



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

# Record of Proceedings, Including Reasons for Decision

In the Matter of

Cameco

Cameco Corporation

Subject

Application for a Licence to Allow Operation of a  
Uranium Mine at the Cigar Lake Project

Public Hearing  
Date

April 3, 2013

## RECORD OF PROCEEDINGS

Cameco: Cameco Corporation  
 Address/Location: 2121 – 11th Street West, Saskatoon, Saskatchewan, S7M 1J3  
 Purpose: Application for a Licence to Allow Operation of a Uranium Mine at the Cigar Lake Project  
 Application received: July 4, 2012  
 Date of public hearing: April 3, 2013  
 Location: Hilton Garden Inn, 90 22nd Street East, Saskatoon, Saskatchewan  
 Members present: M. Binder, Chair      R. Velshi  
                                  R. J. Barriault      D.D. Tolgyesi  
                                  M. J. McDill  
 Secretary: K. McGee  
 Recording Secretary: S. Dimitrijevic  
 General Counsel: L. Thiele

<b>Applicant Represented By</b>			<b>Document Number</b>
<ul style="list-style-type: none"> <li>• G. Goddard, Vice President of Saskatchewan Mining North</li> <li>• S. Lowen, General Manager, Cigar Lake</li> <li>• L. Mooney, Vice-President, Safety, health, Environment, Quality and Regulatory Relations</li> <li>• K. Nagy, Director of Compliance and Licensing</li> </ul>			CMD 13-H5.1 CMD 13-H5.1A
<b>CNSC staff</b>			<b>Document Number</b>
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<b>Other Representatives</b>			
<ul style="list-style-type: none"> <li>• Ministry of Labour Relations and Workplace Safety, represented by N. Crocker, Chief Mine Inspector, Occupational Health and Safety Division</li> </ul>			
<b>Intervenors</b>			
See appendix A			

**Licence: Replaced**

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## 1. INTRODUCTION

1. Cameco Corporation (Cameco) has applied to the Canadian Nuclear Safety Commission<sup>1</sup> for the renewal of its Uranium Mine Construction Licence for the Cigar Lake Project and authorization to operate the mine. The Cigar Lake Project is located in northern Saskatchewan. The current construction licence UMCL-MINE-CIGAR.00/2013 expires on December 31, 2013. Cameco has applied for a licence period of ten years. In its application, Cameco is seeking authorization to complete the final stages of commissioning at the facility, transition into operations, and commence shipping uranium ore slurry to AREVA's McClean Lake Operation for further processing.
2. The Cigar Lake Project is located within the Athabasca Basin of the Precambrian Shield in northern Saskatchewan, about 660 kilometers north of Saskatoon. The mine site is located at the south end of Waterbury Lake. The closest communities are the Northern Settlement of Wollaston Lake and the Hatchet Lake First Nation, located about 80 km to the east. Cigar Lake proven and probable reserves are estimated to be 216.7 million pounds of uranium oxide and the life of the mine is expected to be 15 years.
3. A broadly based environmental assessment process led by a review panel was completed in the 1990s. A construction licence was issued by the Commission in late 2004 and renewed in January 2010 to authorize the underground development and construction activities together with surface construction at the Cigar Lake Project. The licensed facilities include underground mine workings accessed by two mine shafts, a surface load-out facility, waste management systems, a mine water management system and associated site facilities.
4. Construction at Cigar Lake initially proceeded under the original mining plan that envisioned development under the ore body occurring from two different levels. Three serious water inflows (two in 2006 and one in 2008) have caused set-backs to the Cigar Lake Project, and the mine plan was evaluated and significantly revamped in light of the experience of these water inflows. The source of the inflow was identified and the remediation process has been conducted, including the re-entry into the mine and clean-up and restoration of damaged infrastructure. The mine development and construction of ore processing facilities are currently in progress.

### Issue

5. In considering the application, the Commission was required to decide, pursuant to subsection 24(4) of the *Nuclear Safety and Control Act*<sup>2</sup> (NSCA):

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<sup>1</sup> The *Canadian Nuclear Safety Commission* is referred to as the "CNSC" when referring to the organization and its staff in general, and as the "Commission" when referring to the tribunal component.

<sup>2</sup> Statutes of Canada (S.C.) 1997, chapter (c.) 9.

- a) if Cameco is qualified to carry on the activity that the licence would authorize; and
- b) if, in carrying on that activity, Cameco would make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

### Public Hearing

6. Pursuant to section 22 of the NSCA, the President of the Commission established a Panel of the Commission to review the application. The Commission, in making its decision, considered information presented for a public hearing held on April 3, 2013 in Saskatoon, Saskatchewan. The public hearing was conducted in accordance with the *Canadian Nuclear Safety Commission Rules of Procedure*<sup>3</sup>. During the public hearing, the Commission considered written submissions and heard oral presentations from CNSC staff (CMD 13-H5) and Cameco (CMD 13-H5.1 and CMD 13-H5.1A). The Commission also considered oral and written submissions from 11 intervenors (see Appendix A for a detailed list of interventions).

## **2. DECISION**

7. Based on its consideration of the matter, as described in more detail in the following sections of this *Record of Proceedings*, the Commission concludes that Cameco is qualified to carry on the activity that the licence will authorize. The Commission is of the opinion that Cameco, in carrying on that activity, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Therefore,

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, replaces Cameco's Uranium Mine Construction Licence with a new Uranium Mine Licence to authorize construction and operation of Cameco's Cigar Lake Project located in northern Saskatchewan. The new licence, UML-MINE-CIGAR.00/2021, will be valid for an eight-year period, from July 1, 2013 to June 30, 2021.

8. The Commission includes in the licence the conditions as recommended by CNSC staff and set out in the draft licence attached to CMD 13-H5.
9. The Commission accepts CNSC staff's recommendation regarding the delegation of

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<sup>3</sup> Statutory Orders and Regulations (SOR)/2000-211.

authority in the Licence Conditions Handbook (LCH). The Commission notes that CNSC staff can bring any matter to the Commission as appropriate. The Commission directs CNSC staff to inform the Commission on an annual basis of any changes made to the LCH.

10. With this decision, the Commission directs CNSC staff to provide annual reports on the performance of the Cigar Lake Project as part of the Annual Report on the Performance of Canadian Uranium Fuel Cycle and Processing Facilities. CNSC staff shall present these reports at public proceedings of the Commission.
11. The status report submitted after one year from initial commissioning with uranium ore (Status Report #5 defined in the LCH), will be presented at a public proceeding of the Commission with public participation.

### **3. ISSUES AND COMMISSION FINDINGS**

12. In making its licensing decision, the Commission considered a number of issues relating to Cameco's qualification to carry out the proposed activities and the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.

#### **3.1. Management System**

13. The Commission examined Cameco's Management System which covers the framework that establishes the processes and programs required to ensure the organization achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.
14. CNSC staff reported that they had reviewed Cigar Lake's management system performance, including the recent updates to Cameco's *Quality Management Program*. CNSC staff rated Cameco's performance within this Safety and Control Area (SCA) as satisfactory.

##### *3.1.1. Quality Management*

15. Cameco informed the Commission that their quality management system comprises 14 programs, three codes of practice and supporting procedures and work instructions. All these programs and codes of practice are included in the *Mining Facility Licensing Manual* (MFLM), and follow an approach to management as described in ISO 9001 and ISO 14001.
16. Cameco further informed the Commission that they have updated the Cigar Lake's *Quality Management Program* (QMP) to reflect their experience gained through

managing the systematic recovery and remediation of the mine, and resumption of construction activities. The QMP is the highest level document supporting the MFLM. Key tools to evaluate non-conformance and to develop and implement corrective action plans within the QMP are Cameco's Corrective Action Process and the Cameco Incident Reporting System (CIRS).

17. CNSC staff presented to the Commission the results of their monitoring and validation of Cameco's management system. The validation was focused on mine remediation and construction activities during the current licence period. CNSC staff reported that they had conducted an inspection in 2009 to evaluate the effectiveness of Cameco's management system during which they issued seven action notices. As requested, Cameco had provided an action plan to address the inspection findings. CNSC staff verified and closed all action notices after the follow-up inspection conducted in 2010.
18. CNSC staff noted that, through conducted inspections and document reviews, they had observed the advancements in Cameco's management system. These advancements are reflected in increased corporate involvement in the development of a site-specific management system, in a wide-scale adoption of Job Hazard Assessments for non-routine tasks, in the development and implementation of the Systems Application Products database, and through the development and implementation of the CIRS database.

### *3.1.2. Organization*

19. Cameco representatives informed the Commission about the structure of ownership of the project, and explained the organizational structure. They noted that the Cigar Lake Project is a joint-venture mine construction project operated by Cameco and owned by Cameco (50%), AREVA Resources Canada Inc. (37%), Idemitsu Canada Resources Ltd. (8%) and TEPCO Resources Inc. (5%).
20. Cameco representatives explained that the most senior position on site is general manager of Cigar Lake Project, who is, together with the department heads, accountable for the implementation of the QMP and responsible for safe and reliable production to Cameco via the vice-president, Saskatchewan Mining North. Cameco representatives added that the Cigar Lake Project's senior management team is responsible for implementing the regulatory requirements of the licences and permits through the application of the quality management system.

### *3.1.3. Facility Management*

21. Cameco informed the Commission about their plans for the post-remediation and construction activities, which include commissioning, production ramp-up period and completion of the construction of surface facilities at the site. Cameco stated that the managing method used during mine remediation would be applied to commissioning. A readiness review would be used to validate the entire ore processing infrastructure

prior to commissioning and to establish “internal gates” that must be satisfied before proceeding to the next step. These gates include the following:

- development and implementation of all relevant operating procedures and training;
- verification of bulk ground-freeze isotherms in the ore body;
- completion of pre-commissioning procedures;
- verification tests of safety-related equipment and emergency shutdown procedures; and
- lockout/tag out and equipment isolation procedures.

Cameco representatives added that they intend to use a staged approach to reach ore grading of approximately 10% of uranium oxide at the end of commissioning, and that the experience gained by progressing first through lower grades of ore will allow the Cigar Lake team to make necessary adjustments to procedures and practices.

22. Cameco further informed the Commission that they anticipate the desired nominal annual production rate to be achieved by 2019, and that their plan for ramp-up of production is closely tied to the delivery of mining equipment.
23. CNSC staff informed the Commission that they had reviewed Cameco’s revised management system program document that addresses future operational requirements for the Cigar Lake facility. CNSC staff concluded that the revised program meets CNSC requirements, provides a systematic framework to align and integrate management processes, and follows the Plan-Do-Check-Act approach to management as outlined within ISO 9001 and ISO 14001 standards.

#### *3.1.4. Safety Culture*

24. Cameco informed the Commission about their efforts to build a culture focused on safety and accountability as work progresses towards commissioning and operations. Site personnel are encouraged to report all incidents through the CIRS, which is the key tool within the QMP to evaluate non-conformance. Safety culture at Cigar Lake is enhanced through different activities, such as the implementation of the “Green Hand Initiative”, which was developed to encourage accountability among site personnel by visibly marking less experienced personnel, new at site, who might require some additional guidance. More experienced personnel that could provide needed guidance are also visibly marked. In this way site personnel have the opportunity to share their expertise and knowledge with each other in a respectful and productive manner.
25. Cameco representatives stated that their Contractor Management Program ensures that contracted companies and their supervisors are adhering to Cameco’s safety standards for the protection of all workers on site, and noted, as an example, that no one goes underground without completing the training on the use of the mine self-rescuer.



### *3.1.5. Conclusion on Management System*

26. Based on its consideration of the presented information, the Commission concludes that Cameco has appropriate organization and management structures in place and that the performance at the Cigar Lake Project provides a positive indication of Cameco's ability to adequately carry out the activities under the proposed licence.

## **3.2. Human Performance Management**

27. Human performance management encompasses activities that enable effective human performance through the development and implementation of processes that ensure the licensee's staff have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.
28. CNSC staff informed the Commission that, in evaluating this SCA, they had focused on the training of workers to safely commission and operate mining and processing facilities. CNSC staff rated this SCA as satisfactory.

### *3.2.1. Training*

29. Cameco informed the Commission that they have the *Training Development Program* (TDP) in place to ensure that personnel are competent and qualified to safely perform their duties. All training activities are tracked using an enterprise wide database. Cameco representatives stated that the TDP is effective, efficient and flexible enough to facilitate the transition from construction to operations, while being continuously improved.
30. Cameco stated that the TDP had been developed following the Systematic Approach to Training (SAT). For its development and implementation, Cameco assembled a team from personnel of similar processing facilities. Part of this training program requires that all personnel working underground receive Water Inflow and Prevention Awareness Training and Underground Orientation Training. This program is compulsory and workers are not allowed to work underground until these two components of training are completed.
31. Cameco further informed the Commission that the site management team conducts periodic reviews of the training program. The TDP is audited every year and recommendations for its improvement are proposed.
32. CNSC staff reported that Cameco had updated their training and development program to meet future operational requirements. CNSC staff stated that they had reviewed the program and concluded that it meets CNSC requirements.

33. CNSC staff informed the Commission that they had conducted an audit of the training and development program in 2010 and a focused inspection in 2011 to assess the results of implementation and effectiveness of training processes used on-site. CNSC staff stated that Cameco had satisfactorily addressed their comments regarding the findings of the audit. The 2011 inspection resulted in three action notices and three recommendations, while five good practices were also identified. Cameco provided responses with supporting documentation to address the action notices and recommendations, and all of them were closed upon CNSC staff's review and verification.

#### *3.2.2. Conclusion on Human Performance Management*

34. Based on its consideration of the presented information, the Commission concludes that Cameco has appropriate programs in place and that current efforts related to human performance management provide a positive indication of Cameco's ability to adequately carry out the activities under the proposed licence.

### **3.3. Operating Performance**

35. Operating performance includes operating policies, reporting and trending, and application of operating experience that enable the licensee's effective performance, as well as improvement plans and significant future activities. CNSC staff reviewed Cameco's operation performance regarding activities involved in construction of the mine and rated it as satisfactory.
36. CNSC staff reported that, during the current licence period, they had conducted regular compliance inspections of various aspects of the underground mining and surface facilities. They added that Cameco had addressed all identified issues in a satisfactory and timely manner.

#### *3.3.1. Conduct of Operations*

37. Cameco informed the Commission about sequences of the commissioning process and explained the methodology of mining to be applied during the operation of the Cigar Lake Project.
38. Cameco provided a detailed description of the four-stage commissioning process. This process includes regular status reports to CNSC staff. During the fourth stage of this commissioning process, Cameco plans to complete the transfer of responsibilities from the commissioning team to the operations management team.
39. Cameco representatives noted that, after one year of operation, a final status report would be submitted to CNSC staff. This final report would describe the overall

operation and summarize actions taken to mitigate issues identified in the earlier stages of commissioning, and discuss the effectiveness of key safety and protection programs.

40. CNSC staff reported that they had reviewed Cameco's four-stage plan and concluded that it meets CNSC requirements. During the commissioning, CNSC staff intends to conduct inspections and desktop reviews to ensure that Cameco is meeting the commitments laid out in their plan and that workers and the environment continue to be protected during the transition to high grade ore production. Cameco is required to submit status reports at different stages of the project during commissioning and operation as referenced in section 4.1 of the Licence Conditions Handbook (LCH).
41. The Commission sought more details about reporting between the commissioning stages and about other types of reports, and asked if these reports would be made public. CNSC staff responded that the purpose of inter-stage reports would be to verify and review the activities at the site, and would provide opportunities to react in case of an issue or a concern. CNSC staff added that, in addition to status reports, there are other types of reports such as monthly, quarterly or yearly reports, which are all available to the public on request. Cameco representatives added that they post on the Web all broader reports that provide an overview of the Cigar Lake operation, as well as reports from its other business units.
42. Cameco representatives informed the Commission that they had selected the jet boring system (JBS) as the method for the extraction of ore and explained that freezing the ore body would be necessary to provide ground stability and decrease mine water inflow.
43. CNSC staff reported that they had reviewed and accepted Cameco's plan for commissioning the JBS method for uranium mining.
44. The Commission enquired about global experience with the JBS and asked how well it had performed so far. Cameco representatives responded that the JBS is a mining method that had not been used elsewhere, and added that Cameco had been testing this system for a number of years on the industrial scale, drilling holes in both waste rock and ore body.
45. The Commission asked about the potential risks of a large groundwater inflow once the full ground freezing is reached. Cameco representatives responded that ground freezing is a key component of their multiple layers of defence against the potential water inflow. Combined with other mitigation strategies, application of ground freezing significantly lowers the risk of water inflow.

### *3.3.2. Event Reporting*

46. Cameco informed the Commission that their internal accountability process includes a number of activities and reporting mechanisms to ensure safe and reliable operational performance at Cigar Lake. Cameco representatives noted that all issues identified

through these processes are systematically addressed and prioritized on a risk-informed basis. They added that regulatory oversight of licensed activities at Cigar Lake is conducted by the Joint Regulatory Group (JRG), which includes representatives from the CNSC, the Saskatchewan Ministry of Environment (SMOE) and the Saskatchewan Ministry of Labour Relations and Workplace Safety (LRWS), with whom the Cigar Lake management maintains regular communications.

### *3.3.3. Operating Experience*

47. Cameco informed the Commission on its extensive experience in uranium mining and in operating uranium processing facilities. Cameco explained the lessons learned and the experience obtained through the construction and remediation of the Cigar Lake Project. Cameco representatives pointed out that the earned experience was used to implement corrective actions and develop a new mine water management strategy that includes a revised water collection system with sufficient normal, contingency and borehole dewatering capacity, large surface contingency water storage and large installed water treatment capacity. This new strategy has ensured that non-routine water inflows will not result in mine flooding and that all mine water will be successfully treated.
48. Cameco representatives noted that dewatering was followed by safe re-entry into the mine and a staged process of restoration of mine infrastructure. They stated that one of the key underground development activities had been the completion of the Shaft No. 2 sinking. The successful completion of this activity provided the necessary second means of egress from the underground and allowed development activities to proceed in all areas of the mine.
49. CNSC staff reported that, during the current licence period, they had reviewed and verified through multiple inspections Cameco's Corrective Action Plan Implementation Project and water management strategy, and concluded that Cameco was taking appropriate measures to protect the health and safety of workers and the environment. Ten compliance inspections were conducted in the areas of geotechnical, training, radiation protection, environment and waste management. Desktop reviews of Cameco's performance and compliance were conducted in the following areas:
  - monthly, quarterly, and annual reports;
  - reportable incidents and events;
  - licensee's applications for new projects and activities; and
  - meetings with Joint Regulatory Group.

### *3.3.4. Conclusion on Operating Performance*

50. Based on the above information, the Commission concludes that the performance under construction licence at the facility provides a positive indication of Cameco's

ability to carry out the activities under the proposed licence.

### 3.4. Safety Analysis

51. The Commission examined issues related to the program areas of Safety Analysis in order to assess the adequacy of the safety margins provided by the design of the facility.
52. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards. It supports the overall safety case for the facility. CNSC staff reviewed this SCA and rated Cameco's performance as satisfactory.
53. Cameco informed the Commission that its approach to systematic management of risk related to the Cigar Lake Project is guided by the Cameco Risk Standard and Cameco Risk Policy, which are based on the ISO 31000 standards. These standards include specifications on the responsibilities and accountabilities for various levels of risk, and are used to ensure that risks are evaluated, mitigated and managed consistently throughout the corporation.
54. Cameco representatives identified mining of the high-grade uranium ore within the water-saturated Athabasca sandstone as a source of major risks at the Cigar Lake Project. They noted that, after the implemented improvements, the mine plan is designed to mitigate the effects of a potential groundwater inflow by providing sufficient water handling and pumping capacity within the mine and adequate contingency treatment facilities on surface.
55. Cameco representatives pointed out that the greatest potential hazard associated with Cigar Lake activities is the potential for an inflow of water into the mine. As a result of lessons learned from the previous water inflows, a new mine plan and a new water management strategy was developed to efficiently address and minimize the risks associated with potential water inflows. In order to manage the potential for non-routine inflows, Cameco conducted a study which predicted that releasing large volumes of treated water into the original effluent discharge point, that would ultimately discharge to Waterbury Lake, could result in erosion of that drainage system. To prevent such events, Cameco proposed to build a pipeline and discharge effluents directly at Seru Bay on Waterbury Lake. This proposal triggered a joint federal and provincial environmental assessment under *Canadian Environmental Assessment Act* and *Saskatchewan Environmental Assessment Act* respectively. Following the results of the conducted environmental assessment (EA), approval was granted to proceed with construction of the Seru Bay pipeline project. The project was completed in 2012.
56. Cameco representatives added that the combination of the new mine plan and water

management strategy, along with the completion of the sinking of Shaft No. 2, has systematically reduced the potential hazards associated with the planned mining activities.

57. CNSC staff informed the Commission about their assessment of the revised water management strategy. CNSC staff noted that Cameco had initiated the Water Inflow Management Project to support the revised water management strategy and to establish a water handling system that would allow safe release of treated effluent from both routine and non-routine inflows. The improvements achieved through this project were included in the updated Environmental Risk Assessment (ERA) for the Cigar Lake Project. After reviewing the ERA, CNSC staff concluded that, after implementation of mitigation measures, the Cigar Lake Project is not likely to cause significant adverse environmental effects. The ERA would be further updated using the results of monitoring to verify the predicted effluent concentrations and effectiveness of applied mitigation measures.
58. The Commission asked what was, from the standpoint of the minority partners, the biggest risk related to the Cigar Lake Project. The AREVA representative, who supported the granting of the licence in its intervention, responded that the biggest risks were related to natural conditions and challenges associated with access into the ore body. The AREVA representative praised the Cigar Lake Project team for their successes in mitigating these risks and bringing the project to the point where it could be turned from construction and development into production.
59. CNSC staff further informed the Commission that safety reviews had been completed on an on-going basis for specific jobs using Job Hazard Assessments (JHAs) to assess non-routine or complex work activity and as an additional opportunity to identify and mitigate potential hazards to worker health and safety.
60. On the basis of the information presented, the Commission concludes that the systematic evaluation of the potential hazards and the preparedness for reducing the effects of such hazards is adequate for the operation of the facility and the activities under the proposed licence.

### **3.5. Physical Design**

61. Physical design relates to activities that impact on the ability of structures, systems and components to meet and maintain their design basis given new information arising over time, planned modifications to the facility, and taking changes in the external environment into account. The specific components significant for the physical design at the Cigar Lake Project include Shaft No. 2 infrastructure, underground ore processing, JBS, water management, surface facilities, and ground freezing. CNSC staff reviewed Cameco's performance and rated this SCA as satisfactory.
62. Cameco informed the Commission of its activities performed to improve the structural

integrity of the underground mining infrastructure as well as to mitigate the identified risks of mining an ore body surrounded by water-saturated sandstone.

63. With respect to the infrastructure of Shaft No. 2, Cameco informed the Commission that the shaft has a permanent steel hydrostatic liner and that a portion of the shaft had been partitioned for use as a permanent conveyance for people working underground. At the same time a part of it serves as an exhaust line for air from the mine.
64. Cameco explained that the mine currently maintains sufficient capacity to pump at least 1.5 times the maximum estimated inflow of water from the underground workings and said that work in the mine would be restricted to lower risk activities if that pumping capacity should be restricted for any reason. They added that Cigar Lake's surface storage and treatment systems are able to keep up with the predicted sustained inflow that has been modelled, based on the 2006 and 2008 inflow experiences. The treated water would be discharged into Seru Bay of Waterbury Lake through the recently completed pipeline.
65. Cameco informed the Commission that, besides an ore slurry-loadout building, the main surface facilities to be constructed during the next licence period include a new permanent administration building, a new warehouse building and a new maintenance building. The ore slurry-loadout building will receive the ore slurry from underground and store it. The slurry will be thickened and transferred to the McClean Lake JEB mill for processing into uranium oxide. The maintenance building has provisions for handling contaminated equipment brought up from underground. The facilities to be built will replace smaller, modular buildings that have served Cigar Lake during development.
66. CNSC staff informed the Commission that they have reviewed the design of the Cigar Lake Project with an emphasis on the ore processing facilities, JBS and the ventilation system. CNSC staff said that Cameco's *Mining Facility Description Manual* (MFDM) provides detail about the facility, including physical description, technical specifications and capacities.
67. CNSC staff stated that the licensee uses facility change control and design control to ensure that physical changes to the facility are reviewed and approved by site management before implementation. CNSC staff reported that they had inspected the site and verified that the improvements to the facility's change control process have been implemented to make the process more effective.
68. CNSC staff reported that Cameco's physical design of the ore processing facilities, shielding, including the shielding design criteria, JBS and ventilation systems were acceptable. CNSC staff underlined the fact that the ore processing facilities have been designed and constructed for mining the high grade ore with engineered features able to keep radiation doses to workers below 20% of regulatory limits of 50 mSv/y (millisieverts per year) and 100 mSv/over five years. CNSC staff stated that a large number of tests conducted on different systems have confirmed that personnel's

exposure to radiation would be low and that no significant gamma radiation, radon progeny, long-lived radioactive dust or uranium in urine had been recorded throughout the duration of these tests.

69. CNSC staff further reported that they had required Cameco to develop design criteria for the mine ventilation system. This design was applied to the construction of ventilation systems installed on the underground process vessels. CNSC staff added that they had reviewed the design documents for the ventilation system of the ore processing facilities and JBS and were satisfied with the applied engineering controls.
70. The Commission asked about the location of high-pressure pipes of the JBS and whether these required care and safety measures. The Cameco representative responded that high-pressure pipes are laid from the high-pressure pump room to the jet boring area through travel restricted corridors, and noted that all high-pressure guidelines and regulations were followed. The Cameco representative added that high-pressure pipes and surrounding areas are among those areas of the mine where Cameco's operational reliability program had been introduced to monitor the condition and state of the pipes.
71. The Commission enquired about multiple functions of Shaft No. 2 and the possibility of its use as an emergency exit. Cameco representatives confirmed that the shaft has separate compartments and lines, including fresh air intake and gas exhaust, and was also designed to serve as an emergency exit, which would be equipped with a cage or elevator in the future. However, Cameco representatives emphasized the role of mine refuge stations as the primary option in cases of emergency.
72. On the basis of the information presented, the Commission concludes that the design of the facilities at the Cigar Lake Project is adequate for the operation period included in the proposed licence.

### **3.6. Fitness for Service**

73. Fitness for service covers activities that are performed to ensure the systems, components and structures at the Cigar Lake Project continue to effectively fulfill their intended purpose. CNSC staff reviewed Cameco's performance and rated this SCA as satisfactory.
74. Presenting the Cigar Lake *Maintenance Program* (MP), Cameco noted that the key elements of this program include the following:
  - maintenance planning and scheduling;
  - reliability and maintenance engineering;
  - materials management of critical and spare components; and
  - preventative and predictive maintenance programs.



Cameco stated that, through this MP, the company ensures that all assets maintain a high level of equipment integrity.

75. Cameco further informed the Commission that the company had updated the MP to prepare for transitioning from construction to mining activities and to reflect the licence requirements. The descriptions of the maintenance procedures for systems and components of the ore processing are incorporated into the maintenance planning documentation prepared for the commissioning process. Cameco representatives added that the maintenance record keeping was up to date, and that, for the needs of the project, Cigar Lake has hired a reliability engineer and additional maintenance planning personnel.
76. CNSC staff informed the Commission that Cameco had updated and revised the Cigar Lake maintenance program to account for future mine operations and to meet CNSC requirements. CNSC staff added that this revised maintenance program meets their expectations.
77. CNSC staff reported that they had evaluated the maintenance that impacts the physical condition of systems, components and structures at Cigar Lake. CNSC staff stated that Cameco continues with its preventative approach to maintain the overall condition of the equipment at the site.
78. CNSC staff further informed the Commission that they had reviewed Cameco's management system during regular inspections, which included random sampling of equipment, maintenance and monitoring records. These inspections confirmed that preventative maintenance activities were scheduled, completed and recorded, and that the maintenance program was well documented and implemented.
79. The Commission is satisfied with Cameco's programs for the inspection and life-cycle management of key safety systems. Based on the above information, the Commission concludes that the equipment as installed at the facility is fit for service.

### **3.7. Radiation Protection**

80. As part of its evaluation of the adequacy of the provisions for protecting the health and safety of persons, the Commission considered the past performance of Cameco in the area of radiation protection. The Commission also considered the radiation protection program at the Cigar Lake Project to ensure that both radiation doses to persons and contamination are monitored, controlled, and kept as low as reasonably achievable (ALARA), with social and economic factors taken into consideration.
81. Cameco informed the Commission that they have implemented a *Radiation Protection Program* (RPP) to ensure that potential contamination and radiation doses received by workers are monitored and controlled. Cameco representatives said that Cigar Lake's RPP and *Radiation Code of Practice* (RCOP) describe how the site manages radiation

protection issues, meets applicable regulatory requirements and keeps radiation exposures in accordance with the ALARA principle.

82. CNSC staff informed the Commission that they had reviewed Cameco's radiation protection and monitoring programs and their application, as well as the application of the ALARA principle in the mining of high-grade ore. CNSC staff concluded that Cameco had in place a RPP and RCOP at Cigar Lake and added that, in the absence of ore production, the overall radiological risks had remained very low during the current licence period.
83. CNSC staff reported that Cameco's revised RPP and RCOP are aligned with future mine operation requirements. CNSC staff noted that the RPP includes continuous and routine radiological monitoring, dosimetry, contamination control and long-lived radioactive dust exposure control, and that the RCOP was an important ALARA tool, based on the principle of preventive acting and correcting potential problems.
84. Cameco informed the Commission that the radiation exposure to workers was reduced by the shielding and ventilation design features that include the following:
  - concrete or steel of appropriate thickness around tanks, chutes, pump boxes and other components containing the high-grade ore slurry;
  - natural shielding, using rock formations for placing parts of the infrastructure;
  - processes and design features and ventilation system; and
  - direct routing of air flowing through the process areas to the exhaust system.
85. Cameco representatives noted that main radiological hazards during the construction phase of the mine were associated with radon gas exposure and gamma radiation hazards. They also noted that the applied protection measures had been effective and that effective doses over the licence period remained far below the regulatory limits of 50 mSv/y (millisieverts per year); the highest average effective dose during this period was below 0.4% and the highest maximum dose remained below 2.4% of this regulatory limit. Cameco representatives stated that the radiation exposure to workers was mainly reduced by the designed shielding and ventilation features. CNSC staff confirmed that annual doses to workers at the Cigar Lake Project had remained well below the regulatory limits, as reported by Cameco.
86. Cameco representatives added that, although radiation levels are currently very low, in order to address potential spread of radioactive contamination and to prepare for mine development and transition to production, a four-zone contamination control system has been established to control the spread of contaminated material. The company had estimated effective doses per year for various worker categories during mine production, based on the mitigation measures built into the mine design. These estimated values present the basis for establishing expected baseline conditions that would be used to evaluate the effectiveness of the RPP, including contamination control system and mitigation measures.

87. The Commission asked what would be the main source of radiation exposure to workers during the mine operation, taking into account that the JBS and ground freezing would separate miners from the high grade ore. Cameco representatives responded that exposure could come from a number of different sources, mostly from maintenance work on parts of ore processing systems. The Commission further asked how this exposure and estimated annual doses compare with the exposure in other mines with lower grade ore. CNSC staff responded that these estimates are comparable.
88. The Commission is of the opinion that, given the mitigation measures and safety programs that are in place or will be in place to control hazards, Cameco will provide adequate protection to the health and safety of persons, the environment and national security.

### **3.8. Conventional Health and Safety**

89. Conventional health and safety covers the implementation of a program to manage workplace safety hazards. The conventional health and safety program is mandated by provincial statutes for all employers and employees to minimize risk to the health and safety of workers posed by conventional (non-radiological) hazards in the workplace. This program includes compliance with the applicable labour codes and conventional safety training. CNSC staff reviewed Cameco's performance in this SCA and rated it as fully satisfactory.
90. Cameco informed the Commission that they have implemented a revised site-specific *Safety and Health Management Program (SHMP)*. This document is in accordance with Cameco's *Safety, Health, Environment and Quality (SHEQ)* policy and covers the management of workplace safety hazards and the protection of personnel and equipment. The SHMP is based on the international Occupational Health and Safety Standard OHSAS 18001 and sets out the requirements for the management of the health and safety aspects at Cigar Lake. CNSC staff concurred with Cameco.
91. Cameco added that it and long-term contractors at the site have dedicated personnel engaged exclusively in identifying and addressing conventional safety risks, and that they work together to ensure that Cameco safety programs apply to all personnel working at Cigar Lake.
92. Cameco mentioned that the Cigar Lake Project had received a special John T. Ryan award certificate by the Canadian Institute of Mining and Metallurgy for its excellence in safety performance in 2010.
93. Cameco further informed the Commission that Saskatchewan Ministry of Labour Relations and Workplace Safety (SMLRWS) had conducted six inspections in each of 2010, 2011 and 2012 and stated that all issues had been addressed appropriately and closed.

94. CNSC staff informed the Commission about their verification of Cameco's safety practices through compliance inspections conducted during the current licence period. CNSC staff reported that all incidents were reported in a timely manner and in compliance with the regulations. CNSC staff added that the SMLRWS had also conducted inspections regarding conventional health and safety. All contraventions had been adequately addressed, and safety related incidents were properly investigated in a timely manner. The resulting reports were acceptable to both CNSC staff and SMLRWS.
95. The Commission asked the SMLRWS representative how closely they cooperate with CNSC staff in the domain of non-nuclear occupational safety. The SMLRWS representative responded that the functions of the two organisations often overlap, and that they work closely together when considering issues and events of mutual concern. Asked for their comment, CNSC staff confirmed that there are areas that overlap and stated that, when investigating events, CNSC staff work with the province and allow the provincial inspectors to do their reviews and their own independent verifications. The Commission asked Cameco about their level of satisfaction regarding the relationship between the SMLRWS and CNSC staff. Cameco representatives responded that Cameco is mainly guided by their corporate policies and programs, and added that both provincial and federal regulators are fulfilling their regulatory responsibilities and are providing support as necessary.
96. The Commission asked the representative of the SMLRWS about their view of the construction and the readiness of the Cigar Lake Project to move to the next phase. The SMLRWS representative responded that SMLRWS was satisfied with Cameco's performance.
97. The Commission is of the opinion that the health and safety of workers and the public was adequately protected during the operation of the facility for the current licence period, and that the health and safety of persons will also be adequately protected during the continued operation of the facility.

### **3.9. Environmental Protection**

98. Environmental protection covers Cameco's programs to identify, control and monitor all releases of nuclear and other hazardous substances, and to minimize the effects on the environment which may result from the licensed activities. It includes effluent and emissions control, environmental monitoring, and estimated doses to the public. CNSC staff rated Cameco's performance in this SCA as satisfactory.
99. Cameco informed the Commission that the environmental protection at Cigar Lake is assured by the site specific *Environmental Management Program* (EMP) and the *Environmental Code of Practice* (ECOP). Cigar Lake management conducts annual reviews of environmental aspects of the facility's operation and potential impacts on

the environment through the EMP, which is also used to set objectives and plans to improve environmental performance in the areas with the most significant potential impacts.

100. CNSC staff reported that Cameco's EMP incorporates the company's environmental protection policies, programs and implemented procedures. The updated documents account for future mine operations and for the requirements of the CNSC's safety and control areas, and include ongoing effluent monitoring, environmental information gathering and spill prevention. The documents also include additional sampling and monitoring related to the change in effluent discharge location from Aline Creek to Seru Bay.
101. CNSC staff added that Cameco had submitted the updated versions of EMP and ECOP in September 2012 as part of its application for a new licence. CNSC staff reviewed the updated program and provided to Cameco comments that were satisfactorily addressed.
102. With respect to environmental risks, Cameco informed the Commission that these are mostly related to storing potentially problematic waste rock on surface. These risks were addressed through a plan to transport that rock to the former Sue C open pit at McClean Lake for safe, permanent storage.
103. The Prince Albert Grand Council (PAGC), in their intervention, expressed concerns regarding contribution of uranium mining projects to cumulative pollution effects in that area, and regarding an increased contamination of the water bodies. PAGC representatives noted that, while the ore extraction uses modern technology, waste management is still based on the old technologies.
104. The Commission asked if any simulations of the long term impact of effluent releases in Seru Bay had been done. Cameco representatives responded that they had conducted an environmental risk assessment that had concurred with the conclusion in the EA that there would be no significant adverse effects. CNSC staff stated that they had reviewed this assessment and found it acceptable.
105. CNSC staff reported that, during the current licence period, they had conducted ten compliance inspections which included various aspects of environmental protection. CNSC staff confirmed that all action notices resulting from these inspections had been addressed and closed. CNSC staff also confirmed that none of the five reportable environmental spills resulted in any significant effect on the environment.

#### *3.9.1. Effluent and Emissions Control*

106. Cameco informed the Commission that their treated water discharge process at Cigar Lake had been modified and that the regulatory approval for the modified process had been obtained. According to the new process, during summer months, treated water would be stored in batches within lined surface ponds before being released, while in

winter months, the process would switch to a continuous treat-and-release system, in order to avoid ice damage to pond liners. According to the analyses done for both procedures, the level of contaminants in treated water released to the environment was significantly below regulatory limits.

107. CNSC staff reported that, until the end of 2012, there were five reportable environmental spills at Cigar Lake and that none of these incidents resulted in any significant effect on the environment. All reportable incidents were addressed and followed up through Cameco's corrective action process, as required by CNSC and the Saskatchewan Ministry of Environment (SMOE).
108. CNSC staff presented to the Commission values of the concentration limits for contaminants present in the treated effluents, which are based on the *Metal Mining Effluent Regulations*. CNSC staff noted that, during the current licence period, concentrations of contaminants in the effluents had been maintained below the effluent discharge limits, and remained very low. The effluent releases passed all toxicity tests with no exceedances of the environmental action levels contained in the ECOP.
109. The Commission sought more details on the concentration and treatment of molybdenum in the effluent and related regulatory limits. CNSC staff responded that, currently, there is a facility-based set release limit, while the CNSC is still working with Environment Canada on establishing values for regulatory limits that would be applied nationally. CNSC staff added that Cameco had used these CNSC established site-specific levels for monitoring and to put in place their molybdenum removal facility. The limits, sampling methods and controls are included in Cameco's ECOP. The Cameco representative noted that they had learned from the operation of other Cameco-operated facilities in northern Saskatchewan, and added that they had designed and used a two-stage water treatment plant to remove molybdenum and other contaminants.
110. The Commission noted that there was no limit for mercury on the list of effluent constituents and asked for the reason. CNSC staff responded that lists of contaminants and concentration limits were set for each site depending on the presence of contaminants in the releases from that site. In the case of the Cigar Lake Project, mercury was not a contaminant released from the facility.

### 3.9.2. Environmental Monitoring

111. Cameco informed the Commission about its *Status of the Environment Report (SOE)*, which is a reporting requirement of SMOE for mining operations. The report was submitted in early 2012 and contains the environmental monitoring data and other relevant information for the period from 1998 to 2010 inclusive. The results included in the SOE show that the construction activities at Cigar Lake have had minimal effects on the surrounding environment and are consistent with predictions made in previous environmental assessments.

112. Cameco also informed the Commission that the results of monitoring of water bodies affected by the construction of the permanent access road have also shown minimal effects in the aquatic and terrestrial environments.
113. CNSC staff informed the Commission that they continuously review the monitoring information regarding environmental effects of the Cigar Lake Project, which should meet the requirements of the *Metal Mining Effluent Regulations*<sup>4</sup>, as well as additional requirements from the CNSC and Saskatchewan Ministry of Environment.
114. The Commission asked Cameco about bypassing the Aline Creek system to directly discharge effluents into Seru Bay and about their monitoring of the discharges. Cameco representatives responded that the discharge into Seru Bay is part of Cigar Lake comprehensive water management system and that the direct discharge was the subject of an extensive environmental assessment following the water inflow events. The Seru Bay discharge point was the response to a particular evaluation of risks related to insufficient ability of the Aline Creek system, which was the original discharge point, to withstand a non-routine release of mine water in a case of another inflow. Cameco representatives added that areas for monitoring and sampling have been identified during the environmental assessments and said that areas that have been monitored by the SMOE have been specified as well. Cameco representatives further explained that monitoring of the effluents before discharging is also done.
115. CNSC staff confirmed that the effluents are treated on a batch scale and monitored to confirm that they meet the release limits before being released. CNSC staff added that the flow through Aline Creek leading to releases to Seru Bay would not improve the environmental footprint in Seru Bay and was not considered to be the best modern practice.
116. The Northern Saskatchewan Environmental Quality Committee (NS-EQC), in their intervention, suggested closer monitoring of Waterbury Lake as a precautionary measure, given the importance of the lake resources, including food provision, for the Métis and Denesuline nations. The Commission enquired about food contamination in the area. NS-EQC representatives noted that, in the Beaverlodge region, there is a limited fish advisory due to selenium and that fish from Martin Lake was not fit for human consumption. They added that a similar situation could be avoided by application of preventive measures that include closer monitoring for potential contaminants.

### *3.9.3. Conclusion on Environmental Protection*

117. Based on the above information, the Commission is satisfied that, given the mitigation measures and safety programs that are in place to control hazards, Cameco will provide

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<sup>4</sup> SOR/2002-222

adequate protection to the health and safety of persons and the environment. The Commission expects that Cameco and CNSC staff would engage in closer monitoring of Waterbury Lake.

### **3.10. Emergency Management and Fire Protection**

118. Emergency management and fire protection covers the provisions for preparedness and response capabilities which exist for emergencies and for non-routine conditions at the Cigar Lake Project. This includes nuclear emergency management, conventional emergency response, and fire protection and response. After reviewing Cameco's performance related to this SCA, CNSC staff rated it as satisfactory.

#### *3.10.1. Emergency Management*

119. Cameco informed the Commission that they had completed all necessary preparations to be ready to deal independently with all emergency situations. The company has trained personnel and specialized materials and equipment for effective response measures. Cameco's *Emergency Preparedness and Response Program (EPRP)* includes emergency response and mine rescue, mine evacuation, first aid, fire protection, firefighting, and spill response. Cameco added that they had hired a third-party expert to review and validate the emergency response measures at Cigar Lake. The results of this assessment had been reviewed by CNSC staff and no significant gaps were identified in the design of facilities with respect to their ability to cope with multiple natural disasters.
120. CNSC staff informed the Commission that they had reviewed Cameco's revised EPRP. CNSC staff stated that Cameco had addressed all their comments and the issues stemming from this review in a timely and satisfactory manner.
121. With respect to emergency response, Cameco informed the Commission that they have an emergency response team, which had responded to all alarm conditions during the current licence period. After each of these events, debriefing meetings had been held to analyse the response and identify potential for improvement. In the event of transportation emergency, Cameco would respond according to its Emergency Response Action Plan (ERAP), by employing a specialized tow vehicle with crane lift capacity sufficient for recovering a slurry tote. Cameco representatives also noted that Cameco and AREVA intend to conduct a joint emergency response exercise to test the response capabilities for a potential slurry-truck incident.
122. The Commission asked the SMLRWS representative whether special training or measures related to emergency rescue were required, taking into account an operation with the high-grade uranium ore. The SMLRWS representative responded that, besides regular annual audits, the inspector from the Ministry's radiation unit also audits the mine, and that they work in conjunction with the CNSC. The SMLRWS representative



stated that training is mandatory for all involved in the operation of the mine and that employees have to pass a radiation exam with the SMLRWS, as well as Cameco's training on radiation.

123. CNSC staff reported on their inspection conducted in 2012 to assess the performance of Cameco's emergency response to a simulated emergency involving multiple events. Cameco submitted an action plan with corrective measures and proposed completion dates for documenting, implementing and verifying the adequacy and effectiveness of these measures. CNSC staff reviewed the plan and concluded that it was acceptable.
124. CNSC staff informed the Commission about Cameco's response to the request sent to all major licensed facilities, including uranium mines and mills, to undertake a review of the safety assessment and designs for each of their facilities based on natural disasters and severe accident scenarios. CNSC requested this information recognizing the importance to learn from the Fukushima event in Japan. In its response, Cameco stated that each of Cameco's sites has in place extensive emergency planning and response measures. Cameco also retained a third-party expert to conduct a gap analysis of each operation in terms of defence-in-depth. The resulting report did not identify any significant gaps and only a few minor recommendations were made to strengthen emergency planning. CNSC staff stated that Cameco had addressed these recommendations in a satisfactory manner.
125. The Commission enquired about potential consequences of a natural disaster of large proportion and about the effects of such events on the rate of melting of frozen ground and ore. Cameco representatives responded that, after having received the CNSC request to review the safety assessment for the beyond design basis events, Cameco hired third-party experts to review their facilities in northern Saskatchewan, including Cigar Lake. The third party experts had been satisfied that Cameco has adequate planning and resourcing for the beyond design basis events. The experts had recommended that Cameco perform a tabletop exercise to simulate that kind of event. The simulation was performed in December 2012 and Cameco had identified some issues that are being addressed.
126. With respect to melting rate of frozen ground and ore, CNSC staff stated that it would take months, or even years, for the frozen ore to thaw, so that this aspect of an event would not require an immediate response. Cameco representatives noted that, after the first inflow event and remediation, upon accessing the area that had been underwater for four or five years, the ground was still frozen.

### *3.10.2. Fire Protection*

127. Cameco informed the Commission that fire protection at Cigar Lake is managed through their *Fire Protection Program (FPP)*, which is compliant with the *National Fire Code of Canada, 2005 (NFC)* and the *National Building Code of Canada, 2005*

(NBC)<sup>5</sup>. Fire protection is achieved through a combination of fire prevention measures and response systems, which include physical and administrative measures. Physical controls include fire detection and alarm systems, and hydrants located throughout on-site facilities. Administrative controls include third-party reviews of compliance to the NFC and the NBC, inspections, testing and training. Readiness to respond is assured through systematic maintenance programs and regular drills and exercises held by the site's emergency response team.

128. The Commission sought more details regarding the false fire alarms reported in 2012. Cameco representatives responded that a relatively high number of false alarms in their camp had been caused by the high sensitivity of their detection system. CNSC staff noted that, although the mine camp is not part of the licensed area, Cameco applies the same safety standards in their camp as they do in the rest of the facility that is operating under the licence.

### *3.10.3. Conclusion on Emergency Management and Fire Protection*

129. Based on the above information, the Commission concludes that the fire protection measures and emergency management preparedness programs that are in place, and that will be in place, at the facility are adequate to protect the health and safety of persons and the environment.

## **3.11. Waste Management**

130. Waste management covers the licensee's site-wide waste management program. CNSC staff evaluated Cameco's performance with regards to waste minimization, segregation, characterization, and storage. CNSC staff rated Cameco's performance in this SCA as satisfactory.
131. Cameco informed the Commission that management of waste produced during the construction of the mine and the waste that would be produced during future operation of the mine is described in the site's *Waste Management Program (WMP)*. Cameco stated that the JBS mining method would minimize production of waste rock and that clean waste rock would be stored on surface at site. Potentially radioactive slimes generated during mine development and stored temporarily in lined ponds will be returned underground and used as backfill for completed ore cavities.
132. CNSC staff informed the Commission that they had reviewed Cameco's revised WMP and found no major areas of concern. CNSC staff reported that they had carried out ten inspections that were conducted to evaluate different aspects of the waste management at Cigar Lake. The inspection conducted in 2012, focused on waste management, resulted in three good practices and three recommendations. Cameco provided a

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<sup>5</sup> *National Fire Code of Canada, 2005* and *National Building Code of Canada, 2005*, issued by the Canadian Commission on Building and Fire Codes

detailed response to the inspection. CNSC staff reviewed Cameco's responses and found them acceptable, and all recommendations were closed.

133. The Commission asked how much the application of JBS would contribute to minimization of waste production. Cameco representatives responded that, given that the use of JBS results in 16-inch diameter holes to reach the ore, the amount of waste produced would be significantly lower compared to traditional drilling blasts and other techniques.
134. Based on the above information and considerations, the Commission is satisfied that Cameco is safely managing waste at the Cigar Lake Project.

### **3.12. Security**

135. Cameco informed the Commission that Cigar Lake Project's *Security Program (SP)* is designed to prevent the loss or theft of nuclear substances and the interference with activities at the site, and added that, during the current licence period, there were no reportable incidents.
136. CNSC staff reported that security measures currently in place are adequate for both construction and operation of the mine, and rated Cameco's performance in this SCA as satisfactory.
137. The Commission is satisfied that Cameco's performance with respect to maintaining security at the facility has been acceptable, and that Cameco has made and will make adequate provision for ensuring the physical security of the facility.

### **3.13. Safeguards**

138. The CNSC's regulatory mandate includes ensuring conformity with measures required to implement Canada's international obligations under the Treaty on the Non-Proliferation of Nuclear Weapons. Pursuant to the Treaty, Canada has entered into safeguards agreements with the IAEA. The objective of these agreements is for the IAEA to provide credible assurance on an annual basis to Canada and to the international community that all declared nuclear material is in peaceful, non-explosive uses and that there are no undeclared nuclear material or activities in this country.
139. Cameco informed the Commission that integrated safeguards for Cigar Lake are in effect and that Cameco continues to collaborate with the CNSC and the International Atomic Energy Agency (IAEA). Cameco is required, under the safeguards requirements, to provide access to the IAEA, upon request for verification activities at the site. In this respect, Cameco stated that they had not received any access requests from the IAEA for the Cigar Lake Project during the current licence period.

140. CNSC staff added that Cameco submits annual information on its operations to the CNSC, which is included in Canada's annual declaration to the IAEA regarding the Canadian nuclear fuel cycle. CNSC staff confirmed that there were no requests by IAEA inspectors to inspect the Cigar Lake site.
141. Based on the above information, the Commission is satisfied that Cameco has made and will continue to make adequate provision in the areas of safeguards and non-proliferation at the facility necessary for maintaining national security and measures necessary for implementing international agreements to which Canada has agreed.

### **3.14. Packaging and Transport**

142. Packaging and transport covers the safe packaging and transport of nuclear substances to and from the Cigar Lake site. The licensee must adhere to the *Packaging and Transport of Nuclear Substances Regulations*<sup>6</sup> and Transport Canada's *Transportation of Dangerous Goods Regulations*<sup>7</sup> for all shipments leaving the site. The regulations apply to the design, production, use, inspection, maintenance and repair of packages. The regulations also encompass the preparation, consigning, handling, loading, carriage and unloading of packages containing nuclear substances.
143. Cameco informed the Commission that core elements of their revised *Transportation Program* (TP) include storage of dangerous goods while on site, packaging, labeling, documentation for dangerous goods, and loading of transport vehicles. The TP describes transportation processes for ore slurry, bulk materials and freight, waste rock and contaminated waste associated with the project.
144. CNSC staff informed the Commission that they had reviewed the revised TP and concluded that it is in compliance with regulatory requirements.
145. Cameco further informed the Commission that shipments from Cigar Lake during the current licence period were limited to core samples and samples sent to laboratories for radiation analysis. Cameco representatives added that uranium ore slurry would be shipped to the McClean Lake mill as part of the commissioning process and during the operation life of the mine. For these shipments, Cameco will use the same type of slurry totes that have been used for shipping slurry from McArthur River to Key Lake.
146. CNSC staff noted that the containers Cameco intends to use for transporting ore slurry for final processing to an offsite mill would have to meet the regulatory requirements for industrial packages (IP-2) as defined in the *Packaging and Transport of Nuclear Substances Regulations*. During the initial period of operation, CNSC staff plans to conduct enhanced verification activities to ensure that the implementation of the transportation program meets regulatory requirements.

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<sup>6</sup> SOR/2000-208

<sup>7</sup> SOR/2001-286

147. Fond Du Lac Denesuline First Nation, in its intervention, expressed concern regarding transportation of uranium ore and a higher volume of mine traffic in the future, which might increase the potential for traffic accidents and fatalities, spills and dust emissions. The ore haul route includes a ten-kilometre stretch on highway 905, which is a public road frequently used by the community members and is the only roadway to southern Saskatchewan. Additionally, they requested that Cameco continue to be diligent regarding the cleanliness of vehicles leaving the site, particularly with an increase in haul trucks frequenting public roads.
148. The Commission enquired about potential solutions for the concerns raised by the First Nations. Fond Du Lac Denesuline First Nation representatives said that their first concern was the road narrowness, and suggested the widening of the road and better road maintenance. Cameco representatives stated that they had performed a comprehensive risk assessment of all activities involved in the slurry haul and waste hauling to ensure safety of people and protection of the environment.
149. With respect to road conditions, Cameco representatives noted that Highway 905 was maintained by the provincial government, and that Cameco makes sure that the road is kept clear in an emergency, during snowstorms and under similar conditions.
150. With respect to the cleanliness of vehicles, Cameco representatives stated that washing down and scanning the vehicles are part of the established procedures before a vehicle is sent on the road.
151. The Commission further enquired about anticipated frequency of ore slurry transports. Cameco representatives responded that, at the beginning of operations, Cameco would be transporting six to eight trucks per day, with some days without transport, while at full production, the number would be about ten trucks per day. Cameco representatives added that the company has extensive experience in hauling slurry totes, and stated that they were putting in place all necessary safety procedures and would employ professional drivers highly experienced in this type of transportation.
152. The Commission sought more detail regarding the transportation of waste rock. Cameco representatives responded that the only waste rock transportation was planned for the decommissioning of the site.
153. Based on the above information, the Commission is satisfied that Cameco is meeting and will continue to meet regulatory requirements regarding packaging and transport.

### **3.15. Application of the *Canadian Environmental Assessment Act***

154. Before making a licensing decision, the Commission must be satisfied that all applicable requirements of the *Canadian Environmental Assessment Act, 2012*<sup>8</sup> (CEAA 2012) have been fulfilled.
155. Cameco informed the Commission about earlier conducted environmental assessments and noted that, currently, there are no ongoing environmental assessments (EAs) related to Cigar Lake. The initial environmental assessment of the overall Cigar Lake Project was conducted in 1995 as part of the Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan. The federal and Saskatchewan governments approved the Cigar Lake project in principle in 1998, leaving the issue of a permanent disposal site for waste rock to the later environmental assessment screening report (EASR). Cameco completed the EASR related to final waste rock disposal and submitted it to the CNSC in 2004. CNSC reviewed and accepted the report, and issued the initial Uranium Mine Construction Licence for the Cigar Lake Project. Cameco's proposal to build a pipeline and discharge point directly at Seru Bay on Waterbury Lake, in 2008, triggered a joint federal and provincial environmental assessment under CEAA and *Saskatchewan Environmental Assessment Act* respectively. In 2011, Cigar Lake's EA was accepted and approval was granted to proceed with construction of the Seru Bay pipeline project.
156. CNSC staff confirmed that all follow-up activities regarding the environmental assessment have been completed during the previously conducted environmental assessments, and that all regulatory requirements have been fulfilled.
157. Based upon the presented information, the Commission is satisfied that the requirements of the CEAA for the environmental assessment of the proposed operation of the uranium mine at the Cigar Lake Project and for this licence renewal application have been fulfilled.

### **3.16. Aboriginal Engagement and Public Information Program**

158. The common law duty to consult with Aboriginal communities and organizations applies when the Crown contemplates actions that may adversely affect established or potential Aboriginal or treaty rights.
159. A public information program is a regulatory requirement for licence applicants and licensed operators of a uranium mine. Paragraph 3(c)(i) of the *Uranium Mines and Mills Regulations*<sup>9</sup> requires that licence applications include "*the proposed program to inform persons living in the vicinity of the mine or mill of the general nature and characteristics of the anticipated effects of the activity to be licensed on the environment and the health and safety of persons.*"
160. Cameco informed the Commission that they have in place the *Public Information*

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<sup>8</sup> S.C. 2012, c. 19, s.52

<sup>9</sup> SOR/2000-206

*Program* (PIP) with the objective to provide all stakeholders with updates related to on-going Cigar Lake site activities, significant changes and projects. The program also provides a forum for community members to discuss issues and address concerns, and an opportunity to visit the site. Cameco further informed the Commission that they had implemented a *Public Disclosure Protocol*, which describes the types of routine and non-routine information provided by Cameco, and is consistent with the CNSC's regulatory/guidance document RD/GD 99.3: *Public Information and Disclosure*. The protocol is posted on the Cameco Northern Saskatchewan website.

161. CNSC staff informed the Commission that they had reviewed Cameco's PIP, and provided their review comments to Cameco. Cameco addressed these comments adequately, and CNSC staff concluded that the revised program was acceptable.
162. Cameco further informed the Commission that their public engagement activities provide them with an opportunity to effectively engage with Aboriginal groups in northern Saskatchewan. Cameco noted that they had established satellite offices with community liaison representatives at Fond du Lac Denesuline First Nation, Black Lake Denesuline First Nation and Hatchet Lake Denesuline First Nation in the Athabasca Basin, as well as in English River Denesuline First Nation and the Northern Village of Pinehouse.
163. Cameco representatives added that, during the current licence period, they had organised 28 events to engage northern Saskatchewan communities. Some of these events were meetings with the Northern Saskatchewan Environmental Quality Committee (NS-EQC) or the Athabasca Working Group (AWG). A series of events was organized to address the environmental assessment of the Seru Bay project and proposed changes to Cigar Lake's water management system. During the most recent events, the Cigar Lake management team presented and discussed the site activities during the full scale ore production, and plans, employment and business prospects. The team also engaged northern residents regarding the transportation route for hauling slurry between Cigar Lake and McClean Lake mill and the limited shared use of Highway 905 for this purpose. In March 2013, AWG and NS-EQC have been brought to the site to update them on progress of the project. During these meetings Cameco's plans for transporting ore slurry to the McLean Lake Mill have been outlined as well.
164. CNSC staff concurred that, during the current licence period, Cameco had continued to engage residents of Saskatchewan's North, and maintained open communications with the interested local communities and Aboriginal groups, as documented in Cameco's annual reports and observed by CNSC staff.
165. CNSC staff informed the Commission about their participation in Aboriginal engagement activities and stated that they had participated in regular Northern Saskatchewan Environmental Quality Committee (NS-EQC) meetings and in Cameco's annual Northern Tour.
166. CNSC staff added that they had explained CNSC's regulatory role in community

meetings hosted by Cameco with Fond du Lac First Nation, Black Lake First Nation, Stony Rapids, Wollaston Post/Hatchet Lake First Nation. CNSC staff said that they had also conducted research that led to a distribution list of First Nation and Métis groups. CNSC staff sent notification letters and the Notice of Hearing to the identified groups and contacted them directly to answer any questions and encourage participation in this licence hearing process.

167. In addition to these public consultation activities, CNSC provided funding through its Participant Funding Program (PFP) to assist Aboriginal groups, members of the public and other stakeholders to participate in reviewing and commenting on the licence application through written or oral interventions. The interested stakeholders were informed of the PFP through the CNSC web site postings, through a local radio station that broadcasts to 70 communities in northern Saskatchewan (in English, Cree and Dene) and by letters sent to identified Aboriginal groups. A Funding Review Committee, independent from CNSC, reviewed the funding applications received and made recommendations. Based on these recommendations, the CNSC awarded funding to Kineepik Métis Local (Pinehouse), Prince Albert Grand Council, Fond du Lac Denesuline First Nation and Clarence Natomagan (Sydon Consulting).
168. In their intervention, Kineepik Métis Local Inc. (local #9), drew attention to the importance of engaging neighbouring communities and noted positive experience with their ongoing collaboration agreement signed with Cameco, and through contracting opportunities. The collaboration agreement encompasses formation of a five-member environmental committee to address any environmental considerations within community's traditional lands, formalizes a trust fund agreement with a legal trustee, and formation of a six-member joint implementation committee to ensure effective implementation of the agreement. The collaboration agreement enabled provision of economic resources for improvement of the community's infrastructure and other needs.
169. The Commission asked how many members of the community were employed by Cameco. Kineepik Métis Local Inc. representatives responded that the number of people employed either directly by Cameco, or indirectly through local companies contracted by Cameco was approximately 200, and that the financial effect of this engagement was between \$ 20 million and \$ 30 million.
170. The Commission enquired if the community organizes some specific training to expand their contract opportunities. Kineepik Métis Local Inc. representatives responded that they plan to enrol a number of their members in courses for trades which are in demand by Cameco, or their contractors.
171. The Commission asked Cameco whether the 1997 Environmental Impact Statement had considered cultural impacts to the community of Pinehouse. Cameco representatives explained how the approach to Aboriginal issues and traditional knowledge had been evolving through several environmental assessments related to the Cigar Lake Project since the mid 1990s, to come to the current conclusion that social



impact of the project is acceptable. CNSC staff added that the environmental assessment reviews of 2004 and 2011 included public and Aboriginal participation. During the assessment conducted in 2011, none of the Aboriginal groups expressed concerns regarding the project, and CNSC staff were not aware of any adverse impacts that the proposed project may have on any potential or established Aboriginal or treaty rights.

172. Fond Du Lac Denesuline First Nation, in their intervention, emphasized the need for clear and direct communication between Cameco and community members. They noted that, although Cameco has a comprehensive public information program, information does not reach all members of the community, especially those with no internet access, and that there is a lack of clarity and detail. In addition, Fond Du Lac Denesuline First Nation representatives suggested the translation to Dene, of the information provided, should be peer reviewed before being disseminated throughout the community.
173. Asked by the Commission to comment on the concerns regarding the clarity and the completeness of communication, Cameco representatives responded that the company has a long history of engagement in northern Saskatchewan. Cameco representatives noted that they have a community liaison officer stationed in Fond du Lac, and that they would look for feedback on their communication efforts and explore the opportunity to further improve these efforts.
174. With respect to the suggestion regarding peer reviewed translation, Cameco representatives stated that they were trying to satisfy speakers of various Cree and Dene dialects that exist in northern Saskatchewan and to ensure that documents are reviewed before they are disseminated. For the events where translators are present, Cameco provides synopses of presentations and notes in advance.
175. Representatives of the Prince Albert Grand Council (PAGC), in their intervention, suggested that the First Nations should have their representative as a member of the Commission. They stated that they support the development, and want to be part of it, consulted, and included in the decision-making process and benefit sharing.
176. The Commission sought more information regarding engagement efforts respecting the Cigar Lake Project. CNSC staff explained their activities and stated that the standard procedure had been applied for the evaluation of Cameco's performance in public consultation regarding the Cigar Lake Project. Cameco representatives described once more all the activities they had conducted to inform Aboriginal communities about the Cigar Lake Project. They stated that they had engaged with communities in the vicinity of the Cigar Lake Project, including a lot of the members of the PAGC that were listed.
177. The Commission enquired if it was sufficient that Cameco communicate with members of the PAGC, which is an elected body of the community, and whether Cameco should engage with a broader community. PAGC representatives acknowledged that the

PAGC members had been engaged, and clarified that their role is to facilitate meetings and not to speak for the community, unless the PAGC obtain a specific mandate to do so. The Commission suggested that Cameco engage with the broader community whenever possible.

178. Based on this information, the Commission is satisfied that Cameco's public information program meets regulatory requirements. The Commission is also satisfied that Cameco's and CNSC staff's public information activities are effective in keeping the public and Aboriginal communities informed on the facility operations.

### **3.17. Decommissioning Plans and Financial Guarantee**

179. The Commission requires that the licensee has operational plans for decommissioning and long-term management of waste produced during the life-span of the facility. In order to ensure that adequate resources are available for a safe and secure future decommissioning of the Cigar Lake site, the Commission requires that an adequate financial guarantee for realization of the planned activities is put in place and maintained in a form acceptable to the Commission throughout the licence period.
180. Cameco informed the Commission that the updated *Preliminary Decommissioning Plan (PDP)* and *Preliminary Decommissioning Cost Estimate (PCDE)* for the Cigar Lake Project had been approved by the Government of Saskatchewan, and that the new irrevocable standby letters of credit in the amount of \$49.2 million will be issued to the Saskatchewan MOE upon approval of PDP and PCDE by the Commission.
181. CNSC staff reported that, in September 2012, Cameco submitted a revised decommissioning plan and cost estimate to reflect the costs of decommissioning of the operational mine. CNSC staff stated that they had completed a review of the plan and concluded that it provides sufficient detail and is consistent with regulatory requirements.
182. CNSC staff noted that the SMOE had also reviewed the plan and cost estimate, and found the proposed financial guarantee acceptable.
183. The Commission asked if the estimate of financial guarantee includes any future changes in expectations and standards. CNSC staff explained that every financial guarantee includes a contingency of 15% to 30% to account for estimation accuracy and to cover a long-term monitoring program, so that it includes an allowance for additional work that might be necessary in the future. CNSC staff added that all financial guarantees are reviewed after five-year periods to reflect inflation and changes that might be required.
184. Based on this information, the Commission considers that the preliminary decommissioning plans and related financial guarantee are acceptable for the purpose of the current licence application.

### **3.18. Cost Recovery**

185. CNSC staff informed the Commission that Cameco is in good standing with the CNSC regarding the licensing fee payment for the operation at Cigar Lake.

### **3.19. Licence Length and Conditions**

186. Cameco representatives informed the Commission that they have applied for the licence renewal prior to its current licence expiry date, in order to provide the flexibility to accommodate the progress of Cigar Lake commissioning and to fully accommodate the transition from mine development and construction to mining operations. Cameco representatives added that the requested ten-year licence period would allow them to complete commissioning, to ramp-up production and reach a sustained period of operations at full production.
187. CNSC staff supported Cameco's request and recommended a ten-year licence period.
188. CNSC staff noted that they have proposed a reformed licence with an associated Licence Conditions Handbook (LCH). The proposed licence format is consistent with a process of licence reform, undertaken to improve the clarity and consistency of CNSC requirements and to streamline the administration of CNSC licences, while maintaining adequate regulatory oversight. The licence and LCH follow a consistent format used for all CNSC regulated facilities. The revised licence format has already been introduced for nuclear power plants, nuclear fuel fabrication plants, uranium refinery and conversion facilities, and a uranium mill.
189. Prince Albert Grand Council, in their intervention, objected to a ten-year licence, and noted that a ten-year period represents about 67% of the estimated life of the mine.
190. The Northern Saskatchewan Environmental Quality Committee (NS-EQC), in their intervention, recommended a five or eight-year licence, given the history of the Cigar Lake Project with major water inflow incidents, and mining system that had not been used before. They asked for a mid-term performance report that would be presented at a public hearing of the Commission, providing thus more opportunity for public participation. They also noted that, if granted, this would be the first ten-year licence granted to an operating uranium mine.
191. The Commission pointed out that the new, reformed licence envisages annual reports that do not exclude public participation, and that most of the malfunctions show up during the first year of operation. NS-EQC representatives reiterated that public involvement at annual reports was not clearly defined, and that a public hearing provides more opportunity for public interventions. CNSC staff confirmed their support for a ten-year licence, and noted that comprehensive written interventions that

could include all relevant issues related to the operation performance of the mine are allowed for such annual reports.

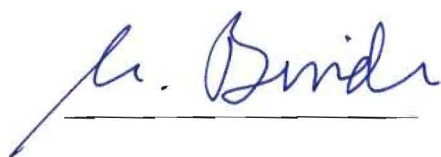
192. The Commission asked CNSC staff to explain oversight of the commissioning of the facility. CNSC staff responded that, instead of hold points with associated physical stops of commissioning activities, they have introduced an analogous process consisting of staged reports that would ensure that all necessary analyses and verifications are done as the commissioning process progresses through its stages. In this way, CNSC staff would be able to react appropriately and, if necessary, impose measures to protect the health and safety of workers, the public and the environment.
193. The Commission asked if any of the minority partners of the Cigar Lake Project has any experience with a ten-year licence for any of their facilities. The AREVA representative responded that their operations at McClean Lake had obtained an eight-year licence, and expressed support for longer licence periods associated with annual reporting on the status and performance of a facility. CNSC staff noted that some operating reactors were granted operating licences for ten-year periods.
194. Based on the above information and considerations, the Commission is satisfied that an eight-year licence with annual reporting on the Cigar Lake performance is appropriate. The Commission accepts the licence conditions as recommended by CNSC staff. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority, and notes that CNSC staff may bring any matter to the Commission as applicable.

#### **4. CONCLUSION**

195. The Commission has considered the information and submissions of CNSC staff, Cameco and all participants as set out in the material available for reference on the record, as well as the oral and written submissions provided or made by the participants at the hearing.
196. The Commission is satisfied that the requirements of the CEAA for the environmental assessment of the proposed operation of the uranium mine at the Cigar Lake Project and for this licence application have been fulfilled.
197. The Commission is satisfied that Cameco meets the requirements of subsection 24(4) of the *Nuclear Safety and Control Act*. That is, the Commission is of the opinion that Cameco is qualified to carry on the activity that the proposed licence will authorize and that Cameco will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
198. Therefore, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, replaces Cameco's Uranium Mine Construction Licence UMCL-MINE-

CIGAR.00/2013 for the Cigar Lake Project located in northern Saskatchewan with a new Uranium Mine Licence. The new licence, UML-MINE-CIGAR.00/2021 will be valid from July 1, 2013 to June 30, 2021.

199. The Commission includes in the licence the conditions as recommended by CNSC staff and set out in the draft licence attached to CMD 13-H5.
200. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority in the Licence Conditions Handbook (LCH). The Commission notes that CNSC staff can bring any matter to the Commission as applicable. The Commission directs CNSC staff to inform the Commission on an annual basis of any changes made to the LCH.
201. With this decision, the Commission directs CNSC staff to provide annual reports on the performance of the Cigar Lake Project as part of the Annual Report on the Performance of Canadian Uranium Fuel Cycle and Processing Facilities. CNSC staff shall present these reports at public proceedings of the Commission.
202. The status report submitted after one year from initial commissioning with uranium ore (Status Report #5 defined in the LCH), will be presented at a public proceeding of the Commission with public participation.



JUN 12 2013

Michael Binder  
President,  
Canadian Nuclear Safety Commission

Date

## Appendix A – Intervenors

<b>Intervenors</b>	<b>Document Number</b>
Kineepik Métis Local. Inc. (#9), represented by V. Natomagan	CMD 13-H5.2
Northern Saskatchewan Environmental Quality Committee, represented by A. Augier and W. Kelly	CMD 13-H5.3
Greater Saskatoon Chamber of Commerce, represented by K-S. Windsor	CMD 13-H5.4
Canadian Nuclear Association, represented by H. Kleb	CMD 13-H5.5
AREVA Resources Canada Inc., represented by J. Corman	CMD 13-H5.6 CMD 13-H5.6A
Clarence Natomagan, Sydon Consulting Inc.	CMD 13-H5.7
The North Saskatoon Business Association	CMD 13-H5.8
Athabasca Basin Development Limited Partnership	CMD 13-H5.9
Fond du Lac Denesuline First Nation, represented by D. McDonald and R. Froess	CMD 13-H5.10 CMD 13-H5.10A
Prince Albert Grand Council, represented by L. Hardlotte, J. Tsannie, R. Beatty, A. Jobb, E. Hansen and R. McLeod	CMD 13-H5.11
Saskatchewan Mining Association, represented by P. Schwann	CMD 13-H5.12 CMD 13-H5.12A