Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on March 25 and 26, 2015

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Canada

Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held Wednesday, March 25, 2015 and Thursday, March 26, 2015 at the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario.

Present:

M. Binder, President
A. Harvey
D.D. Tolgyesi
R. Velshi
S. McEwan

M. Leblanc, Secretary
L. Thiele, Senior General Counsel
S. Dimitrijevic, Recording Secretary

CNSC staff advisors were: B. Howden, M. Langdon, T. Gates, J. LeClair, D. Newland, B. Torrie, S. Simic, C. Moses, S. Fundarek, P. Thompson, K. Francis, S. Jovanovic, M.-P .Grondin, E. Dagher, A. McAllister, M. Rickard, G. Frappier, L. Sigouin, F. Rinfret and C. Carrier

Other contributors were:

- Ontario Power Generation Inc.: L. Swami, R. Manley, K. Gilbert and J. Peters
- New Brunswick Power: S. Granville, J. Nouwens and D. Mullin
- Bruce Power: F. Saunders and F. Guglielmi
- Cameco Corporation: L. Mooney, B. Moldovan, K. Himbeault, K. Nagy and B. Moldovan
- VGS Solutions: V. Snell
- Office of the Fire Marshal and Emergency Management: T. Kontra, A. Suleman and D. Nodwell
- New Brunswick Emergency Management Office: G. MacCallum
- Health Canada: D. Quayle and L. Bergam
- Natural Resources Canada: J-F. Lafaille
- Atomic Energy of Canada Limited and Canadian Nuclear Laboratories Ltd.: B. Walker and J.Lundy

Constitution

1. With the notice of meeting CMD 15-M6 having been properly given and all permanent Members of the Commission being present, the meeting was declared to be properly constituted.

2. Since the meeting of the Commission held November 5, 2014, Commission Member Documents CMD 15-M6 to CMD 15-M16.1 were distributed to Members. These documents are further detailed in Annex A of these minutes.

Adoption of the Agenda

3. The revised agenda, CMD 15-M7.A, was adopted as presented.

Chair and Secretary

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

Minutes of the CNSC Meeting Held February 4, 2015

5. The Commission Members approved the minutes of the February 4, 2015 Commission Meeting as presented in CMD 15-M8.

STATUS REPORTS

Status Report on Power Reactors

6. With reference to CMD 15-M9, which includes the Status Report on Power Reactors, CNSC staff presented updates on the following items:

   - Point Lepreau NPP unplanned outage: CNSC staff informed the Commission that the fuelling machine had been repaired and was undergoing further maintenance prior to the unit returning to service.

   - Suspect material used to manufacture valves: CNSC staff informed the Commission that the NPP licensees had received, between February 26 and March 13, 2015, letters from their supplier indicating that material properties of certain supplied valves may not meet required specifications. These valves were considered 'suspect' and are reportable under REGDOC 3.1.1, *Reporting Requirements for Nuclear Power Plants*. CNSC staff noted that all licensees' engineering assessments have shown no immediate safety concerns, and added that CNSC staff will continue to update the Commission as further information is provided by the licensees. A detailed report is expected by June 2015.

ACTION
by
June 2015

Point Lepreau Fuelling Machine

7. The Commission sought more information regarding the fuelling machine problem at the Point Lepreau NPP. A representative from NB Power explained the fuelling operation during which the fuelling machine that had been receiving irradiated fuel became inoperable. Following their operational decision-making process, after evaluating the situation, the management determined that the

reactor was in a safe state and decided to shut it down, take action to solve the issue and restart. The NB Power representative added that this was not an unexpected problem and is a known maintenance issue that is dealt with through preventive maintenance. There is a proposed design modification that would possibly prevent this malfunction; however, this had not been part of the original refurbishment assessment, and the position of the industry has been to do preventive maintenance on a certain schedule.

8. The Commission suggested that future status reports and submissions by the licensees be written with more clarity and using simple language understandable for a non-engineer audience.

Suspected Valves

9. The Commission sought more information on the suspect valves and the safety of their operation. CNSC staff and representatives of licensees provided details regarding the number of valves in each NPP. CNSC staff added that the licensees had conducted technical operability evaluations or engineering assessments on all the installed valves and had concluded that these valves were safe for continued operation. The licensees had also reviewed their operational experience and maintenance histories to conclude that there were no deficiencies or corrective work orders with any of these valves.

10. The Commission asked whether the problem with suspect valves was limited to Canada. CNSC staff responded that the problem had an international dimension since the valves in question were purchased from an international supplier. The Bruce Power (Bruce) representative explained that the problem was caused by material used by one of the valve manufacturers and informed the Commission about Bruce's analyses and review of the original valve specifications to satisfy itself that the safety case had been met. The Bruce representative added that Bruce was checking all other work orders with the company in question, as well as with others, to see if any of those might be an issue. The Bruce representative further noted that, according to the conducted reviews and analyses, there is no need for replacement of the valves checked so far.

11. The Commission asked if the same material was used in other components. The Bruce representative responded that they had identified and were already verifying all the materials with significant quality assurance requirements. The Bruce representative noted that several legal actions had been taken against the material supplier in the United Kingdom, and that the supplier had been removed from all of their supplier lists.

12. The Commission sought more details regarding the origin of steel used for manufacturing the affected valves. The Bruce representative explained the whole line of supply. The Bruce representative further explained that the problem with the suspect valves had originated with the materials' testing company and specifications on steel properties issued by this company.

13. The Commission enquired about the quality assurance (QA) of the materials and components used in power plants. The Bruce representative responded that the company has its own audit programs, especially for larger and more significant components, but also relies on collaboration within the nuclear industry. The Bruce representative described practical aspects of testing and tracking of purchased materials and components and pointed out that the collaboration within the industry has shown good results so far.

14. The Commission asked about the extent of damage that could result from the malfunction of affected valves, and about actions envisaged to prevent those. The Bruce representative responded that the extent of potential damage depends on the size, type and position of valves. Typically, a leak would occur and cause an unplanned shutdown. The Bruce representative explained multiple layers of QA and safety. The OPG representative also explained testing protocols and purchasing practices to ensure that the materials used strictly correspond to safety codes and manufacturers' certificates.

15. The Commission asked if this was an isolated event or if there were other similar events. CNSC staff responded that they were aware of events where the procurement programs of some of the licensees had caught some components before they entered the plant. CNSC staff added that they expect the response from the industry to result in lessons that the licensees need to make changes within the procurement process in order to prevent suspect items to get into the plants.

16. The Commission enquired about sharing the information with the rest of the industry and on an international level. The OPG representative responded that this information had been shared among all the licensees in Canada and that all of them had conducted identical actions. The OPG representative added that the information had been shared through operational experience, the World Association of Nuclear Operators and the Institute of Nuclear Power Operations.

Emergency Generators at Pickering NPP

17. The Commission sought more information regarding the emergency generators at Pickering NPP and their fitness for

operation under extreme and beyond design conditions. The Commission expressed concerns about the acceptability of design of generators that might affect their efficiency under extreme conditions. A representative from OPG explained the functioning and automatic start of their emergency generators and provided more detail about operating parameters, setting for operation under extreme cold conditions, and the provisions taken until repairs are done. CNSC staff noted that this issue was about degradation of mitigation measures in place under given conditions rather than acceptability of the design criteria. CNSC staff noted that they intend to revisit this aspect of operation at the Pickering NPP. The OPG representative added that, in spite of reduced availability, their emergency generators were available for mitigation of a potential accident that might have occurred under extreme conditions. The OPG representative stressed that their action levels are set in such a manner that there is a substantial margin between the limits of operation and the limits of safety.

18. The Commission asked about reporting and whether OPG was conducting a root cause analysis. The OPG representative responded that, within their corrective action program, they were conducting a high level documented investigation and taking steps to improve the components of the system.

Event Initial Report (EIR)

Cameco Corporation (Cameco): Key Lake Mill Event

19. With reference to CMD 15-M16.1 and CMD 15-M16, representatives from Cameco and CNSC staff presented information regarding an unplanned release of uranium dust in the work space at Cameco Corporation (Cameco) Key Lake Mill that occurred on February 16, 2015. During the event, an amount of calcined uranium was released through a breach in the transport duct line into the area of the yellow cake building. Representatives from Cameco described the functioning of the calciner, and outlined steps taken to ensure that workers' health and safety were protected and to prevent a recurrence in the future.

20. The Cameco representative informed the Commission that the company had initiated a root cause analysis that would encompass the earlier January event. The final report on this event is expected by the end of April 2015. Cameco's corrective action process will ensure that lessons learned would be shared with all Cameco operations, according to the company representative.

21. CNSC staff informed the Commission about their review of the report submitted by Cameco and about actions taken in response to the event. CNSC staff reported on the results of the inspection

conducted February 23 and 24, 2015 as well as about their review of Cameco's corrective actions. CNSC staff was satisfied with Cameco's immediate actions to address the event and to enable a safe restart of the calciner and the mill.

22. CNSC staff added that they had issued a request according to subsection 12(2) of the General Nuclear Safety and Control Regulations[1] (GNSCR) requesting that both Cameco and AREVA, for their operating mills, review the design and operational features in order to prevent unplanned releases of yellow cake into the work environment, to review the equipment processes and procedures that are used to monitor and identify if there is any weakening of the containment systems, to review the radiation monitoring programs, and identify corrective actions if needed. CNSC staff proposed to inform the Commission on the outcome of the final investigations and the responses to the subsection 12(2) request as part of the uranium mines and mills annual report in the fall of 2015.

ACTION by November 2015

23. The Commission sought more information regarding construction of the duct line between the calciner and quench tower, supporting elements and weld breaks and seals, and sought explanation about a potential cause for the break. Cameco representatives explained these technical details and added that the results of their engineering assessment suggested that there had been a load-bearing event on the ducting or an impact on the ducting, and the initial load-bearing episode or impact had caused the initial weld seal failure. This initial weld seal break had been followed by 11 other weld failures. Cameco representatives added that calcined uranium is a heavy product and explained that its cascading and accumulation had resulted in overload and collapse of the ducting.

24. The Commission asked if the same explanation could be applied to the January 2015 event. Cameco representatives responded that the two events had occurred at different points of the calcination process and thus on different systems of the calciner facility. CNSC staff noted that the two events were not related, since the February one seems to be caused by an impact.

25. The Commission enquired about the frequency of inspections of the integrity of the welds and monitoring of other components during the operation of the calciner. Cameco representatives responded that it was not normal practice to check the ducting and remove the insulation and cladding from that material. The Cameco representative added that the conducted inspection of the affected section of the ducting did not show problems with the thickness of that ducting and the rest of the scrubber system. The

[1] S.O.R. 2000/202

Cameco representative stated that the engineering assessment suggests that preventative and predictive maintenance would not have prevented this incident.

26. The Commission asked if an impact caused by a person could have been noticed and reported. Cameco representatives responded that the engineering assessment had showed that there had been some deformation of the cladding, but not significant enough to result in a collapse of the piping. Other results of investigation suggested that the impact had been caused by a contractor worker working on the construction of the new calciner. The worker had not taken notice of it nor provided notification to Cameco. Cameco representatives indicated that they intend to reinforce the contractors' reporting of even minor incidents. The Commission expressed concerns regarding the construction work conducted around the main system of the facility without precautionary measures to avoid potential impact and resulting damage to the system.

27. The Commission enquired about CNSC staff's decision to request the subsection 12(2) information and whether some kind of similar action could have been conducted after the January event. CNSC staff responded that the purpose of their action was to ensure that this type of event, release of a contaminant in the working area, is observed and appropriate mitigation and corrective actions are taken in the shortest time possible. Through this action, the licensees will evaluate the possibility for this type of incident, as well as take a more detailed look into design of their systems. CNSC staff provided some examples of potential improvements to the components of a calciner facility. CNSC staff added that the licensees had been approached immediately following the January event, so that the 12(2) request was only a formalization of the action that had been already initiated.

28. The Commission asked if the scope of Cameco's root cause analysis would contain factors sought in the 12(2) request. The Cameco representative responded that they had initiated the root cause investigation before receiving the 12(2) request. The scope of Cameco's investigation would encompass the issues from the request. The Cameco representative stressed Cameco's particular interest in sharing the experiences and lessons learned from both events, and noted that the same interest is present at AREVA, Cameco's joint venture partner at the Key Lake Mill.

29. The Commission asked if the CNSC inspectors, as a response to these events, intend to change some of the inspection frequency protocol checklists into other systems. CNSC staff responded that they inspect each of the operating sites about six times a year and that they intend to intensify inspections of the dryers, the calciners

and similar systems.

30. The Commission sought more information about the construction of a new calciner. The Cameco representatives provided technical details and described the construction and components of the new calciner, and explained similarities and differences between the new and the old one.

31. The Commission asked, referring to accumulation of the material in the ducting, if there were means to clean the pipes periodically. The Cameco representative responded that the ducting was designed in 1999, and inspection and cleaning were not anticipated. Since then, ports have been installed to enable inspections as well as cleaning of the duct. The acquired experience and knowledge were being transferred over to the new calciner.

32. The Commission enquired about the time between the failure and the moment of its discovery, and about the type of inspection done after the failure was discovered. The Cameco representative responded that, based on the results of urine bioassay samples collected from workers on the day of the event, the time elapsed between the failure and its discovery was rather short. The inspection to determine the extent and position of damage was done after removing the insulation and the cladding off of the ducting. The Cameco representative reiterated that routine inspections or preventative or predictive maintenance would not have prevented this failure from happening. CNSC staff expressed uncertainty regarding the failure mechanism and time elapsed between the formation of an initial crack and its discovery. Both CNSC staff and Cameco representatives stressed the importance of the ongoing root cause investigation in shedding more light on the causes of the event.

33. The Commission requested that the final report, that should include causes for the event, health consequences, results of *post-festum* monitoring of the workers, responses to the 12(2) requests, and CNSC staff's review, be presented by CNSC staff as part of the *Annual Performance Report for Uranium Mines and Mills*. **ACTION** by November 2015

DECISION ITEM

REGDOC 2.3.3 – Periodic Safety Reviews

34. With reference to CMD 15-M12, CMD 15-M12.1 and CMD 15-M12.1A, CNSC staff and Dr. V.G. Snell from VGS Solutions (consultant) presented a draft REGDOC-2.3.3, *Periodic Safety Review*, for the Commission's approval for publication and use by CNSC staff in assessing the periodic safety reviews (PSR).

35. CNSC staff provided contextual information, explained the consultation process and outcomes, and explained how the document would be implemented if approved. CNSC staff explained that a PSR is a systematic evaluation of a NPP operation against modern safety codes, standards and practices, which is usually done in 10-year intervals.

36. CNSC staff noted that the PSR methodology had already been used in Canada as a basis for the Integrated Safety Reviews (ISR) performed to support refurbishment projects, and stressed that both the Integrated Regulatory Review Service mission to Canada in 2009 and the 2011 Fukushima Task Force had recommended that the CNSC formally adopt the use of PSR.

37. The consultant presented the results of the study conducted to assess options for PSR frequency and the impact on operating licence renewals. The study encompassed several models varying in frequency of PSR and frequency of licence renewals. The methodology applied in the study included the development of evaluation criteria, an evaluation matrix and informal interviews. The criteria developed for the evaluation of presented models included safety maintenance and improvements, international practice, technology neutrality, public information and involvement, and effective use of resources.

38. Both CNSC staff and the consultant presented their recommendations to the Commission. While the consultant recommended the model based on 10-year PSR frequency and 40-year licence renewal period, CNSC staff recommended to the Commission to approve the model that encompasses 10-year PSR frequency and 10-year licence renewal period.

39. Representatives from OPG, Bruce Power and NB Power expressed their support for the proposed document, PSR concept and the 10-year frequency model, and stated that they have already in place requirements to comply with REGDOC-2.3.3. At the same time, they expressed their preference for a longer licence period, a more technical approach in presenting safety areas to the Commission for licence renewal hearings, and stressed that a large amount of administrative overhead work is needed for the preparation of licence renewal documents.

40. The Commission expressed its expectation that the proposed 10-year PSR frequency integrated with 10-year licence renewal period could reduce the amount of administrative work needed for the preparation of documentation for licence renewal since most of the technical work would be done through the PSR. Representatives from the industry stated that a significant amount of information

needs to be prepared for annual reports and that the scope of these reports in the future, as well as the whole licence renewal procedure, needs to be clarified after the introduction of the PSR in order to avoid duplication of efforts. CNSC staff noted that the implementation of the PSR, if approved, will be conducted in a way to avoid duplication of efforts. It would require that licensees regularly submit relevant information, which would be compiled by CNSC staff and used to put together the annual reports that would be presented to the Commission. In that way, the Integrated Implementation Plan would be monitored and CNSC staff, the Commission, as well as the public, would be informed on how the performance of a licensee compares to the PSR findings and the Integrated Implementation Plan.

41. The Commission commended CNSC staff for their efforts in developing the document and asked for CNSC staff's rationale for the 10-year licence period. CNSC staff responded that, after long and extensive consultations with the stakeholders, they had adopted an evolutionary approach to regulatory continuous improvement and recommended the 10-year licence renewal period. CNSC staff supported their recommendation by stating the following:

    - from the evolutionary perspective, the transition from the early two-year licences to five-year licences lasted about ten years. An immediate transition to long licence period could compromise the efficiency of the process, while a coincidence between the PSR conducted over the 10-year period and the licence renewal procedure having the same frequency would reduce the possibility of duplication of effort; and
    - if approved as recommended, the implementation of PSR through a small number of licence conditions added to the operating licences as they appear for licence renewal, would represent further safety improvements to an already sound and transparent licensing process, and would be the most efficient way for smooth introduction of PSR into the regulatory process.

    CNSC staff stressed the importance of more frequent licence renewals for transparency and an increased opportunity for public participation in the process. CNSC staff also stressed that, while a PSR evolves around physical or programmatic improvements over a given period of time, the licence renewal allows the CNSC to evaluate simultaneously and interdependently all programs covering all safety and control areas.

42. The Commission enquired about areas such as waste management, security and others which are not covered by PSRs. CNSC staff explained the flexibility that allows sensitive areas, such as

security, to be excluded from PSRs; however, the regulator can decide to include these areas in a PSR. CNSC staff further explained that they had decided, at this point, to exclude some areas since all of them would be reviewed under the licence renewal process that would, as recommended, coincide with the PSR. CNSC staff stressed that the main purpose of a PSR is to focus on radiological safety related to operation of NPPs rather than to cover the wide spectrum of regulators' activities. Due to such an approach, previously mentioned areas, including conventional health and safety, typically are not included in the scope of a PSR.

43. The Commission asked how other jurisdictions approach areas that are not included in the PSR. CNSC staff and the consultant explained that the proposed PSR is not a replacement for the existing comprehensive licence renewal procedure that includes all safety areas. The PSR is an additional tool that would complement everyday regulatory activities and assessment conducted until now. It was pointed out that most other jurisdictions do not have a security mandate. Some of them, such as the United Kingdom, have such areas integrated in their regulations, while others combine these areas among distinct regulatory agencies dedicated to specific safety areas.

44. The Commission asked if all evaluation criteria had been pondered equally or had been attributed different weights when used for the evaluation of the examined PSR models. The consultant responded that, for his evaluation, the most important one was maintaining and improving safety. Public information and involvement was also important because of the CNSC mandate, as well as an effective use of resources in order to use the existing limited resources with the most benefit for safety. Some weight is also given to consistency with international practice. CNSC staff noted that they had relied on the consultant's analysis of the PSR models and put a lot of weight on improvements to nuclear safety. CNSC staff reiterated their approach to be evolutionary as opposed to revolutionary since they had seen benefits in integrating the PSR into the 10-year licensing process, primarily in balancing the effective use of resources and involvement of the public.

45. The Commission enquired about involvement of the public and perception of the proposed 10-year licensing period. CNSC staff responded that the licence renewal is intended to be an opportunity for the public to get involved in licensing, and explained other tools intended for enforcement of regulatory requirements. CNSC staff underlined the role of annual reports, combined with the PSR in the future, in providing transparent information on the operation of NPPs to the public. Intervenors can already send written submissions in the content of presentations of annual reports at

Commission meetings. Representatives from the industry stated that the nuclear industry becomes more open in terms of public engagement and noted that the Commission could invite intervenors to participate via oral or written presentations at the annual reports. Representatives from the industry added that they were meeting with their stakeholders more frequently and intend to continue and expand these meetings.

46. Referring to the Global Assessment Report (GAR), which should provide an overall assessment of the safety of a plant including strengths and gaps, and the Integrated Improvement Plan as important components of the PSR, the Commission asked if these would be transparent and publically available. CNSC staff responded that the process is transparent. After the GAR is done, the Integrated Implementation Plan would be presented to the Commission and would be a public document[2].

47. The Commission asked if SLOWPOKE operators had been considered as part of CNSC's outreach activities associated with PSRs. CNSC staff responded that they had started internal discussions on the possible role of PSRs for other Class I facilities, noting that they have had experience with using a PSR-type process for the NRU, and stated that it is not intended for use with the Class II facilities. CNSC staff noted that there is a cut-off of the complexity of a facility and that SLOWPOKE reactors are below it so there would be no real derived benefit in doing such an integrated assessment.

48. The Commission asked if the document had been peer reviewed by the International Atomic Energy Agency (IAEA) or other regulators. CNSC staff responded that they had not sent the document for reviews; however, the ISR done for the Point Lepreau refurbishment, which served as a basis for conceiving the proposed 10-year PSR model, had received a favourable review from the IAEA.

49. After considering the recommendations submitted by CNSC staff and Dr. V.G. Snell from VGS Solutions, the Commission approves REGDOC-2.3.3, *Periodic Safety Review* as presented by CNSC staff in CMD 15-M12, for publication and use. The Commission directs CNSC staff to facilitate the integration of the PSR into licence renewals and implement it through proposed licence conditions that would be reflected in Licence Condition Handbooks. DECISION

[2] CNSC staff confirmed during the June 17-18, 2015 Commission Meeting that both the Global Assessment Report and the Integrated Implementation Plan will be publicly available.

INFORMATION ITEMS

Independent Environmental Monitoring Program

50. With reference to CMD 15-M15, CNSC staff presented the Independent Environmental Monitoring Program (IEMP). In its presentation, CNSC staff informed the Commission about its regulatory oversight of environmental monitoring, provided the objectives of the IEMP, and described the analytical work done in CNSC laboratory. CNSC staff explained its work on independent environmental monitoring and verification of environmental monitoring results submitted by the licensees. CNSC staff demonstrated the newly developed IEMP Dashboard that is used to publish results of conducted environmental analyses in a user-friendly interactive manner, and is publically accessible from the CNSC website.

51. The Commission enquired about the duplication of work done by the licensees through their environmental monitoring programs. CNSC staff responded that this program was not conceived as a substitute for the licensees' environmental monitoring programs and would be executed independently by CNSC staff, from sampling to interpretation of results. The licensees' obligations, as required by their operating licences, would remain unchanged. The data obtained through the IEMP would be publically available since one of the program objectives is to address concerns that had been expressed for many years by the public. The data would also be used to review the outputs of the licensees' programs and verify compliance. CNSC staff added that the program had grown up from the pilot project conducted in 2012, and was in the stage of collecting and analyzing samples from all facilities, which would serve as a basis for producing trending information in the future.

52. With respect to potential duplication of work with other organizations, CNSC staff noted that, while planning for this project, they had discussions with Health Canada and Ontario Ministry of Labour that also have their sampling and monitoring programs and specific monitoring locations around NPPs. Consequently, IEMP plans were adapted to avoid duplication with these organizations, as well as with the licensees that have more comprehensive monitoring programs with higher sampling frequencies. CNSC staff noted that the added value of the IEMP stems from transparency and public accessibility of the data, a response to expectations from international organizations that CNSC as a regulator can independently verify levels of contaminants in the environment, as well as verification of the data submitted by the licensees.

53. The Commission asked if there is a website where all the collected results of environmental monitoring can be found, and whether the results obtained by other organizations would be included in the IEMP Dashboard. CNSC staff responded that there is no site where the public could access all the data, and that there was an interest, shown by some licensees and the public, for such a site. CNSC staff added that they were discussing this matter with other organizations, although a direct comparison of the data coming from different organizations would be difficult due to different detection limits, nature and range of the collected data.

54. The Commission asked what would be a procedure if samples collected through the IEMP show unusually high contamination. CNSC staff responded that the exceedance of limits and bad performance would continue to be addressed by the CNSC robust compliance program; however, if samples having higher levels of contamination are found, new samples will be collected and the procedure would be revalidated to ensure that the information is accurate. These steps would be followed by engaging the licensee to compare results and analytical protocols, and take further steps as needed.

55. The Commission asked if the program allows for a fast response to an incident at a facility. CNSC staff responded that a sample collection and analyses could be done quickly in response to incidents and gave examples of such interventions in recent past done by the CNSC laboratory. However, the IEMP is designed for ongoing/annual sampling and not for emergency purposes.

56. The Commission enquired about sampling and analytical methodology and asked if the analytical methods and standards applied throughout the IEMP would be different from those used by the licensees in their analyses. CNSC staff explained the procedures for sampling, selection and distribution of sampling locations and analytical methods. CNSC staff further explained procedures for evaluation of licensees' programs and inspections, and responded that the analytical methods are standardized and that the CNSC laboratory possibly has an advantage of more modern equipment, compared to other laboratories.

57. The Commission asked about the manpower needed to conduct the program and its cost. CNSC staff responded that funding from Treasury Board had been used in addition to CNSC's own funds to significantly improve the equipment of the CNSC laboratory. With respect to manpower, the program was designed to run within the existing resources. The program is also part of CNSC's compliance activities and is cost-recoverable.

58. The Commission asked about involvement of local and Aboriginal communities in this program. CNSC staff responded that they were working on developing a plan for such an engagement primarily in the domain of sampling and analysing traditional food.

Updates on items from previous Commission proceedings

Update on the Study on the Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures

59. With reference to CMD 15-M10 and CMD 15-M10.A, CNSC staff informed the Commission about the disposition of public comments on the draft *Study of the Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures*. This information was presented as requested by the Commission at the June 19, 2014 Commission meeting[3]. CNSC staff's presentation included highlights from public consultation, a table of comments received during the public review period and staff's responses to these comments. The presentation also included the updated revised study report. CNSC staff identified key concerns raised during the public consultation, and specified the improvements to the draft study resulting from the public consultation and Commission's suggestions given during the June 19, 2014 Commission meeting. CNSC staff stated that, upon finalization, the document will be published on the CNSC's website and in the scientific literature.

60. A representative from OPG supported the study conclusions that the risks were being effectively managed in alignment with international risk frameworks. OPG expressed the view that the study has addressed the Commission's directions, and that the publication of the report would give the public an opportunity to further understand the safety aspects of licensed facilities in Canada.

61. The Commission commended CNSC staff for this comprehensive study and report, and asked about specifics of some sensitivity cases done for multi-unit accidents. CNSC staff explained the considered hypothetical accident scenario and said that, based on the existing experience and conducted modelling, a multiple unit accident happening over a short period of time, such as simultaneous release from four reactors, was not an appropriate scenario to look at. Consequently, it was concluded that an appropriate approach was to look at the four units experiencing an accident from a common cause, but looking at them with containment and other systems functioning during a period of time, which is more reflective of the safety systems in place.

[3] Minutes of the CNSC Meeting held on June 19, 2014, paragraph 40.

62. The Commission asked about expressing the probability of these multi-unit scenarios in terms of frequency of events. CNSC staff responded that discussed scenarios had extremely low probability, much below 10^{-8}, which means that, practically, it could be eliminated as a credible scenario.

63. The Commission asked about additional information regarding the protection of drinking water. CNSC staff responded that, in addition to the original information regarding the actions to protect drinking water system, the scenario that they had assessed showed that there was no large release of contaminated water to the Great Lakes, so there would not be a pathway to contamination of drinking water.

64. The Commission sought an explanation for the difference between dose and dose rates, and asked why the assumption had been made that high doses and dose rates, and low doses and dose rates have the same biological degree of harm. CNSC staff indicated that the assumption was poorly worded in the document and would be corrected. CNSC staff clarified matters by indicating that on the Radiation Risk Assessment Tool (RadRAT), a National Cancer Institute's calculator for estimating the lifetime risk of cancer incidence for members of the U.S. population and countries with similar cancer incidence rates from exposure to ionizing radiation, does indeed account for different degrees of harm by using a dose and dose-rate effectiveness factor. CNSC staff further explained that the dose rate would be the dose delivered per unit of time and the dose would be the cumulative dose that was received over a set period of time (e.g. duration of exposure).

65. The Commission noted that the reported non-human biota do not include birds. CNSC staff stated that the similar organism complexity of birds and mammals result in similar sensitivity to radiation. CNSC staff noted that the work ongoing in Chernobyl is an area of active research on more sort of the chronic effects that may arise to nonhuman biota, but this work is still not completed. In addition, the latest report of the United Nations Scientific Committee on the Effects of Atomic Radiation provided more detail and highlighted this issue, noting that there were areas of uncertainty and that the research was continuing. CNSC staff also noted that the migration of animals in and out of the study area would offset the localized effects.

66. The Commission enquired about Fukushima doses estimated by modelling and measured values, and their discussion in the conducted study. CNSC staff explained that for Fukushima most of the air concentrations had been estimated through models, but there were a lot of measurements taken of ground deposition of

radionuclides. Models combined with measured values had been in some cases used to estimate doses to the larger population. CNSC staff added that, when direct measurements were taken at Fukushima, they were considerably lower than those that had been estimated from the combined measured environmental contaminants with the modelling and were comparable to the doses estimated in the conducted study.

67. The Commission asked for an explanation of evacuation zones. CNSC staff responded that the estimates for the assessed evacuation zone were based on the robustness of the modelling that was done, the dose estimates and the health risks. The doses had been estimated from the combination of the range of dose estimates from the hypothetical accident and looking at the protective action levels in the Provincial Emergency Response Plan. The estimated doses had been compared with the doses from the Fukushima accident, and they were within the reasonable range for that type of severe accident. CNSC staff also pointed out at differences existing between the situation assessed in this study for Canadian sites and the Fukushima and Chernobyl events, where the exact doses were not known at the time of the event.

68. The Commission asked about evacuation feasibility and effective time, and sensitivity analysis under the scenario of evacuation efficiency of less than 100%. CNSC staff responded that their assessment of the feasibility of evacuating the population around the plant, even in fairly bad weather conditions, had shown that the time estimate was lower than 24 hours as previously documented in the Darlington evacuation time estimate study. Following the June 19, 2014 Commission meeting, CNSC staff have covered the scenario when the evacuation was not 100% effective and the maximum dose was received, by looking at the sensitivity to doses by evacuating the population only at 100 mSv, and included that in the report. The Fire Marshal and Emergency Management (OFMEM) representative confirmed that the evacuation time resulting from the Darlington evacuation time estimate study was under 24 hours. Representatives from OPG added that the code used for calculations done in the study was the same used in the USA by the U.S. Nuclear Regulatory Commission that requires this kind of study to be reproduced in new U.S. nuclear plants on an ongoing basis. This code had been modified to match the Pickering and Darlington scenarios for the population and the layout of the community.

69. The Commission asked how valuable and useful this study was for the OFMEM in their emergency management planning. The OFMEM representative responded that the study was very detailed, thorough and very helpful, and that they were using it to review their planning basis and parts of the plan.

70. The Commission enquired about the applicability of the study, conducted primarily for the Darlington site, to the Bruce nuclear site having its own specificities, most particularly with respect to population number and density. CNSC staff responded that the affected population would be smaller around the Bruce site, and that, given the hypothetical nature of this severe accident and the existing information on evacuation time estimates, the dispersion modelling and the doses to individuals would not be any higher than these estimated in the presented study. CNSC staff explained that the emergency planning in Ontario is based on generic accident planning basis, so that the emergency planning zones and emergency arrangements are similar in nature for all nuclear sites. The OFMEM representative added that these plans are aimed at consequence management and the decisions are based on the projected or actual event.

71. The Commission asked whether the safety measures implemented after the Fukushima event had been credited appropriately in the study. CNSC staff responded that, in a study of a severe accident like this one, the assumption was that all the radionuclides were released in the environment, and that the effectiveness of the plant safety systems and operator actions, that would remove significant amounts of contaminants or prevent releases from the accident altogether, were not taken into account.

72. The Commission pointed to further potential improvements in content and clarity of information presented to the public in several sections of the report, so that it would be easily understood by a lay-person. CNSC staff agreed to amend the report to reflect the Commission's direction.

Update on Distribution of Potassium Iodide Tablets

73. With reference to CMD 15-M13, CMD 15-M13A, CMD 15-M13.1 and CMD 15-M13.1A, CNSC staff and representatives from the OFMEM presented an update on distribution of potassium iodide tablets (KI), as directed by the Commission in August of 2014[4]. CNSC staff described the strategy adopted in New Brunswick where NB Power and the Province of New Brunswick had been pre-distributing and pre-stocking KI pills, and stated that they had already met the parameters set out in REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*. CNSC staff also provided an overview of the pre-distribution efforts in Ontario and reported that stakeholders had formed the working group which is supported by two task groups. CNSC staff noted that they expect the December 2015 deadline to be met.

[4] Minutes of the CNSC Meeting held on August 20 and 21, 2014, paragraphs 217 and 220.

74. The OFMEM representatives pointed out that this is a multijurisdictional effort, informed the Commission about the provincial context and the Radiation Health Response Plan that includes guidelines for KI procurement, stocking and distribution, and provided further details regarding the working group and task groups' efforts on pre-distribution of KI pills. The OFMEM representatives reported that discussions were under way to specify details of the Primary Zone and Secondary Zone distribution mechanisms. These discussions considered roles of organizations such as the Ontario Pharmacy Association, the Ontario Government Pharmacy, and distribution options including potentially mail, coupons or door-to-door distribution. The OFMEM representatives also reported on their efforts regarding public education and noted that, in addition to other communication products and preparation of a strong public education campaign, detailed information on KI would be included in a comprehensive and centralized NUCLEAR website.

75. The Commission enquired about the beginning of the pills distribution and asked if negotiations for compensation for pharmacies will be completed by the end of 2015, when the program should be fully operational. The OFMEM representative responded that the distribution of pills could start well before the end of 2015, and that the discussions with pharmacies are also focused on the end of 2015 deadline, but that a final option for distribution has not yet been determined. The OFMEM representative added that discussions on the use of KI pills have to come under the Ontario Ministry of Health, which is the direct liaison with organizations like pharmacies.

76. The Commission sought more information regarding the approach to resolve issues stemming from relocations and population changes within the Primary Zone. The OFMEM representative responded that, in their plans and public education efforts, they were taking into account population movement as well as population growth. A representative from the New Brunswick Emergency Management Office (NBEMO) responded that they maintain a detailed demographic database and have a Warden Service that maintains situational awareness about their zones and report on movement or change in households, as well as of transient seasonal population. These wardens also maintain a ready supply of KI pills for immediate distribution.

77. The Commission asked about location of KI storage and about responsibility for the KI pills stock renewal. The representative from NBEMO responded that the expiring pills are withdrawn and replaced with a fresh set on a rotating basis through their Warden Service on a door-to-door basis. The OFMEM representative added that they keep track of the date the pills were issued and bring

forward the appropriate date for reordering.

78. The Commission noted that the distribution process in Ontario is rather complicated, given its multijurisdictional nature, and asked if there was a comparison with other countries with large populations, e.g. France. CNSC staff responded that the working group had discussed practices in other jurisdictions, and pointed out that they have had some discussions with representatives from the Province of Québec to learn from their experience. CNSC staff added that in France a coupon system is in use and that Ontario was considering the use of a similar system.

79. The Commission asked about the role of Health Canada regarding this matter. A representative from the Radiation Protection Bureau of Health Canada explained that the distribution and implementation of the protective action guidelines with respect to thyroid blocking agents is beyond the scope of their mandate and that they rely on other branches of Health Canada for the KI issues, including the use and chemical stability of the product. The representative further explained that, while it is within their mandate to establish recommendations and guidelines for actions during and after an emergency, the actual manner in which those are implemented is the responsibility of the province.

80. The Commission enquired about the incidence of side effects and asked for more details about contraindications to the use of KI pills for specific groups such as population over 40 years of age, pregnant women, etc. The OFMEM representative responded that these aspects were discussed at the working and task groups meetings and committed to provide complete information to the members of the Commission[5].

81. The Commission asked if the information for the public would be provided in languages other than English. The OFMEM representative responded that they were considering multiple languages for the documents.

82. The Commission asked for the cost of the whole endeavour. The OFMEM representative responded that the KI pills will be paid for by OPG, and after the purchase and decision about the distribution method it would be easier to estimate the total cost with more precision. The current cost estimation ranges between 5$ and 10$ per household, depending on the delivery method.

[5] After the meeting the OFMEM provided to the Commission members the brochure “Potassium Iodide (KI) Guidelines” issued in 2014 by the Emergency Management Branch of the Ministry of Health and Long-Term Care. Section 5.5 of this brochure contains detailed information about risks and contraindications regarding the use of KI pills.

83. The Commission expressed its satisfaction with the progress made and emphasized its continuous interest in the communication aspect. The Commission expects to be updated on the decision about the distribution method, on further progress in public education and on a more precise cost estimate as the project gets closer to the due date.

ACTION by October 2015

Update on AECL / CNL Restructuring

84. With reference to CMD 15-M14 regarding the updates to items from previous Commission proceedings, representatives from Atomic Energy of Canada Ltd. (AECL), Canadian Nuclear Laboratories Ltd. (CNL) and Natural Resources Canada (NRCan), presented an update regarding the restructuring of AECL and CNL. The presentation encompassed information on CNL's missions, internal reorganization of AECL and governance transformation into a GoCo model. The NRCan representative also informed the Commission about the decision about the future of the NRU reactor and confirmed that the reactor will cease its operation after March 31, 2018, and is intended to be placed in a safe shutdown state, pending its decommissioning.

85. CNSC staff informed the Commission about CNSC staff's role and activities regarding AECL/CNL restructuring, and stressed that CNSC staff continues with its usual day-to-day regulatory compliance activities for all of CNL's licences. CNSC staff added that they were preparing for future activities, such as changes in the compliance program for CNL and planning for upcoming licensing activities, in particular the relicensing of the Chalk River Laboratories (CRL) with the inclusion of a new licence condition that would deal with the end of operation of the NRU reactor. The current operating licence expires on October 31, 2016. The considered changes are based on discussions with CNSC's regulatory counterparts in the UK, the Office of Nuclear Regulation, which has the experience with a GoCo model that is similar to the model being adopted in Canada.

86. With respect to the AECL/CNL restructuring, CNSC staff informed the Commission that they had provided to NRCan advice related to the CNSC's regulatory mandate, the regulatory framework, the regulations and the Commission's licensing process. CNSC staff participated in meetings with qualified prospective CNL operators to discuss in general terms regulation and licensing in Canada. CNSC staff stressed that these interactions had been done under pre-established rules of engagement that ensured fairness to all bidders and protected the independence of the Commission and the CNSC as a regulator.

87. The Commission sought more detail regarding CNSC staff's engagements with potential bidders and whether the regulatory

aspect was a component of the change management plan in AECL/CNL transition. CNSC staff explained that NRCan had offered to have the CNSC participate in joint and one-on-one meetings with the qualified respondents. This limited engagement helped the respondents to learn about Canada's regulatory regime. The NRCan representative confirmed that the ongoing process includes the regulatory aspects and that there will not be a transfer of CNL to the private sector without ensuring that all the regulatory requirements would have been observed.

88. The Commission asked about concerns that industry and customers may have around the GoCo model. The CNL representative responded that their partners from the industry had positive reactions to the modified mandate and AECL/CNL restructuring, and were pleased to see the capital reinvestment in Chalk River science and technology facilities. The CNL representative added that the needs for a research reactor beyond the lifetime of the NRU would be revisited and discussed, and noted that significant investments were coming forward by the Government of Canada to maintain the capabilities of the organization. The NRCan representative added that the Government of Canada had engaged industry and other stakeholders and decided to extend the life of NRU until 2018, so that the industry and other stakeholders could come up with ideas in terms of how to maintain the best capabilities and expertise in Canada to meet their needs.

89. The Commission sought more details regarding the decision to end the operation of NRU by March 31, 2018, and factors influencing that decision. The NRCan representative responded that there were a number of considerations at play, and that the question of medical isotope production was the important one, particularly the decision to cease the routine production of molybdenum-99 by October 2016. The NRCan representative noted that NRCan monitors the need for medical isotopes, and current indicators show that the supply would be sufficient to meet demand. However, the government recognizes that there are risks and deems it prudent to keep the NRU operating until 2018 as an insurance policy, should there be a need.

90. The Commission enquired about the possibility to restart isotope production if needed. The AECL representative responded that they were maintaining active discussions regarding the ways to manage restart of the molybdenum-99 production if needed. CNSC staff added that they had considered this possibility and would work with CNL to learn how quickly they may need to bring the reactor back to production. CNSC staff noted that there could be additional measures that the CNSC would need to put into place in terms of compliance. The Commission expects that, with the expiry of the current licence in 2016, an application for renewal of the

licence would address the circumstances that would possibly enable the NRU reactor to produce isotopes beyond 2018, if needed.

91. The Commission asked who is in position to make decisions to determine whether there is a shortage of molybdenum-99. The NRCan representative responded that the decision will rest with the Government of Canada to determine if there is a shortage such that the production of the NRU should be resumed.

92. The Commission further asked if a decision to restart the NRU in such a shortage situation would require CNSC's approval. CNSC staff responded that such an approval would not be necessary since there would be a clear upfront agreement under what conditions CNL would be able to return to service.

93. The Commission asked if CNL's mission, namely science and technology, are confined to NRU. The CNL representative responded that the NRU is one of multiple facilities at CRL to support this mission, but there are many others including 10 scientific centres of excellence that actually service the needs of this mission, and some 50 unique facilities that are part of the licence. The NRU is one of the facilities that support three of those 10 centres of excellence. The CNL representative added that the NRU currently supports some of the research initiatives important for several federal government agencies, including CNSC, and their role in regulation. The representatives from CNL and NRCan added that a benefit from a commercial perspective would be that CNL, as a privately operated organization, could initiate new development and commercial projects, as long as these are consistent with planning approved by the federal government. Since the federal government is already funding these activities, it will have broad discretion on decision making.

94. The Commission asked what would be the responsibilities and involvement of AECL in the case of a hypothetical severe accident. The AECL representative responded that CNL will be the responding unit while AECL would provide support and help, and would make sure that CNL has the funding necessary to respond. The NRCan representative added that, in case of an emergency situation that would require funding not anticipated through the annual planning process, AECL would be attentive to the extent the government has to respond and provide the funding. CNL, as the licensee and operator of the Chalk River site, will be therefore carrying insurance in that respect. CNSC staff noted that CNL has access to the funding and the provisions that they need to deal with an incident should it ever happen. The AECL representative confirmed the position of CNSC staff.

95. The public portion of this session closed at 2:19 p.m on March 26, 2015.

Recording Secretary — JUN 2 5 2015 — Date

Secretary — JUN 2 5 2015 — Date

APPENDIX A

CMD	DATE	File No

15-M6 2015-02-24 e-Doc 4657577
Notice of Meeting of March 25 and 26, 2015

15-M7 2015-03-11 e-Doc 4669638
Agenda of the meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, March 25 and 26, 2015 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario

15-M7.A 2015-03-19 e-Doc 4697288
Revised agenda of the meeting of the Canadian Nuclear Safety Commission (CNSC) to be held on Wednesday and Thursday, March 25 and 26, 2015 in the Public Hearing Room, 14th floor, 280 Slater Street, Ottawa, Ontario

15-M8 2015-03-18 e-Doc 4673494
Approval of Minutes of Commission Meeting held February 4, 2015

15-M9 2015-03-23 e-Doc 4699932
CNSC Status Report on Power Reactors as of March 23, 2015

15-M16 2015-03-17 e-Doc 4696350
Event Initial Report on an unplanned release of uranium dust in the work environment at the Key Lake Mill

15-M16.1 2015-03-18 e-Doc 4697413
Unplanned release of uranium dust in the work environment at the Key Lake Mill - Oral presentation by Cameco Corporation

15-M12 2015-03-10 e-Doc 4679017
Regulatory Document for Publication – REGDOC-2.3.3, *Periodic Safety Reviews*

15-M12.A 2015-03-18 e-Doc 4696678
REGDOC-2.3.3, *Periodic Safety Reviews* – Presentation by CNSC Staff

15-M12.1 2015-03-06 e-Doc 4680349
REGDOC-2.3.3, *Periodic Safety Reviews* – Presentation by VGSSolutions

15-M15 2015-03-09 e-Doc 4679013
Independent Environmental Monitoring Program (IEMP) – Oral presentation by CNSC staff

15-M11 2015-02-27
Packaging and Transport of Nuclear Substances Regulations (2015) – Decision Item on a Regulatory Document by the Commission (Confidential)

15-M11.A 2015-03-16
Packaging and Transport of Nuclear Substances Regulations (2015) – Presentation by CNSC Staff (Confidential)

15-M10 2015-03-09 e-Doc 4579369
Update on the Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures – Written submission from CNSC Staff

15-M10.A 2015-03-12 e-Doc 4688193
Update on the Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures - Presentation from CNSC Staff

15-M13 2015-103-10 e-Doc 4682418
Update f on the Distribution of Potassium Iodide (KI) Tablets

15-M13.A 2015-03-13 e-Doc 4691912
Update on the Distribution of Potassium Iodide (KI) Tablets – Presentation by CNSC Staff

15-M13.1 2015-03-09 e-Doc 4684773
Update on the Distribution of Potassium Iodide (KI) Tablets – Submission from the Office of the Fire Marshal and Emergency Management

15-M13.1A 2015-03-18 e-Doc 4697409
Update on the Distribution of Potassium Iodide (KI) Tablets – Presentation from the Office of the Fire Marshal and Emergency Management

15-M14 2015-03-18 e-Doc 4697419
Update on AECL Restructuring – Presentation from AECL, Canadian Nuclear Laboratories and Natural Resources Canada