA, authorized DOs to carry out licensing authorities for Class II facilities,[30] CNSC DOs have not been authorized to carry out the licensing authorities for Class I facilities. Therefore, all licensing activities for Class I facilities, including those for Class IB hadron therapy facilities, currently must be carried out by the Commission.

150. In its presentation, CNSC staff provided the Commission with information about hadron therapy and with a risk-based analysis of hadron therapy facility regulation, noting that the level of risk to the public, workers and the environment was assessed to be lower than currently-licensed Class IB facilities. CNSC staff explained that authorizing DOs to carry out licensing authorities for Class IB hadron therapy facilities would allow for expeditious regulatory decision making which would benefit Canadian cancer patients, most of whom currently access this therapy in the United States (US), while ensuring that safety is not compromised. CNSC staff also provided information on its proposal for the regulation of these facilities, which included proposing that the Commission establish three new classes of licences and authorization of DOs to carry out licensing activities in respect of hadron therapy facilities under paragraphs 37(2)(c) and (d) of the NSCA. CNSC staff clarified that its proposal was solely applicable to the regulation of hadron therapy facilities and no other Class IB facilities.

Technical Assessment and Risk Profile

151. The Commission enquired about how the neutron flux during the operation of a hadron therapy unit compared to the neutron flux of a medical linear accelerator during its operation. CNSC staff explained that the neutron flux during a hadron double scattering treatment was higher than the neutron flux of an operating medical linear accelerator. However, the neutron flux during a hadron pencil beam scanning treatment was similar to the neutron

[29] SOR/2000-204
[30] Class II facilities, as defined by the *Class II Nuclear Facilities and Prescribed Equipment Regulations*, SOR/2000-205.

flux of a medical linear accelerator.

152. The Commission also enquired about neutron shielding for hadron therapy facilities. CNSC staff explained that secondary neutron production during hadron therapy was well understood and that a Monte Carlo simulation[31] was used to model neutron flux of hadron therapy facilities during various treatment modalities to ensure that patient and worker exposure to neutrons was limited. CNSC staff also confirmed that neutron shielding was a primary design consideration for hadron therapy facilities.

153. The Commission considered the benchmarking carried out in regard to the international regulatory approach for hadron therapy facilities, medical linear accelerators and isotope production accelerators, noting that a more informative comparison might have shown whether hadron therapy facilities were regulated in a manner similar to Class I or Class II facilities internationally. CNSC staff provided additional information about the regulation of hadron therapy facilities internationally, noting that the US Nuclear Regulatory Commission's requirements in this regard were implemented at a state level, and were equivalent to those for Canadian Class II facilities.

154. The Commission examined the risk profile comparison of hadron therapy facilities versus existing Class IB and Class II accelerator facilities by safety and control area (SCA), as provided by CNSC staff in Table 1 of CMD 18-M64. The Commission requested additional information about the regulatory oversight of the maintenance of hadron therapy facilities, including systems such as interlocks and shielding, as well as the training of facility technicians and operators. CNSC staff explained that DNSR DOs were currently carrying out effective regulatory oversight of Class II facilities that had similar risks and implemented similar safety measures to those of the proposed hadron therapy facilities. CNSC staff further stated that it had determined that the current regulatory oversight carried out by DNSR DOs and supporting CNSC staff for Class II facilities and prescribed equipment could be adequately adapted to ensure the required regulatory oversight and safety of Class IB hadron therapy facilities.

155. Further on the maintenance and operation of hadron therapy facilities, CNSC staff provided information about the technical assessment that would be conducted by CNSC staff should a

[31] Monte Carlo simulations are a statistical method used to model the impact of risk and uncertainty of a process through random sampling (in this case, the neutron flux of a hadron therapy unit) that cannot be easily predicted because of the potential for the introduction of random variables. (Source: http://news.mit.edu/2010/exp-monte-carlo-0517).

complete application to construct a hadron therapy facility be submitted, noting that this assessment would have to meet the requirements of Class I Regulations, and would consider the design and operation of the facility. CNSC staff also explained that the Class I Regulations required an applicant to include information about the maintenance of the facility, as well as training and qualification of operators, in an application for a licence to construct a Class I facility.

156. The Commission requested more detail in respect of the safety analysis SCA which noted that hadron therapy facilities were "similar to medical electron accelerators but somewhat less standardized and more complex." CNSC staff explained that, in regard to the safety analysis of a proposed facility, CNSC staff would review the design of the facility, as well as potential malfunctions, to assess the adequacy of measures proposed by an applicant. CNSC staff further explained that, despite having been used for 50 years, hadron therapy had greatly evolved and matured in the last 10-15 years, and was therefore considered an emerging and changing technology with new entrants in the industry. As such, their assessment was more complex than a standard medical accelerator. CNSC staff emphasized, however, that the three potential vendors in the Canadian market had similar technologies.

157. The Commission enquired about whether the proponents of hadron therapy facilities would be developing this technology for use in Canada or whether they would be using existing technology. CNSC staff responded that hadron therapy technology was well established and that the equipment that would be proposed by a proponent for use in Canada would reflect existing technology. CNSC staff also stated that, prior to their use, hadron therapy units needed Health Canada (HC) approval, noting that HC had already approved one model of hadron therapy unit for use in Canada.

Proposed Licensing Process for Hadron Therapy Facilities

158. The Commission, in considering the risk profile of hadron therapy facilities as presented by CNSC staff, and the importance of the technology in respect of the health of Canadian patients, enquired about how the licensing process for a proposed hadron therapy facility would differ if it was carried out by a DO rather than by the Commission. CNSC staff explained that, since licensing would be carried out by a DO under section 37 of the NSCA, a public hearing would not be required, thus streamlining the

licensing process and reducing the associated timeline by several months. CNSC staff emphasized that its proposal in this regard was intended to ensure that Canadian patients had access to hadron therapy in Canada as soon as possible, rather than being referred to hadron therapy facilities in the US. CNSC staff also noted that DOs could at any time refer a matter back to the Commission should a need arise.

159. Further on this issue, CNSC staff confirmed that all technical assessments of an application, across all 14 SCAs and as required by the Class I Regulations, would be carried out by CNSC staff, and that an applicant would have to meet all CNSC regulatory requirements prior to a DO issuing a licence to construct. CNSC staff also confirmed that Indigenous engagement, financial guarantees and other matters of regulatory and licensing importance were always considered by a DO prior to the issuance of a licence and were not diluted in any way through the DO licensing process.

160. The Commission enquired about the financial guarantee and decommissioning plan requirements for Class IB versus Class II facilities. CNSC staff explained that both the Class I and Class II Regulations required that an application for a licence in respect of a facility had to include information about the proposed decommissioning of the facility. CNSC staff also stated that, although not a regulatory requirement, all existing Class I and Class II licences included a licence condition to maintain a financial guarantee in a form acceptable to the Commission and confirmed that this licence condition would apply to hadron therapy facility licensing as well.

161. In response to the Commission’s enquiry about the status of the application submitted for the construction of a hadron therapy facility in Canada, CNSC staff explained that the application was currently undergoing a preliminary technical assessment by CNSC staff and that some outstanding information still had to be submitted by the applicant. CNSC staff also informed the Commission that the applicant had hoped to start treating patients in 2020 and that, in the interest of the health of Canadians and considering that the level of risk associated with the proposed facilities was similar to that of facilities for which DOs currently have licensing authorities, CNSC staff was of the view that requesting Commission authorization to allow DOs to license hadron therapy facilities was appropriate.

Regulatory Oversight

162. The Commission noted that, to date, DOs had not been authorized to carry out licensing activities for Class I facilities and enquired about DNSR's readiness in this regard. CNSC staff informed the Commission that DNSR was the directorate that was currently carrying out all regulatory oversight activities in respect of, as well as technical assessments of, Class IB accelerator facilities and was very experienced with the regulation of these facilities. CNSC staff further noted that, since DNSR already had a well-developed regulatory oversight program for Class IB accelerator facilities, DNSR was prepared to carry out oversight of the hadron therapy facilities.

163. Noting that this would be a first-of-its-kind facility in Canada, the Commission enquired about how CNSC staff would ensure adequate regulatory oversight while gaining operational and regulatory experience with hadron therapy technology. CNSC staff stated that, although its regulatory oversight strategy for hadron therapy facilities was not yet fully developed, through its experience with the regulation of Class IB and Class II accelerator facilities, and through the operating experience and lessons learned from international operation of hadron therapy facilities, CNSC staff was well-equipped to inform the regulatory oversight strategy for this technology. CNSC staff also stated that, as part of its hadron therapy facility licensing strategy, the licence would include hold points prior to the authorization of project phases such as commissioning and operation, with experienced senior CNSC staff responsible for the release of such hold points.

164. The Commission considered CNSC staff's proposal to change, through a future Class II Regulations amendment, the parameter for the delineation between Class II particle accelerators and particle accelerators that are defined as Class IB nuclear facilities, from beam energy to beam power. The Commission expressed the concern that more complex research and isotope production accelerator facilities, which posed a much greater risk to workers and the public and should remain as Class IB facilities, could potentially be captured by the proposed Class II Regulations amendments. CNSC staff, acknowledging the higher risks presented by more complex accelerator facilities, explained that the proposed amendments to the Class II Regulations specifically considered this scenario and that Class IB facilities would not be captured in the amended Class II Regulations and would remain Class IB facilities.

Commission Decision

165. The Commission examined the information provided in regard to hadron therapy facilities and the regulation of this technology in Canada, and appreciates the importance of timeliness in respect of determining the appropriate level of regulation for this technology and the potential for the Commission's decision in this matter to affect the health of Canadians.

166. The Commission recognizes that no dedicated hadron therapy facilities are currently in operation in Canada and that any proposed hadron therapy facility would be a first-of-its-kind facility in Canada. Notwithstanding the international benchmarking of the regulation of this technology or its risk level as presented by CNSC staff, the Commission notes that there is certain information which would inform the Commission's decision in respect of allowing DOs to carry out licensing authorities for these facilities, information that is not yet available or was not presented in sufficient granularity to the Commission:
    - details about the CNSC regulatory model and strategy for hadron therapy facilities, including siting, construction and operational considerations;
    - actual risk to workers and the public presented by the operation of hadron therapy facilities; and
    - public interest in respect of CNSC regulation of hadron therapy facilities.

167. On this basis and at this time, the Commission

    - does not establish new classes of licences in respect of hadron therapy facilities; and

    - does not authorize DOs to carry out licensing authorities as defined in paragraphs 37(2)(c) and (d) of the NSCA in respect of hadron therapy facilities.

DECISION

168. The Commission's decision in this matter is not a reflection of the Commission's confidence in CNSC staff's regulatory oversight activities or in DO decision making. However, for the reasons noted above, the Commission is of the view that extending the licensing process by several weeks to allow for a Commission public hearing process is appropriate and will not negatively impact the timely provision of hadron therapy to Canadian patients.

169. Noting that a full licence application for hadron therapy facilities may be received in the near future, the Commission expects

CNSC staff to ensure its readiness to undertake a Commission hearing process which will ensure the Commission's timely consideration of such an application. The Commission notes that the format of any future proceeding and the Commission's decision to provide the public an opportunity to intervene shall be decided at such time that an application is submitted.

170. Based on the information presented, the Commission agrees with CNSC staff's findings that the regulation of hadron therapy facilities may be better suited under the Class II Regulations. The Commission directs CNSC staff to continue the work that has been initiated by CNSC staff for the amendment of the Class II Regulations and to bring forth recommendations in this regard.

Closure of the Public Meeting

171. The meeting closed on December 13, 2018 at 3:54 p.m.

Recording Secretary	Feb. 26, 2019 Date
Charles Morean Recording Secretary	Feb. 26, 2019 Date
Recording Secretary	Feb. 26. 2019. Date
Secretary	26-02-2019 Date

APPENDIX A

18-M59	2018-10-31	5635757
Notice of Commission Meeting		
18-M60	2018-11-28	5635967
Agenda of the Meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, December 12 and 13, 2018, in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
18-M60.A	2018-12-07	5725323
Updated Agenda of the Meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, December 12 and 13, 2018, in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
18-M60.B	2018-12-11	5732568
Revised Agenda of the Meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, December 12 and 13, 2018, in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario		
18-M61	2018-12-11	5732697
Approval of the Minutes of Commission Meeting held on October 3 and 4, 2018		
18-M48	2018-10-12	5561699
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from CNSC Staff		
18-M48.A	2018-12-12	5727218
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Presentation from CNSC Staff		
18-M48.4	2018-11-13	5712171
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the English River First Nation, represented by C. Campbell		
18-M48.5	2018-11-13	5712200
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Ya'thi Néné Land and Resource Office, represented by M. Dawe and P. Denechezhe		

18-M48.7	2018-11-13	5712237
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Prince Albert Grand Council, represented by A. Al Mamun, H. Michell and R. Augier		
18-M48.7A	2018-12-05	5728313
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Revised written submission from the Prince Albert Grand Council		
18-M48.10	2018-11-23	5717599
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Sagamok Anishnawbek		
18-M48.10A	2018-12-05	5728319
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Presentation from the Sagamok Anishnawbek, represented by R. Assinewe and D. Erickson		
18-M48.11	2018-11-27	5721861
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Athabasca Chipewyan First Nation, represented by J. Flett and W. McNeil		
18-M48.1	2018-11-06	5711727
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Athabasca Joint Engagement and Environmental Subcommittee		
18-M48.2	2018-11-09	5711717
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Métis Community of Pinehouse		
18-M48.3	2018-11-13	5711702
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Canadian Nuclear Workers'Council		

18-M48.6	2018-11-13	5712230
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Saskatchewan Environmental Society		
18-M48.8	2018-11-13	5712249
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Canadian Environmental Law Association		
18-M48.9A	2018-12-03	5725730
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Revised submission from Northwatch		
18-M48.12	2018-11-27	5721870
Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2017 Submission from the Algonquins of Ontario		
18-M64	2018-11-28	5718546
Establishing new classes of licence for the regulation of hadron therapy facilities Submission from CNSC Staff		
18-M64A	2018-12-12	5728094
Establishing new classes of licence for the regulation of hadron therapy facilities Presentation from CNSC Staff		
18-M63	2018-12-04	5727266
Status Report on Power Reactors Submission from CNSC Staff		
18-M62	2018-12-11	5732837
Bruce Power: Transformer Fire and Mineral Oil Leak at Unit 8 of Bruce B Nuclear Generating Station Written submission from CNSC Staff		
18-M62.1	2018-12-11	5731533
Bruce Power: Transformer Fire and Mineral Oil Leak at Unit 8 of Bruce B Nuclear Generating Station Presentation from Bruce Power		

CMD		
18-M55.1	2018-10-11	5712587
Ontario Power Generation (OPG): Mid-Term Report on Results of Compliance Activities and Performance of OPG`s Darlington New Nuclear Project Submission from Ontario Power Generation		
18-M55.1A	2018-12-05	5728298
Ontario Power Generation (OPG): Mid-Term Report on Results of Compliance Activities and Performance of OPG`s Darlington New Nuclear Project Presentation from Ontario Power Generation		
18-M55	2018-11-27	5721362
Ontario Power Generation (OPG): Mid-Term Report on Results of Compliance Activities and Performance of OPG`s Darlington New Nuclear Project Submission from CNSC Staff		
18-M55.A	2018-12-13	5727164
Ontario Power Generation (OPG): Mid-Term Report on Results of Compliance Activities and Performance of OPG`s Darlington New Nuclear Project Presentation from CNSC Staff		
18-M47	2018-10-05	5617111
Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017 Submission from CNSC Staff		
18-M47.A	2018-12-13	5644018
Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017 Presentation from CNSC Staff		
18-M47.1	2018-11-13	5711894
Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017 Submission from the Canadian Nuclear Workers’Council		
18-M47.2	2018-11-13	5711922
Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017 Submission from Northwatch		
18-M47.3	2018-11-19	5715228
Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017 Submission from the Canadian Environmental Law Association		

18-M47.4	2018-11-23	5717628
Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017 Submission from the Sagamok Anishnawbek		
18-M65	2018-12-04	5726609
Isologic Innovative Radiopharmaceuticals Ltd – Exceedance of the regulatory dose limit for extremities by a Nuclear Energy Worker Submission from CNSC Staff		