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## **Oral presentation**

### **Submission from the Concerned Citizens of Renfrew County and Area**

In the Matter of the

#### **Canadian Nuclear Laboratories**

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Application for the renewal of the Nuclear  
Research and Test Establishment Operating  
Licence for the Chalk River Laboratories

#### **Commission Public Hearing**

**January 23-25, 2018**

## **Exposé oral**

### **Mémoire de Concerned Citizens of Renfrew County and Area**

À l'égard des

#### **Les Laboratoires Nucléaires Canadiens**

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Demande de renouvellement du permis  
d'exploitation d'établissement de recherche  
et d'essais nucléaires pour les Laboratoires  
de Chalk River

#### **Audience publique de la Commission**

**23-25 janvier 2018**



**The proposed Canadian Nuclear Laboratories site license  
renewal at Chalk River: an analysis of selected issues.**

**Submission from Concerned Citizens of Renfrew County and Area  
for the January 2018 CNSC hearing**

**December 8, 2017**

# **The proposed Canadian Nuclear Laboratories site license renewal at Chalk River: an analysis of selected issues.**

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## **Executive Summary**

Concerned Citizens of Renfrew County and Area is a non-governmental, volunteer organization that has been working for the clean-up and prevention of radioactive pollution from the nuclear industry in the Ottawa Valley for 40+ years. Our main current focus is nuclear waste. We have intervened at CRL site licence hearings held by the Canadian Nuclear Safety Commission (CNSC), and previously by the Atomic Energy Control Board, for over 20 years. This submission addresses concerns about the renewal of the CRL site licence in the context of the January 2018 CNSC hearing on the application by Canadian Nuclear Laboratories (CNL) for a renewal of the CRL site licence. While some of our comments below cover more than a narrow focus on waste, all the issues covered in this submission have the potential to impact the issue of nuclear waste at the CRL site, be it directly or indirectly.

We discuss the following matters:

- Why do the proposed CRL licence and license condition handbook contain sweeping changes that would reduce regulatory oversight, and why do CNSC staff provide no information about these changes, or their implications?
- Why is so little information available to the public about decommissioning priorities at CRL, associated costs, and how they will be paid for?
- Is the “owner” of the CRL waste being regulated in accordance with the Government of Canada’s radioactive waste policy framework?
- How can a 10-year licence term (until 2028) be justified, when the current “GoCo” contract for operating CRL will be up for review in 2021?
- How did CNSC staff determine that building and operating a small modular reactor (SMR) at CRL is “out of scope” of the licence hearing despite CNL’s active pursuit of this goal?

## **Proposed Changes to Licence and Licence Conditions Handbook - OVERVIEW**

CMD 18-H2 is the “Commission Member Document” prepared by the staff of the Canadian Nuclear Safety Commission (CNSC 2017) for the January 2018 hearing on the application from Canadian Nuclear Laboratories (CNL 2017a) to renew the site licence for the Chalk River Laboratories (CRL).

The Summary of CMD 18-H2 indicates that the following items are attached:

- The proposed licence, NRTEOL- 01.00/2028;
- The draft Licence Conditions Handbook;
- The current licence, NRTEOL-01.00/2018; and
- The environmental assessment report [a CNSC staff review of the current status of the CRL site].

However, the **current licence** is missing from CMD 18-H2. We recommend that this omission be corrected in a revised CMD 18-H2. We also recommend that the “Proposed Licence Changes” section be expanded to fully document and explain the licence changes proposed by CNSC staff.

The “Proposed Licence Changes” section on page 117 of CMD 18-H2 refers to “development of standard licence conditions and standard format for Class I nuclear facilities licences” and states that “The proposed licence uses the standard format and incorporates the standard licence conditions applicable to CRL” (CNSC 2017). CMD 18-H2 fails to describe/reference the standard format and standard licence conditions for Class 1 nuclear facilities. Nor does CMD 18-H2 explain the process through which these were developed. We recommend that a revised version of CMD 18-H2 provide this information.

Standard licence conditions cannot be applied to a site that is anything but standard. A one-size-fits-all approach for class 1 nuclear facilities cannot provide adequate protection of health, safety and the environment when applied to a complex site such as CRL. Yet this is what is proposed in CMD 18-H2.

CNSC staff propose to delete half of the current 56 licence conditions. These include 2.2 Management of Safety, 3.4 Minimum Staffing Requirements, 4.4 Nuclear Facilities Undergoing Decommissioning Activities, 4.7 Emergency Operating Procedures and Severe Accident Management, 4.15 Reporting of Unplanned Situations or Events, 7.5 Environmental Qualification, 10.2 Release of Radioactive Substances, 10.3 Release of Hazardous Substances, and 12.3 Nuclear Legacy Liabilities.

Retained licence conditions often lack important details found in the existing licence conditions. For example, compare the existing condition 2.1 Management System with the proposed new condition 1.1:

**2.1** The licensee shall implement and maintain a management system, including a written safety policy which places safety paramount within the management system, overriding all other demands, for activities carried out under this licence;

**1.1** The licensee shall implement and maintain a management system.

Or compare the existing condition 6.1 Physical Design with the proposed new condition 5.1:

**6.1** The licensee shall ensure that the defence-in-depth principle is applied in the design of new or modified nuclear facility at the CRL site in order to prevent, or if prevention fails, to mitigate the consequences resulting from radioactive releases;

**5.1** The licensee shall implement and maintain a design program.

Or compare the existing conditions 10.1 Environmental Management System and 10.4 Action Levels for Environmental Releases with the proposed new condition 9.1:

**10.1** The licensee shall implement and maintain an environmental management system, including an integrated environmental monitoring program that includes site-wide groundwater monitoring.

**10.4** The licensee shall notify the Commission within seven calendar days of becoming aware that an action level for environmental releases has been reached, and shall submit a detailed report to the Commission within 60 calendar days of becoming aware of the matter.

**9.1** The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

These changes only represent the “tip of the iceberg.” Prior to the introduction of the “Licence Conditions Handbook” early CNSC licences were long and detailed. Once these Handbooks came into use, many substantive licence conditions (e.g., compliance verification activities, reporting requirements) were moved from the actual licence into the Handbook. For example, the current CRL Handbook contains 486 “Compliance Verification Criteria” (CNSC 2016). These criteria are used in on-site inspections and reports to verify that CNL is conducting its activities in accordance with the *Nuclear Safety and Control Act* (NSCA), NSCA regulations, and the current 56 CRL site licence conditions.

CNSC staff now propose to delete the vast majority of these Compliance Verification Criteria and replace them with references to CSA standards and internal CNL documents. CSA standards are not easily accessed by the public as they require signing a non-commercial use agreement. Furthermore, CCRA were denied access to the internal CNL documents in preparing for this hearing. Relying on documents that are either difficult or impossible for the public to access will result in a major loss of transparency and accountability and will create risks of severe adverse consequences for safety, health and the environment.

Detailed criteria under the headings Safety Policy, Safety Culture, Management of Safety, Sufficiency and Competency of Staff, and Safety Analysis are all proposed for deletion. Even with the coming shutdown of the NRU reactor, there remains an enormous inventory of radioactive substances at CRL (including high-level wastes) that must be handled with great care. The implications of removal of these safety criteria are even more troubling in the context of CNL’s intent to build and operate a small modular reactor “demonstration facility” at the CRL site (see below). Here is an example of a safety criterion that would be deleted:

**Criterion 4.12(7):** The licensee shall require and encourage licensee’s personnel to internally report abnormal events and near misses relevant to the safety of CRL facilities.

Major changes to requirements in the current CRL Handbook related to decommissioning activities are also proposed, e.g., the proposed deletion of Criteria 4.4(1)(c), 4.4(2), 4.4(4), 4.4(5), 4.4(7) and 4.4(11). These changes will be discussed in detail later.

CNSC staff propose deletion of Criteria 10.1(6), 10.2(a-d), and 10.3(4):

**Criterion 10.1(6):** The licensee shall continue to

(a) monitor, mitigate and remediate the lands that have been contaminated by radioactive or hazardous substances; and

(b) monitor the underground plumes in terms of their spatial distribution and loadings of radioactive and hazardous substances.

**Criterion 10.2(1):** The licensee shall

(a) only discharge radioactive substances to the environment by means of the release paths identified in Appendix I to the CRL Handbook and such other release paths as the Commission or a person authorized by the Commission may approve in writing;

(b) use best practicable means to exclude all entrained solids, gases and non-aqueous liquids from radioactive liquid effluents prior to discharge to the environment;

(c) use the best practicable means to minimize the activity of gaseous and liquid radioactive substances that are released to the environment;

(d) keep records that describe fully and accurately the amount and type of nuclear substances released from CRL into the environment;

**Criterion 10.3(4):** The licensee shall keep records that describe fully and accurately the amount and type of hazardous substances released from CRL into the environment.

These changes would have significant negative implications for health, safety and environmental protection. They are also described in greater detail in the next section.

## Detailed Review of Licence Changes of Concern and their Implications

### 1. Licence Period

In September 2015 the federal Crown Corporation Atomic Energy of Canada Limited (AECL) transferred ownership of its subsidiary, Canadian Nuclear Laboratories Limited (CNL) to a consortium of five multinational companies. The CRL site is now managed under a Government owned-Contractor operated (GoCo) business model: On September 13, 2017 AECL and CNL signed a “Site Operating Company [SOC] Agreement” for operation of the Chalk River Laboratories, with a 6-year term, renewable for two, 2-year terms. AECL retains ownership of the land and facilities at Chalk River, and retains responsibility for decommissioning and waste management liabilities.

As explained in a recent Independent Audit Report Special Examination, AECL received \$969 million in federal funding in fiscal year 2016–17 for AECL’s own operations and CNL’s operating expenses. Approximately \$866 million of this was paid or payable by AECL to CNL. The funding included \$530 million for decommissioning and waste management, intended to deal with “the results of decades of nuclear activities at the Corporation’s sites and with the cleanup of waste at orphan sites for which the federal government has assumed responsibility.” The decommissioning and waste management total cost “was estimated at over \$7.9 billion as of 31 March 2016” (Auditor General of Canada 2017).

CMD 18-H2 lacks an assessment of the success of the GoCo model, even though it has been in place for the entire current 17-month licence period. According to the federal Minister of Natural Resources:

There is a recognition that the transition to the Government-owned, Contractor-operated model – like any large transformation – takes time. It is therefore too early to quantitatively assess the success of the model since the results of changes today will only become measurable years from now. (Carr 2017)

CNSC is now proposing a 10-year licence period:

**Licence Period:** This licence is valid from April 1, 2018, to March 31, 2028 unless suspended in whole or in part, amended, revoked or replaced.

Given that funding in the 2016-17 and 2017-18 federal budgets “to accelerate work that will reduce risks and discharge Canada’s radioactive waste liabilities faster” exceeded a billion dollars (CCRCA and CELA 2017a), it is clearly in the interests of Canadian taxpayers that a quantitative assessment of the success



of the GoCo model take place prior to September 2021 when the SOC Agreement will be up for review. We recommend that the CRL licence be renewed for a maximum of three years and that the next licence hearing examine the success of the GoCo model in reducing federal nuclear liabilities.

## **2. Licenced Activities**

Section III (Licenced Activities) of the proposed new licence is similar to Section IV (Licenced Activities) of the current licence, with the exception of the addition of the phrase “prepare a site for... a nuclear facility.” We recommend that the Commission clarify the rationale for the addition of this phrase.

## **3. Interpretation**

Section V (Interpretation) of the current licence has four conditions that are proposed for deletion:

- (a) Where in the conditions set out in this licence the Commission requires any matter to be approved, the Commission may (i) modify, revise or withdraw either wholly or in part any such approval; (ii) approve, either wholly or in part, any modification or revision or any proposed modification or revision to any matter for the time being approved; (iii) delegate the approval authority for (a) and/or (b) to a person or to an authority identified by the Commission for that purpose.
- (b) In the conditions set out in this licence any reference to any approval, consent, notification or any formal communication between the Commission or CNSC staff and the licensee (and vice versa) shall be deemed to be a reference to a written document.
- (e) The appendix attached to this licence forms part of the licence. [NOTE that the proposed new licence lacks this appendix, i.e. the “Release Limits for Radioactive Nuclear Substances to the Environment from Chalk River Laboratories.”]
- (f) The licensee may use a graded approach to compliance with the licence.

We strongly urge the Commission to consider the legal implications of these changes. Deletion of subsection (a) could be construed as constraining the Commission’s powers with regard to approval of changes to activities or facilities at CRL. Deletion of subsection (b) could lead to a loss of clarity with regard to communications between the Commission and the licensee. Deletion of subsection (c) could mean that the “Release Limits for Radioactive Nuclear Substances to the Environment from Chalk River Laboratories” (the current Appendix A) no longer form part of the licence.

Unless CNSC staff can provide a strong and clear rationale for the deletion of these clauses, we recommend that they be retained in the new licence.

## **4. General Conditions**

The following condition in the current licence is proposed for deletion:

### **1.5 Resolution of Conflicts or Inconsistencies**

The licensee shall, in the event of any conflict or inconsistency between licence conditions, codes or standards or regulatory documents used as compliance verification criteria in the CRL

Handbook, direct the conflict or inconsistency to the Commission or to a person authorized by the Commission for resolution.

Given the large number of major changes proposed in the new licence, and the recent transition from AECL to CNL as the licensee, we strongly recommend that this licence condition be retained.

## 5. Management System

As noted above, it is proposed that the wording of current licence condition 2.1 be modified to remove language referring to “a written safety policy which places safety paramount within the management system, overriding all other demands, for activities carried out under this licence.” Furthermore, the two subsequent conditions in the current licence are proposed for deletion:

### **2.2 Management of Safety**

The licensee shall monitor the safety performance of the CRL facilities and upgrade them when substantial risk factors not recognized earlier appear during operation, or through research findings, or revised safety analyses.

### **2.3 Licensee Organization**

The licensee shall have an operating organization adequate to support safety and an appropriate response in emergencies.

These changes would be accompanied by major changes to the CRL Handbook. Compliance verification criteria proposed for deletion under condition 2.1 include:

### ***Management System Requirements***

**Criterion 2.1(2):** The licensee shall ensure that adequate and appropriate resources are allocated to each activity based on its nuclear safety significance and complexity, on the hazard and magnitude of its potential impact, and on its possible consequences if it is carried out incorrectly.

**Criterion 2.1(6):** The licensee shall ensure that

- (a) sufficient resources and processes are established and maintained to define, achieve, analyze, and preserve the quality of items that are important to safety, and to take timely and effective corrective or preventive actions to respond to deviations from required specifications;
- (b) procured items and services meet established requirements and perform as specified and that selected suppliers continue to provide acceptable items and services during the fulfillment of their procurement obligations;
- (c) if the licensee delegates any activities to other organizations, the licensee remains responsible for the overall effectiveness of those activities;
- (d) designs, documents, tools, materials, parts, processes, services, and practices that do not conform to specified requirements are identified, corrected and reported to an appropriate level of management within the organization;
- (e) the safety implications of any non-conformance are evaluated, mitigation actions are taken for any safety deteriorations, and the actions taken are recorded;
- (f) work that is important to safety is controlled and performed using easily understood, approved current instructions, procedures, drawings, or other means, that have been appropriately validated before first use and are periodically reviewed to ensure adequacy and effectiveness; and

(g) personnel are trained in the requirements of the management system, so that they are competent to perform their assigned work and understand the safety consequences of their activities.

### ***Safety Policy***

**Criterion 2.1(8):** The safety policy shall include a commitment to excellent performance in all activities important to safety, the establishment and perpetuation of a strong safety culture, and control and verification of activities important to safety.

**Criterion 2.1(9):** The safety policy shall declare the licensee's objectives and the public commitment of licensee management to nuclear safety.

**Criterion 2.1(10):** The safety policy shall

- (a) be clear about giving safety an overriding priority in all licensed activities;
- (b) include a commitment to continuously develop safety;
- (c) require directives for implementing the policy and monitoring safety performance;
- (d) require safety objectives and targets, clearly formulated in such a way that they can be easily monitored and followed up by the licensee's management;
- (e) require that an acceptable level of safety culture be achieved;
- (f) require clear accountability in safety matters;
- (g) require an independent internal management unit with responsibility for the ongoing proactive oversight and surveillance of nuclear safety activities and compliance with regulatory requirements;
- (h) require that adequate resources are devoted to safety;
- (i) require regular review of practices that contribute to facility safety;
- (j) be communicated to all CRL personnel with tasks important to safety, in such a way that the policy is understood and applied; and
- (k) be communicated to contractors, in such a way that licensee expectations are understood and applied in the contractors' activities.

### ***Safety Culture***

**Criterion 2.1(11):** The licensee shall use the management system to promote and support a healthy safety culture by:

- (a) ensuring a common understanding of the key aspects of safety culture within the organization;
- (b) providing the means by which the organization supports individuals and teams in carrying out their tasks safely and successfully, taking into account the interaction between individuals, technology and the organization;
- (c) reinforcing a learning and questioning attitude at all levels of the organization; and
- (d) providing the means by which the organization continually seeks to develop and improve its safety culture.

Compliance verification criteria proposed for deletion under condition 2.2 include:

### ***Management of Safety***

**Criterion 2.2(1):** The licensee shall maintain CRL facilities at an acceptable level of safety, and shall upgrade, as soon as reasonably practicable, facilities when substantial risk factors may appear. The licensee shall demonstrate that the level of safety of a facility after an upgrade is better or at least at the same level as before the upgrade.

**Criterion 2.2(2):** The licensee shall ensure that

- (a) CRL is operated in a safe manner and in accordance with all applicable legal and regulatory requirements;
- (b) decisions on safety matters are preceded by appropriate investigation and consultation so that all relevant safety aspects are considered;
- (c) safety issues are subjected to appropriate safety review by a suitably qualified review function;
- (d) CRL staff is provided with the necessary facilities and working conditions to carry out work in a safe manner;
- (e) safety performance is continuously monitored through an appropriate review system in order to ensure that safety is maintained and improved as needed;
- (f) relevant operating experience, international development of safety standards and new knowledge gained through research and development projects are analyzed in a systematic way and continuously used to improve the CRL and licensee activities; and
- (g) CRL activities and processes are controlled through a documented management system covering all activities, including relevant activities of vendors and contractors that could have a detrimental effect on the safe operation of CRL.

**Criterion 2.2(3):** The licensee may delegate authority to carry out licensed activities on its behalf, but shall not delegate the licensee's prime responsibility for safety. The licensee holds the overall responsibility for safety of the CRL facilities; the licensee's responsibility for safety cannot be delegated.

Unless CNSC staff can provide a strong and clear rationale for their proposed changes, we recommend that all licence conditions and compliance verification criteria related to management of safety, safety policy, and safety culture be retained in the new CRL site licence and CRL Handbook.

## 6. Human Performance Program

It is proposed that the wording of current licence condition 3.2 (Training) be modified to remove language referring to "an overall training policy and initial and continuing training programs on the basis of long-term qualifications and competencies required for performing a job, and training goals that acknowledge the critical role of safety." Furthermore, conditions 3.3 (Staffing and Certification – NRU Reactor) and 3.4 (Minimum Staffing Requirements) in the current licence are proposed for deletion.

Deletion of licence conditions related to the NRU Reactor can be justified in light of the scheduled March 31, 2018 shut-down of this facility (and the molybdenum-99 production facility). But additional justification is required for the proposed deletion of minimum staffing requirements:

### 3.4 Minimum Staffing Requirements

The licensee shall have on site and at all times a sufficient number of qualified staff for both normal operation and to respond to accident and emergency conditions.

This licence condition is currently applicable to the ZED-2 Reactor; the Nuclear Fuel Fabrication Facility B429; the B234 Universal Cells; the Tritium Laboratory; the Fuel and Materials Cells; the Nuclear Fuel Fabrication Facility B405; the CECEUD (Combined Electrolysis and Catalytic Exchange Upgrading and Detritiation Facility); the Health Physics Neutron Generator; the Recycle Fuel Fabrication Laboratory; the Gamma Beam Irradiation Facility (B524); the GC60 Gamma Irradiator (B513); the Van de Graaf Accelerator; and the Waste Management Areas.

Unless CNSC staff can provide a strong and clear rationale for their proposed changes, we recommend that the original language of licence condition 3.1 (Human Performance) be retained; that licence conditions 3.2 (Training) and 3.4 (Minimum Staffing Requirements) be retained; and that the compliance verification criteria related to these three licence conditions be retained in the new CRL Handbook (with appropriate changes to reflect shut-down of the NRU Reactor and molybdenum-99 production facility).

## 7. Operating Performance

Operating performance licence conditions proposed for deletion are:

### **4.2 New Nuclear Facilities**

The licensee shall only carry out construction and/or operation activities of any new nuclear facility at the CRL site with the prior approval of the Commission.

**4.3 Nuclear Facilities in Storage-with-Surveillance State** The licensee shall undertake maintenance, monitoring and surveillance activities for nuclear facilities in storage-with-surveillance state in accordance with documented plans and procedures.

### **4.4 Nuclear Facilities Undergoing Decommissioning Activities**

The licensee shall only decommission a nuclear facility, or any part thereof, at the CRL site in accordance with documented decommissioning plan(s) and procedures, and with the prior approval of the Commission to proceed with the decommissioning.

### **4.5 Modifications to Existing Facilities and Processes**

The licensee shall ensure that permanent and temporary modifications to systems, structures, equipment, component and software important to safety are adequately designed, reviewed, controlled and implemented, including the compliance with relevant safety requirements.

### **4.7 Emergency Operating Procedures and Severe Accident Management**

The licensee shall develop, implement and maintain, where applicable, a comprehensive set of emergency operating procedures for design basis accidents and beyond design basis accidents, and guidelines for severe accident management.

### **4.11 Fire Protection**

The licensee shall implement and maintain a fire protection program to address fire protection and prevention at the CRL site.

### **4.12 Operational Experience Program**

The licensee shall develop, implement and maintain a program to collect, screen, analyze and document operating experience and events at the CRL site or reported by industry in a systematic way, and to apply the lessons learned to activities at the CRL site.

### **4.14 Chemistry Control**

The licensee shall implement and maintain a chemistry control program at the CRL site.

### **4.15 Reporting of Unplanned Situations or Events**

The licensee shall report to the Commission unplanned situations or events at the CRL site.

Significant changes are proposed to the wording of other current licence conditions, e.g., compare the existing condition 4.16 with the proposed language in 3.2:

### **4.16 Reporting of Annual Compliance Monitoring and Operational Performance**

The licensee shall submit annual compliance monitoring and operational performance reports to the Commission.

**3.2 Reporting Requirements** The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

We recommend retaining the current language of licence condition 4.16, as this ensures that reports will be submitted to the Commission, and hence these reports should be publicly available.

Along with the proposed deletion of nine licence conditions, changes to the CRL Handbook are proposed for most of the 16 operating performance licence conditions. We have already noted some of the changes to the compliance verification criteria related to decommissioning. Other changes include:

***Operations***

**Criterion 4.1(2):** The licensee shall not operate any CRL facility when

- (a) any problem or potential problem is discovered through research findings (including internal and external operating experience) or new or revised safety analyses that represents (i) a new hazard or potential hazard to the health and safety of persons, security or the environment; or (ii) a known hazard or potential hazard to the health and safety of persons, security or the environment that is different in nature, greater in probability, or greater in magnitude than was previously presented to the Commission in licensing documents;
- (b) the facility operates in a state that was not considered in the safety analysis reports;
- (c) an event of a type that was not considered in the safety analysis reports occurs;
- (d) an unexplained or unexpected behaviour of a reactor core (or a nuclear facility) or of a safety system occurs; or
- (e) a nuclear substance or a hazardous substance is released in a quantity or at a rate that is greater than that predicted in the bounding case analysed in the safety analysis reports.

***Design of New Nuclear Facilities***

**Criterion 4.2(1):** The design of any new facility shall follow a formal design process, which shall include consideration of human factors.

**Criterion 4.2(2):** The design of any new facility shall meet the applicable criteria in subsection 6.1 of Part II of the CRL Handbook and shall be in compliance with applicable standards (including their referenced publications) specified in CRL Handbook.

***Construction of New Nuclear Facilities***

**Criterion 4.2(3):** The licensee shall submit the required documentation for review, and shall obtain the approval of the Commission or a person authorized by the Commission before proceeding with the construction.

**Criterion 4.2(4):** A determination of the applicability of the CEAA must be made by CNSC staff. An environmental assessment under CEAA may or may not be required.

***Operation of New Nuclear Facilities***

**Criterion 4.2(6):** The licensee shall not operate any new nuclear facility (including any new Class II prescribed equipment) at CRL without the prior approval of the Commission or a person authorized by the Commission.

***Modifications***

**Criterion 4.5(1):** The licensee shall ensure that any modification to any CRL facility, irrespective of the reason for the modification, does not degrade the facility's ability to be operated safely.

**Criterion 4.5(2):** The licensee shall not construct, install or modify any facility, building, structure, component or equipment if that construction, installation or modification would result in impact on health, safety or the environment that is different in nature or greater in magnitude or probability than that described in the licensing documents without prior approval of the Commission or a person authorized by the Commission.

**Criterion 4.5(3):** The licensee shall not make modifications to, or deviate from the design, operating conditions, purposes, methods, procedures or limits described in the safety analysis reports and/or operational limits and conditions documents that would result in an impact on health, safety or the environment that is different in nature or greater in magnitude or probability than that described in those documents without prior approval of the Commission or a person authorized by the Commission.

**Criterion 4.5(4):** A determination of the applicability of the CEAA must be made. An environmental assessment under CEAA may or may not be required.

Removal of this language referring to prior approval of the Commission, and to determination of the applicability of the CEAA (the *Canadian Environmental Assessment Act*), appears significant, because modifications to activities and facilities (such as the waste management areas) at the CRL site could have potentially significant adverse impacts on the environment. The requirement to assess these impacts should be retained.

Other significant deletions include compliance verification criteria related to Operational Limits and Conditions, Emergency Operating Procedures and Severe Accident Management, Nuclear Criticality Safety Evaluations, and Fire Protection.

We have already noted the proposed deletion of criterion 4.12(7) under Operational Experience Program. The current CRL Handbook also currently includes the following criteria, which have been deleted in the proposed Handbook:

**Criterion 4.12(1):** The licensee shall evaluate the operating experience at CRL to identify

- (a) any latent safety-relevant failures or potential precursors;
- (b) any possible adverse trends in safety performance;
- (c) any reduction in safety margins;
- (d) significant events using clearly-defined criteria based on impact on safety;
- (e) repeat events using trend analysis;
- (f) trends based on the causes, contributing factors and initiators of previous events.

**Criterion 4.12(2):** The licensee shall ensure that significant and repeat events are investigated to their root causes to identify effective corrective actions.

**Criterion 4.12(3):** Relevant operational experience and events reported by industry shall also be subject to a systematic process of collecting, screening, analyzing, and applying the lessons learned to activities at CRL.

**Criterion 4.12(4):** The licensee shall designate staff for carrying out this program, for the dissemination of findings important to safety and, where appropriate, for recommendations on actions to be taken. Significant findings and trends shall be reported to the licensee's top management.

**Criterion 4.12(5):** The licensee shall provide adequate training, resources and support to licensee's staff responsible for evaluation of operational experience and investigation of events.

**Criterion 4.12(6):** The licensee shall ensure that results are obtained, conclusions are drawn, measures are taken, good practices are considered, and timely and appropriate corrective

actions are implemented to prevent recurrence of situations referred to in criterion 4.12(1) of the CRL Handbook, and to counteract developments adverse to safety.

**Criterion 4.12(8):** The licensee shall ensure that information resulting from the operational experience is disseminated to relevant staff, lessons learned are applied where relevant, and that operating experience at CRL and other licensees is appropriately considered in training programs.

**Criterion 4.12(9):** The licensee shall perform periodic reviews of the effectiveness of the system for investigation of events and operational experience feedback process based on performance criteria.

We note in particular the importance of reviewing operational experience and events across the entire nuclear industry, given the status of CRL as Canada's national nuclear research laboratory.

While some of the compliance verification criteria proposed for deletion may be addressed in Canadian Standards Association documents or in internal CNL documents, the public does not have ready access to these. To ensure accountability and transparency, we recommend that current operating performance licence conditions and compliance verification criteria be retained, unless CNSC staff can provide a strong and clear rationale for their deletion.

## 8. Safety Analysis

Although CNSC staff propose to retain a licence condition on Safety Analysis, all compliance verification criteria would be deleted from the new CRL Handbook and replaced with references to internal documents and to CNSC REGDOC- 2.4.1. We note that REGDOC-2.4.1 is primarily intended for safety analysis of nuclear reactors and would not necessarily provide criteria for safety analysis of other CRL nuclear facilities. Thus, it would seem important to retain criteria such as the following:

**Criterion 5.1(1):** The safety analysis shall identify:

- (a) radiological hazards related to production, possessing or processing licensed nuclear substances at the facility;
- (b) chemical hazards of licensed nuclear substances and hazardous chemicals produced from licensed material;
- (c) facility hazards that could affect the safety of licensed nuclear substances and thus present an increased radiological risk;
- (d) potential accident sequences caused by process deviations or other events internal to the facility and credible external events, including natural phenomena;
- (e) the consequence and the likelihood of occurrence of each potential accident sequence, and the methods used to determine the consequences and likelihoods;
- (f) each item relied on for safety, the characteristics of its preventive, mitigative, or other safety function, and the assumptions and conditions under which the item is relied upon to support compliance with the performance requirements; and
- (g) common-cause failures initiated by internal and/or external events.

**Criterion 5.1(2):** The objectives of the safety analysis shall be to

- (a) confirm that the design of the nuclear facility meets its design and safety requirements;
- (b) derive or confirm operational limits and conditions which should be consistent with the design and safety requirements;



- (c) demonstrate that the management of the anticipated operational occurrences (AOO) and design basis accidents (DBA) is possible by automatic response of either the control systems or safety systems in combination with prescribed operator actions;
- (d) assist in establishing the progression of severe accidents for the purpose of severe accident management;
- (e) assist in demonstrating that the accident management program is capable of providing mitigation for beyond design basis accidents (BDBA), to the extent practicable; and
- (f) assist in demonstrating that safety goals, that may be established to limit the safety risks posed by the nuclear facility, are met.

Even if certain safety analysis criteria are only applicable to nuclear reactors, we recommend that these also be retained, given that CNL aims to build and operate a small modular reactor “demonstration facility”, possibly within the proposed 10-year licence term proposed by CNSC staff (see below).

Paragraph 6(c) of the *Class I Nuclear Facilities Regulations* requires that an application for a licence to operate a Class I nuclear facility contain a “final safety analysis report demonstrating the adequacy of the design of the nuclear facility.” The current CRL Handbook contains criteria for preparation of safety analysis reports that are specific to CRL. The proposed new CRL Handbook would delete these, and would instead refer to CNSC REGDOC- 2.4.1 and various internal documents.

Current safety analysis criteria call for attention to interactions among the different facilities at the CRL site, a description of radioactive and hazardous waste management provisions, and a description of how relevant decommissioning and end-of-life aspects are taken into account during operation:

***Format and Content of Safety Analysis Reports***

**Criterion 5.1(20):** The licensee shall establish and document the typical format and content of the safety analysis reports.

**Criterion 5.1(21):** As a minimum, the safety analysis report shall

- (a) describe the facility and its interaction with other nuclear or non-nuclear facilities (buildings/structures) at CRL;
- (b) identify applicable regulations, codes and standards;
- (c) describe the relevant aspects of the facility organization and the management of safety;
- (d) contain detailed descriptions of the safety functions, all SSCs important to safety, their design basis and functioning in all operational states, including shutdown and accident conditions;
- (e) describe the normal operation of the facility and demonstrate the facility is safe;
- (f) describe the emergency operation procedures and accident management guidelines, inspection and testing provisions, qualification and training of personnel, operational experience feedback program, and the management of aging;
- (g) outline the general design concept and the approach adopted to meet the fundamental safety objectives;
- (h) contain an evaluation of the safety aspects related to the facility and its interaction with the CRL site;
- (i) describe the safety analyses performed to assess the safety of the facility in response to postulated initiating events against safety criteria and radiological release limits;
- (j) contain the technical basis for the operational limits and conditions;
- (k) describe the policy, strategy, methods, and provisions for radiation protection;
- (l) describe the policy, strategy, methods, and provisions for environmental protection;

- (m) describe the emergency preparedness arrangements and the liaison and co-ordination with onsite and offsite organizations in the response to an emergency;
- (n) describe the radioactive and hazardous waste management provisions; and
- (o) describe how the relevant decommissioning and end-of-life aspects are taken into account during operation.

We recommend that all current safety analysis compliance verification criteria be retained unless CNSC staff can provide a strong and clear rationale for their deletion.

## 9. Physical Design

As noted above, existing licence condition 6.1 (Physical Design) differs significantly from the proposed new condition 5.1 (Physical Design). Language referring to applying the “defence-in-depth principle” to “the design of new or modified nuclear facility at the CRL site in order to prevent, or if prevention fails, to mitigate the consequences resulting from radioactive releases” would be removed.

In our view, this language is extremely important with regard to the design or modification of any waste management facility, or of any proposed small modular reactor “demonstration facility”.

The current CRL Handbook contains physical design criteria that “apply mainly to nuclear fission reactors,” but adds that “For other nuclear facilities at CRL, the criteria have to be adapted to the type of facility such that the intent of each criterion is achieved where applicable.”

CNSC staff propose to delete all 72 physical design criteria found in the current CRL Handbook, including the following:

**Criterion 6.1(1):** The licensee shall make design provisions to ensure that potential radiation doses to the public and site personnel do not exceed prescribed limits and are as low as reasonably achievable.

**Criterion 6.1(2):** The licensee shall ensure that all designs, including changes to the designs, meet all relevant safety, code, standard and regulatory requirements.

**Criterion 6.1(3):** The design shall have as an objective the prevention or, if this fails, the mitigation of consequences resulting from anticipated operational occurrences and design basis accident conditions.

**Criterion 6.1(4):** The licensee shall apply the defence-in-depth principle to prevent, or if prevention fails, to mitigate harmful effects of radioactive releases.

**Guidance 6.1(4):** Defence in depth is the application of multiple levels of protection for all relevant safety activities, whether organizational, behavioural or equipment related. Application of the concept of defence in depth throughout the design and operation of a nuclear facility provides multilayer protection against a wide range of anticipated operational occurrences and accident conditions, including those resulting from equipment failure or human error within the facility, and from events that originate outside the facility. The strategy for defence in depth shall be twofold: first, to prevent accidents, and second, if prevention fails, to limit the potential radiological and associated chemical consequences and to prevent any evolution to more serious conditions.

**Criterion 6.1(5):** The design shall provide multiple physical barriers to the uncontrolled release of radioactive substances to the environment, and an adequate protection of the barriers.

**Criterion 6.1(6):** The design shall prevent as far as practicable

- (a) challenges to the integrity of the barriers;
- (b) failure of a barrier when challenged; and
- (c) failure of a barrier as consequence of failure of another barrier.

**Criterion 6.1(12):** The following types of natural and human-induced external events shall be taken into account in the design of the facility, as a minimum:

- (a) extreme wind loading (definition of 'extreme' shall be based on historical weather data for the site);
- (b) extreme outside temperatures;
- (c) extreme rainfall, snow conditions or site flooding;
- (d) extreme cooling water temperature and icing;
- (e) earthquake;
- (f) airplane crash;
- (g) nearby transportation, industrial activities or other conditions that reasonably can cause fires, explosions or other threats to the safety of nuclear facilities at CRL; and
- (h) electromagnetic interferences.

**Criterion 6.1(60):** High pressure core melt scenarios shall be prevented.

**Criterion 6.1(61):** Containment degradation by molten fuel shall be prevented or mitigated as far as reasonably practicable.

**Criterion 6.1(62):** The SSCs [structures, systems and components] important to safety shall be designed to be tested, maintained, repaired and inspected or monitored periodically to maintain integrity and functional capability over their lifetime, without undue risk to workers or significant reduction in their availability. Where such provisions cannot be attained, the licensee shall specify proven alternative or indirect methods and shall take adequate safety precautions to compensate for potential undiscovered degradation.

We recommend that current physical design licence condition and compliance verification criteria be retained unless CNSC staff can provide a strong and clear rationale for their deletion.

## 10. Fitness for Service

CNSC staff propose to subsume five current Fitness for Service licence conditions (**7.1 Maintenance, In-Service Inspection and Functional Testing; 7.2 Frequency of Calibration of Radiation Detection Instruments; 7.3 Control of Measuring and Test Equipment; 7.4 Aging Management; and 7.5 Environmental Qualification**) under a single condition:

### 6.1 Fitness for Service Program

The licensee shall implement and maintain a fitness for service program.

Staff also propose deletion of 41 fitness for service compliance verification criteria currently found in the CRL Handbook, including:

#### *General*

**Criterion 7.1(1):** The licensee shall develop, implement and maintain documented programs of maintenance, testing, surveillance, and inspection of SSCs [structures, systems and components] important to safety to ensure that their availability, reliability, and functionality remain effective in accordance with the design over the lifetime of the facility. These programs shall take into account operational limits and conditions.

**Criterion 7.1(2):** The licensee shall review the programs for maintenance, testing, surveillance, and inspection of SSCs important to safety periodically in light of operating experience, safety analysis and other requirements. The licensee shall assess any proposed changes to the program to analyze their effect on system availability, their impact on safety, and their conformance with applicable requirements.

**Criterion 7.1(3):** The licensee shall determine the extent and frequency of preventive maintenance, testing, surveillance, and inspection of SSCs through a systematic approach, following operating experience and best industry practices, taking into account as a minimum

- (a) their importance to safety;
- (b) their inherent reliability;
- (c) their potential for degradation (based on operational and other relevant experience, research and vendor recommendations);
- (d) the consequences of failure;
- (e) results of condition monitoring; and
- (f) the deterministic and probabilistic safety analysis.

**Criterion 7.1(4):** The licensee shall establish, review, and validate procedures for maintenance, testing, surveillance, and inspections.

**Criterion 7.1(5):** The licensee shall establish and implement a comprehensive work planning and control system to ensure that maintenance, testing, surveillance and inspections are properly authorized, carried out, and results documented, according to procedures and in the scheduled time window.

**Criterion 7.1(8):** Following any abnormal event due to which the safety functions and functional integrity of any structure, system or component may have been challenged, the licensee shall identify and revalidate the safety functions and carry out any necessary remedial actions, including inspection, testing, maintenance, and repair, as appropriate.

#### ***System Health Monitoring***

**Criterion 7.1(22):** The licensee shall develop a system health monitoring program for nuclear systems important to safety.

#### ***Frequency of Calibration of Radiation Detection Instruments***

**Criterion 7.2(1):** The licensee shall maintain an accurate inventory of monitoring instruments and associated/related equipment, both in use and in storage, used to make radiation protection and environmental protection measurements such as radiation dose, dose rate, activity, or radionuclide concentration. Each instrument shall have assigned a calibration frequency (or no calibration required as appropriate).

**Criterion 7.2(2):** The licensee shall ensure that all monitoring instruments referred to in criterion 7.2(1) that require calibration are calibrated when first taken into use; after any damage to, or servicing of the instrument (excluding battery changes); at any time the instrument's response is suspected of being incorrect; and within 12-month intervals thereafter for radiation survey meters, and as specified by the manufacturer for all other instruments.

#### ***Environmental Qualification***

**Criterion 7.5(1):** The licensee shall ensure that all required systems, equipment and components in the nuclear facility are qualified to perform their safety functions under the environmental conditions defined by the nuclear facility's design basis accident.

**Criterion 7.5(5):** The licensee shall have in place a monitoring program to assist in measuring degradation and failures of qualified equipment. The monitoring program shall contain elements of condition monitoring and environmental monitoring:

(a) Condition monitoring (i.e., surveillance, periodic maintenance, testing, corrective action, failure trending, operating experience reviews, etc.) shall assess variables that indicate the physical state of the equipment, including cables, and assess its ability to perform its intended function following the period of observation.

(b) Environmental monitoring shall measure environmental stressors, such as temperature, radiation and operational cycling during normal operating conditions. The licensee shall perform periodic re-evaluations of equipment qualified life based on monitoring results.

Some of these licence conditions and compliance verification criteria would be of particular relevance to CNL's proposed small modular reactor "demonstration facility", but many have general applicability. While internal documents and CSA standards listed in the proposed new CRL Handbook may cover many of these areas, these are inaccessible to the general public. To ensure transparency and accountability, we recommend that current fitness for service licence conditions and compliance verification criteria be retained unless CNSC staff can provide a strong and clear rationale for their deletion.

## 11. Radiation Protection

CNSC staff propose to subsume two radiation protection conditions in the current licence under a single condition:

**7.1 Radiation Protection Program** The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

This would result in deletion of a requirement (in licence condition **8.2 Occupational Radiation Exposure Action Levels**) that the licensee submit a detailed report to the Commission within 60 calendar days of becoming aware that an occupational radiation exposure action level has been reached.

We strongly recommend that this requirement be retained.

## 12. Conventional Health and Safety

While the wording of the current licence condition 9.1 would be essentially unchanged in the new licence, CNSC staff are proposing to replace the following current compliance verification criteria:

**Criterion 9.1(1):** The licensee shall comply with the *Canada Labour Code* Part II.

**Criterion 9.1(2):** To manage workplace safety hazards, the following requirements shall be addressed:

(a) the workplace is maintained in a safe, clean, and orderly manner;

(b) hazards are evaluated, and eliminated or controlled, and the consequences of exposure to personnel are minimized;

(c) hazardous conditions are identified and, where practicable, physical barriers are installed; and

(d) hazardous materials are labeled.

**Criterion 9.1(3):** The licensee shall control the bulk chemicals, laboratory chemicals, corrosive agents, and cleaning agents to ensure proper handling, storage, and use.

These criteria would be replaced by references to three internal CNL documents.

The Preamble to the “Conventional Health and Safety” section of the proposed new CRL Handbook does state that “As a federal regulated site, CRL is also subject to the requirements of *Canada Labour Code* and *Canada Occupational Health and Safety Regulations*.”

However, we recommend that CNSC staff provide a rationale for not listing the *Canada Labour Code* and the *Canada Occupational Health and Safety Regulations* as compliance verification criteria, and that staff confirm that current occupational health and safety criteria in the CRL Handbook would be fully addressed if they are replaced by references to internal CNL documents.

## 13. Environmental Protection

CNSC staff propose to replace the five current environmental protection licence conditions:

### **10.1 Environmental Management System**

The licensee shall implement and maintain an environmental management system, including an integrated environmental monitoring program that includes site-wide groundwater monitoring.

### **10.2 Release of Radioactive Substances**

The licensee shall control, monitor and record releases of radioactive nuclear substances from CRL such that the releases do not exceed the limits specified in Appendix A to this licence.

### **10.3 Release of Hazardous Substances**

The licensee shall control, monitor and record releases of hazardous substances.

### **10.4 Action Levels for Environmental Releases**

The licensee shall notify the Commission within seven calendar days of becoming aware that an action level for environmental releases has been reached, and shall submit a detailed report to the Commission within 60 calendar days of becoming aware of the matter.

### **10.5 Environmental Assessment Follow-up Program**

The licensee shall progress to completion all follow-up programs identified as a result of environmental assessments, and shall report the progress to the Commission on an annual basis.

These would all be subsumed into a single condition:

**9.1 Environmental Protection Program** The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

CNSC staff propose to delete language related to site-wide groundwater monitoring currently in condition 10.1 and in compliance verification criterion 10.1(4)(c), which states that “The integrated environmental monitoring program shall include... the groundwater monitoring for the CRL waste management areas and the CRL controlled areas.” CNSC staff also propose deletion of criterion 10.1(6)(b), which states that “The licensee shall continue to... monitor the underground plumes in terms of their spatial distribution and loadings of radioactive and hazardous substances.”

As noted earlier, the proposed new CRL Handbook would replace this language with a reference to CSA standard N288.7, *Groundwater Protection Programs at Class 1 Nuclear Facilities and Uranium Mines and Mills*. This CSA standard does contain detailed guidance on groundwater monitoring, but given the extensive groundwater contamination at CRL, we strongly recommend that a reference to site-wide groundwater monitoring be retained as a condition in the new CRL site licence.

We further note the proposed deletion of CRL Handbook Criterion 10.1(6)(a), that “The licensee shall continue to... monitor, mitigate and remediate the lands that have been contaminated by radioactive or hazardous substances.” CSA Standard N288.7 states explicitly that “This Standard does not provide guidance on risk management or remediation.” Removal of the requirement to remediate contaminated lands at CRL (e.g., Waste Management Areas A, B and C) would have significant adverse environmental impacts.

CNSC staff are proposing the deletion of many other environmental protection licence conditions and criteria that could result in significant adverse environmental impacts:

- the requirement in licence condition 10.4 for the licensee to submit a detailed report to the Commission when an action level for environmental releases has been exceeded;
- the prohibition in criteria 10.2(1) and 10.2(3) against discharging radioactive substances to the environment by unapproved release paths;
- the prohibition in criterion 10.2(3) against radioactive liquid releases to the ground; and
- the prohibition in criterion 10.3(5) against hazardous liquid releases to the ground.

For completeness, here is a list of the environmental monitoring criteria in the current CRL Handbook that would be deleted fully or in part in the proposed new Handbook:

#### ***Environmental Monitoring Program***

**Criterion 10.1(4):** The integrated environmental monitoring program shall include:

- (a) the radiological and hazardous environmental monitoring programs;
- (b) radiological and hazardous effluent monitoring; and
- (c) the groundwater monitoring for the CRL waste management areas and the CRL controlled areas.

#### ***Effluent Monitoring Program***

**Criterion 10.1(6):** The licensee shall continue to

- (a) monitor, mitigate and remediate the lands that have been contaminated by radioactive or hazardous substances; and
- (b) monitor the underground plumes in terms of their spatial distribution and loadings of radioactive and hazardous substances.

#### ***Releases of Radioactive Substances***

**Criterion 10.2(1):** The licensee shall

- (a) only discharge radioactive substances to the environment by means of the release paths identified in Appendix I to the CRL Handbook and such other release paths as the Commission or a person authorized by the Commission may approve in writing;
- (b) use best practicable means to exclude all entrained solids, gases and non-aqueous liquids from radioactive liquid effluents prior to discharge to the environment;
- (c) use the best practicable means to minimize the activity of gaseous and liquid radioactive

substances that are released to the environment;

(d) keep records that describe fully and accurately the amount and type of nuclear substances released from CRL into the environment;

(e) operate and maintain the real-time sampling and monitoring system (equipment) for argon-41 from the Building 109 stack;

(f) review and revise as required the out-of-service criteria for all controlled release point verification monitoring equipment which must include, as a minimum, (i) the maximum time equipment is allowed to be out of service; and (ii) the process for estimating the magnitude of any releases during the period when monitoring equipment was out of service; and

(g) review and revise the liquid effluent release point flow diagrams for all release points to the Ottawa River when required due to evolving technologies, regulations or operational information.

**Criterion 10.2(3):** The licensee shall not

(a) discharge radioactive substances to the environment through any release path in Appendix I to the CRL Handbook that the Commission or a person authorized by the Commission has notified in writing not to be used;

(b) in any year discharge radioactive substances, as a total of all discharges from all release paths identified in Appendix I to the CRL Handbook, in which the activity of any radionuclide or group of radionuclides exceeds the relevant annual limit specified in Appendix A to the licence; and

(c) make any controlled radioactive liquid releases to the ground on the CRL site.

#### ***Releases of Hazardous Substances***

**Criterion 10.3(1):** The licensee shall maintain hazardous emissions as low as reasonably achievable during normal operations.

**Criterion 10.3(2):** The licensee shall control work at CRL such that the releases of hazardous substances to the environment do not exceed the relevant values in Tables I-7 and I-8 of Appendix I to the CRL Handbook.

**Criterion 10.3(3):** The licensee shall report annually, in the annual compliance monitoring and operational performance monitoring reports, if any of the limits in Tables I-7 and I-8 is exceeded.

**Criterion 10.3(4):** The licensee shall keep records that describe fully and accurately the amount and type of hazardous substances released from CRL into the environment.

**Criterion 10.3(5):** The licensee shall not make any controlled hazardous liquid release to the ground on the CRL site.

**Criterion 10.3(6):** The licensee shall review and revise as required the liquid effluent release point flow diagrams for all release points to the Ottawa River when required due to evolving technologies, regulations or operational information.

#### ***Action Levels for Environmental Releases***

**Criterion 10.4(2):** Any changes to action levels listed in Appendix I to the CRL Handbook require the CNSC staff's concurrence.

**Criterion 10.4(3):** The licensee shall review and, if necessary, revise the action levels at least once per licence period in order to validate their effectiveness. If the licence period is shorter than five years, the review may be postponed until the next licence period.

#### ***Environmental Assessment Follow-up Programs***



**Criterion 10.5(1):** Upon identification of new follow-up requirements, the licensee shall submit to CNSC staff for verification, the proposed methods to ensure adequate environmental assessment follow up.

**Criterion 10.5(2):** The licensee shall submit the annual status report on environmental assessment follow-up actions at Chalk River Laboratories to the CNSC staff for acceptance as described in criterion 4.16(4).

**Criterion 10.5(3):** The licensee shall include the proposed close-out items and applicable criteria in the annual status report on environmental assessment follow-up actions at Chalk River Laboratories.

CNSC staff propose to replace these current provisions for environmental protection with references to CSA Standards N288.4, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*; N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills facilities*; N288.6, *Environmental risk assessment at class I nuclear facilities and uranium mines and mills*; N288.7, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills*; and N288.8, *Establishing and implementing action levels for releases to the environment from nuclear facilities*.

However, these standards do not contain the full suite of prohibitions, reporting, monitoring, and record keeping provisions for environmental protection found in the current licence and CRL Handbook. These proposed changes open the door to potentially serious adverse environmental impacts. We strongly recommend that the existing environmental protection licence conditions and compliance verification criteria be retained. If CNSC proceeds with these changes to the environmental protection provisions in the CRL site licence and CRL Handbook, a significant number of activities that would normally require an environmental assessment pursuant to Section 67 of the *Canadian Environmental Assessment Act*, will no longer be expressly prohibited in the Licence Conditions Handbook.

## 14. Emergency Management

The wording of current licence condition 11.1 would be altered in the proposed new condition 10.1:

### **11.1 Emergency Management Program and Fire Response**

The licensee shall implement and maintain an emergency management program to prepare for and respond to emergency events, including fires, initiating at or impacting the licensed site, and for dealing with both the onsite and offsite effects of such emergencies.

### **10.1: Emergency Preparedness Program**

The licensee shall implement and maintain an emergency preparedness program.

The current CRL Handbook notes that Ontario's *Emergency Management and Civil Protection Act* requires that all nuclear facilities in Ontario follow the *Provincial Nuclear Emergency Response Plan* (PNERP). The PNERP includes an *Implementing Plan for Chalk River Laboratories*. The current CRL Handbook refers to the PNERP and contains detailed compliance verification criteria to ensure that the licensee is able to respond promptly and effectively to emergencies.

In the proposed new Handbook, references have been removed to the PNERP, and all the following detailed emergency management criteria have been deleted, including:

### ***Emergency Management***

**Criterion 11.1(1):** The licensee shall make arrangements for responding to events requiring protective measures at the scene for

- (a) regaining control of any emergency arising at the CRL site, including events related to a combination of nuclear and non-nuclear hazards;
- (b) preventing or mitigating the consequences at the scene of any such emergency; and
- (c) cooperating with external emergency response organizations in preventing adverse health effects in workers and the public.

**Criterion 11.1(2):** The licensee shall

- (a) provide the means for identifying quickly which individuals have received doses equal to or exceeding the limits specified in section 15 of the *Radiation Protection Regulations*; and
- (b) maintain facilities and supplies at the site for the decontamination of personnel, arrangements for the services of a physician and other medical personnel qualified to handle radiation emergencies, arrangements for transportation of injured or contaminated individuals to treatment facilities, and arrangement for treatment of individuals at treatment facilities outside the site boundary.

**Criterion 11.1(3):** The licensee shall prepare and maintain a program to ensure that CRL is prepared for and has a planned response to emergencies. This program shall include

- (a) identification and general classification of emergencies;
- (b) development of emergency response plans for all general classifications identified;
- (c) establishment of an emergency response organization;
- (d) establishment of emergency facilities, equipment, and resources;
- (e) development of personnel protection procedures to control radiation exposure;
- (f) establishment of a public information program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the emergency; and
- (g) evaluation of program effectiveness using audits and exercises

**Criterion 11.1(4):** The licensee shall have people available at all times with the authority and responsibilities to classify and declare an emergency and, upon classification, to promptly initiate the appropriate onsite response.

**Criterion 11.1(5):** The licensee shall have available at all times sufficient number of qualified personnel for staffing appropriate positions promptly following the declaration and notification of an emergency.

**Criterion 11.1(6):** The licensee shall make arrangements to provide technical assistance to operational staff, and to make available teams for mitigating the consequences of an emergency.

**Criterion 11.1(7):** The licensee shall make arrangements to promptly alert the offsite responsible authorities.

**Criterion 11.1(8):** The licensee shall designate appropriate emergency facilities for responding to events on site and that will provide coordination of offsite monitoring and assessment throughout different phases of an emergency response. Emergency facilities shall be suitably located and protected to enable the control of the exposure of emergency personnel.

**Criterion 11.1(9):** The licensee shall take appropriate measures to protect those occupying emergency facilities from hazards resulting from accidents.

**Criterion 11.1(10):** The licensee shall keep available, and sufficiently and frequently test the instruments, tools, equipment, and communication systems for use in an emergency to demonstrate that they are in good working order and that they are unlikely to be affected by postulated accidents.

**Criterion 11.1(11):** The licensee shall provide an onsite emergency control centre, separated from other CRL facilities, for onsite emergency management staff. The control centre shall have means of communicating with other CRL facilities, and with the onsite and offsite emergency response organizations.

**Criterion 11.1(12):** The licensee shall

- (a) determine and specify the knowledge, skills, and abilities needed for personnel to perform their assigned emergency response functions;
- (b) inform all employees and all other persons present on CRL site of the actions to be taken in the event of an emergency;
- (c) include basic emergency training and ongoing refresher training on an appropriate schedule for the emergency response personnel;
- (d) include implicated offsite response organizations in emergency exercises as appropriate; and
- (e) evaluate emergency exercises systematically, and review and update the emergency preparedness and response arrangements and the emergency response plan based on experience gained.

**Criterion 11.1(13):** The licensee shall prepare procedures for non-routine and emergency conditions that require immediate action. These conditions can include but are not limited to

- (a) unexpected radiological and non-radiological hazards;
- (b) excessive emissions of radiological and non-radiological liquid or gaseous effluent;
- (c) fires; and
- (d) natural disasters such as storms, floods and earthquakes.

Emergency procedures shall be kept in prominent and easily accessible locations for use during emergencies. Secure storage for emergency procedures may be used when appropriate.

Closure of the NRU reactor does not eliminate the possibility of a nuclear emergency at the CRL site. High-level fuel wastes are present on the site, and CNL plans to ship more high-level wastes to CRL from other federal reactor sites (Whiteshell, Gentilly-1, Douglas Point) (CNL 2017c). CNL's proposed construction and operation of a small modular reactor demonstration facility (CNL 2017a) would create significant additional risks of a nuclear emergency.

We recommend that CNSC staff explain their proposal to remove references to the PNERP and detailed emergency management criteria from the proposed new Handbook. In the absence of a satisfactory explanation, references to the PNERP and detailed emergency management procedures should be retained. These proposed changes are likely to have significant potential adverse impacts in case of emergencies. We strongly recommend that the language of the current licence condition 11.1 be retained along with related compliance verification criteria.

## 15. Fire Protection

The current CRL licence addresses fire protection in condition 4.11 and fire response in condition 11.1 (in tandem with nuclear emergency response). The proposed new CRL site licence has a single fire protection condition (10.2). The proposed new licence would retain the current requirement for "an independent third-party review of one industrial fire brigade fire drill every two calendar years," and includes references to the National Fire Code, the National Building Code, two CSA standards, and four internal CNL documents. However, CNSC staff propose that the following criteria be deleted from the new Handbook:

### *Fire Protection Program*

**Criterion 4.11(5):** The licensee shall implement the defence-in-depth principle to fire protection, providing measures to prevent fires from starting, to detect and extinguish quickly any fires that do start and to prevent the spread of fires and their effects in or to any area that may affect safety.

**Criterion 4.11(6):** The licensee shall design and locate the SSCs [structures, systems and components] important to safety so as to minimize the frequency and the effects of fire and to maintain capability for shutdown, residual heat removal where applicable, confinement of radioactive material and monitoring of facility state during and after a fire event.

**Criterion 4.11(7):** The licensee shall design buildings that contain equipment that is important to safety as fire resistant, subdivided into compartments that segregate such items from fire loads and segregate redundant safety systems from each other. When a fire compartment approach is not practicable, the licensee shall use fire cells, providing a balance between passive and active means as justified by fire hazard analysis.

**Criterion 4.11(8):** The licensee shall design buildings that contain radioactive materials that could cause radioactive releases in case of fire so as to minimize such releases.

**Criterion 4.11(9):** The licensee shall ensure that access and escape routes for firefighting and operating personnel are available.

**Criterion 4.11(10):** The licensee shall carry out and keep updated fire hazard analyses to demonstrate that the fire safety objectives are met, that the fire design principles are satisfied, that the fire protection measures are appropriately designed and that any necessary administrative provisions are properly identified.

**Criterion 4.11(11):** The licensee shall develop fire hazard analyses on a deterministic basis, covering at least:

- (a) for all normal operating and shutdown states, a single fire and consequential spread, anywhere that there is fixed or transient combustible material; and
- (b) consideration of other credible events, occurring concurrent and independent of fires, on the ability to meet fire safety objectives.

**Criterion 4.11(12):** The fire hazard analysis shall demonstrate how the possible consequential effects of fire and extinguishing systems operation have been taken into account.

**Criterion 4.11(13):** The licensee shall ensure that for new designs or modifications

- (a) each fire compartment or fire cell is equipped with fire detection and alarm features, with detailed annunciation for the facility staff of the location of the fire; these features shall be provided with non-interruptible emergency power supplies and appropriate fire resistant cables;
- (b) fixed or mobile, automated or manual extinguishing systems are installed; these systems shall be designed and located so that their rupture, spurious or inadvertent operation does not significantly impair the capability of SSCs important to safety to carry out their safety functions;
- (c) the distribution loop for fire hydrants outside buildings and the internal standpipes that are required by the NFCC provide adequate coverage of areas relevant to safety. The coverage shall be justified by the fire hazard analysis;
- (d) ventilation systems are arranged such that each fire compartment fully fulfils its segregation purpose in case of fire; and
- (e) parts of ventilation systems (such as connecting ducts, fan rooms and filters) that are located outside fire compartments have the same fire resistance as the compartment or be capable of isolation from it by appropriately rated fire dampers.

**Criterion 4.11(14):** The licensee shall establish procedures to control and minimize the amount of combustible materials and minimize the potential ignition sources that may affect items important to safety.

**Criterion 4.11(15):** The licensee shall establish and implement procedures to ensure the operability of fire protection measures. These procedures shall include inspection, maintenance and testing of fire barriers, fire detection and extinguishing systems.

**Criterion 4.11(16):** The licensee shall implement adequate arrangements for controlling and ensuring fire safety, as identified in the fire hazard analyses.

#### ***Third-Party Reviews***

**Criterion 4.11(17):** The licensee shall, prior to implementing any proposed change of use or modification to the facilities on the CRL site for which a screening assessment indicates a potential impact on fire protection design basis, goals or criteria:

- (a) submit the proposed modification for third-party review of compliance with criteria 4.11(1) and 4.11(2) of the CRL Handbook and the standards listed therein;
- (b) have the review carried out by a qualified third party having specific expertise with such reviews; and
- (c) submit the results of the review in writing to CNSC staff.

#### ***Fire Response***

**Criterion 11.1(21):** The licensee shall establish and keep up to date written emergency procedures that clearly define the responsibility and actions of staff in responding to any fire at CRL.

**Criterion 11.1(22):** The licensee shall develop, keep up to date, and train for, a firefighting strategy to cover areas in which a fire might affect items important to safety and protection of radioactive materials. This strategy shall include criticality safety guidelines for firefighting.

**Criterion 11.1(23):** When reliance for manual firefighting capability is placed on an offsite resource, the licensee shall provide proper coordination between the CRL personnel and the offsite response group, in order to ensure that the latter is familiar with the hazards of CRL.

**Criterion 11.1(24):** If CRL personnel are required to be involved in firefighting, the licensee shall document their organization, minimum staffing level, equipment, fitness requirements, and training, and their adequacy shall be confirmed by a competent person.

These appear to be important criteria that can help prevent fires, assist fire inspectors and auditors, and maintain the safety of CRL and off-site personnel in the event of a fire. We recommend that current fire safety criteria be retained unless CNSC staff can provide a strong and clear rationale for their deletion.

## **16. Waste Management**

There are two waste management licence conditions in the current licence:

**12.1 Waste Management** The licensee shall implement and maintain a waste management program documenting handling, processing, transportation, storage and safeguarding of nuclear wastes, including spent fuel and nuclear wastes mixed with other hazardous substance.

#### **12.3 Nuclear Legacy Liabilities**

The licensee shall ensure that nuclear legacy liabilities at the CRL site are addressed.

CNSC staff propose to replace these with the following:

**11.1 Waste Management Program** The licensee shall implement and maintain a waste management program.

The proposed new licence condition 11.1 lacks the detailed requirements contained in the current licence condition 12.1 (i.e., to document “handling, processing, transportation, storage and safeguarding of nuclear wastes”). The proposed new CRL Handbook waste management criteria are equally lacking in detail. CNSC staff propose to delete all but one of the criteria contained in the current Handbook:

**Criterion 12.1(1):** The licensee shall implement and maintain a waste management program documenting handling, processing, transportation, storage, and safeguarding of nuclear wastes, including spent fuel and nuclear wastes mixed with other hazardous substances.

**Criterion 12.1(2):** The licensee shall maintain up to date a waste management framework document identifying the characteristics of all radioactive and hazardous wastes that are produced in the course of the current licensed activities or accepted from outside clients.

**Criterion 12.1(3):** The licensee shall not produce, in the course of the licensed activities, or accept from outside clients, waste for which there is no identified and approved treatment, or storage, or disposal facility.

**Criterion 12.1(4):** The licensee shall treat, store, or dispose of all wastes identified in criteria 12.1(2) and 12.1(3) of the CRL Handbook only in accordance with an appropriate authorization.

**Criterion 12.1(5):** The licensee shall

(a) ensure that the production, in terms of both rate and volume, of radioactive waste is minimized; and

(b) maintain adequate records of inventory and throughput of radioactive wastes produced, and retain them for 10 years after the date of CNSC staff’s acceptance of the end-state report.

**Criterion 12.1(6):** The licensee shall ensure, to the extent reasonably practicable, that

(a) radioactive waste produced is accumulated in a controlled and contained manner such that it cannot escape from such control or containment;

(b) no leak or escape of radioactive nuclear substances or radioactive wastes can occur without being detected.

**Criterion 12.1(7):** For nuclear substances other than those cited in condition 4.13 of the licence, the licensee shall keep records, and retain them for 10 years after the date of CNSC staff’s acceptance of the end-state report, that describe fully and accurately

(a) the amount, type and location of nuclear substances placed into or removed from each waste management area at CRL; and

(b) the production, acquisition and disposition of nuclear substances in nuclear facilities at CRL.

Of these seven criteria, the only one proposed for retention in the new CRL Handbook is Criterion 12.1(3), which prohibits the production or acceptance of waste for which no treatment, storage facility, or disposal facility exists. This criterion may act to delay CNL’s planned shipments of high-level waste to CRL from other federal reactor facilities (Whiteshell, Gentilly-1, Douglas Point) (CNL 2017c). However, deletion of the other six criteria would have significant potential adverse environmental consequences.

Serious risks would arise if the licensee were no longer required to:

- document the characteristics of all radioactive and hazardous wastes produced at CRL or accepted from outside clients - Criterion 12.1(2);
- obtain appropriate authorization of waste management activities - Criterion 12.1(4);
- minimize the production of radioactive wastes - Criterion 12.1(5)(a);
- maintain accurate records of radioactive wastes – Criteria 12.1(5)(b) and 12.1(7);
- prevent undetected leaks of radioactive wastes – Criterion 12.1(6)(b);

- ensure (as far as possible) that radioactive wastes cannot escape from control or containment – Criterion 12.1(6)(a).

Although Criterion 12.1(1) exactly duplicates the language of the licence condition, it is accompanied in the current CRL Handbook by Guidance 12.1(1). This Guidance makes reference to CNSC regulatory policy P-290 *Managing Radioactive Waste*. According to the Handbook, P-290 contains “principles for effective waste management and the CNSC’s approach to regulating the management of radioactive waste.” In this regard it is important to note that no mention is made of P-290 in the proposed new Handbook. We recommend that CNSC staff clarify if P-290 is no longer considered to provide useful guidance on managing radioactive waste, and whether it has been replaced by another document.

All the documents listed in the proposed new CRL Handbook as providing compliance verification criteria are either CSA standards or internal CNL documents, and hence are not readily available to the public. This represents a serious barrier to accountability and transparency. We recommend that CNSC make CSA standard N292.3, *Management of low- and intermediate-level radioactive waste* and all other CSA standards referenced in the CRL Handbook freely accessible to the public on the CNSC website.

The proposed deletion of licence condition 12.3 is extremely puzzling, even bizarre, given that addressing nuclear legacy liabilities is a very prominent component of the “Site Operating Company” contract between AECL and CNL, and that the 2016 and 2017 federal budgets contain over a billion dollars (\$1,049,900,000) “to accelerate work that will reduce risks and discharge Canada’s radioactive waste liabilities faster” (CCRCA and CELA 2017a). We recommend that current licence condition 12.3 on Nuclear Legacy Liabilities be retained, and strengthened by adding criteria requiring the licensee to produce and make public a new baseline assessment of costs for addressing nuclear legacy liabilities at CRL, and requiring the licensee to develop and make public a spreadsheet that lists all identifiable CRL liabilities in the left-hand column, proposed corrective actions in the middle column, and estimated costs in the right-hand column (see next section for more on this).

The CNSC staff proposal to replace the current waste management provisions in the licence and CRL Handbook with a reference to CSA Standard N292.3 would remove the reporting, monitoring, and record keeping provisions for waste management that are contained in the current licence and CRL Handbook. Although CNL is actively pursuing permanent waste disposal options at CRL and elsewhere, CSA standard N292.3 explicitly excludes permanent waste disposal: “This Standard applies to waste organizations and facilities... that generate, possess, manage, and transport low- and intermediate-level radioactive waste throughout the life-cycle up to the point of disposal” [emphasis added].

As we have documented in our petition to the Commissioner of the Environment and Sustainable Development (CCRCA and CELA 2017b), the Government of Canada has not developed adequate laws, regulations, policies and strategies for radioactive waste management, particularly disposal. The deletion of proposed licence provisions related to waste management and the failure to develop new licence provisions applicable to radioactive waste disposal opens the door to potentially serious adverse environmental impacts. We strongly recommend that the current language of the waste management licence condition 12.1 be retained, and that related compliance verification criteria be retained and strengthened to address waste disposal. If CNSC proceeds with changes to waste management provisions in the CRL site licence and CRL Handbook, a significant number of activities that would normally require an environmental assessment pursuant to Section 67 of the *Canadian Environmental Assessment Act*, will no longer be expressly prohibited.

## 17. Decommissioning

The current licence addresses decommissioning in several separate licence conditions, effectively making a distinction between decommissioning planning (licence condition 12.2), and operational decommissioning activities (licence conditions 4.3 and 4.4):

### **4.3 Nuclear Facilities in Storage-with-Surveillance State**

The licensee shall undertake maintenance, monitoring and surveillance activities for nuclear facilities in storage-with-surveillance state in accordance with documented plans and procedures.

### **4.4 Nuclear Facilities Undergoing Decommissioning Activities**

The licensee shall only decommission a nuclear facility, or any part thereof, at the CRL site in accordance with documented decommissioning plan(s) and procedures, and with the prior approval of the Commission to proceed with the decommissioning

### **12.2 Decommissioning**

The licensee shall maintain a comprehensive preliminary decommissioning plan for the CRL site, and shall review and revise the plan at such times as the Commission may require and in any event, no later than ten years from previous revision.

Although the proposed new licence briefly addresses decommissioning operations under licence condition 3.1 (Operating Program), it would contain only one decommissioning condition:

**11.2 Decommissioning Plan** The licensee shall maintain a decommissioning plan.

Many nuclear facilities at Chalk River are no longer in use. They are being, or will be, decommissioned in several stages. They include the NRX Reactor, the Plutonium Tower, the Waste Water Evaporator, the Plutonium Recovery Laboratory, and the NRX Fuel Bays. The NRU Reactor will soon join this list.

This makes it important for the CRL site licence to reflect the various stages of the decommissioning process. A plan is required to achieve each of the stages for a given facility. A report is required on the status of a given facility once the “end-state” has been reached for a particular stage. There must also be an overall “Detailed Decommissioning Plan” for the facility.

CNSC uses confusing terminology for the early stages of decommissioning. It uses the term “storage with surveillance” to mean “a planned stage during decommissioning program where the remaining contaminated materials, equipment and site(s) will be placed under controlled surveillance for a specified period of time”. CNSC has more recently introduced the terms “safe shutdown state” and “permanent safe shutdown state” as a substitute for “storage with surveillance.” But in essence, all these are part of the overall decommissioning process for a nuclear facility.

Here is what is proposed in the new CRL Handbook under licence condition **3.1 Operating Program**:

### ***Facilities in Safe Shutdown State***

The licensee shall develop and maintain storage-with-surveillance plans (SWS plans) for Class I and Class II nuclear facilities in permanent safe shutdown state. The licensee shall maintain those facilities in permanent safe shutdown state according to the SWS plan for the facility.



### ***Facilities under Decommissioning***

For Class I and Class II nuclear facilities at CRL, the licensee shall prepare detailed decommissioning plans (DDP) and procedures as needed, and submit the DDP to CNSC staff for review. For the decommissioning of radioisotope laboratories, storage rooms, contaminated buildings, support facilities, low-hazard nuclear structures and non-contaminated buildings, the licensee shall prepare facility/building clean-up (removal) plans, notify CNSC staff and submit the facility/building clean-up (removal) plans to CNSC staff for information.

### ***Release from Regulatory Control***

The licensee shall only release the decommissioned property, or any part thereof, for reuse upon the acceptance of the final end-state report by the CNSC.

These provisions are similar to those in CSA Standard N294, *Decommissioning of facilities containing nuclear substances*, but they do not fully replace the language in the current CRL Handbook under licence condition 4.4, Nuclear Facilities Undergoing Decommissioning Activities:

**Criterion 4.4(1)(c)** For Class I and Class II nuclear facilities at CRL listed in Tables B-1, B-2, B-4 and B-6 of the CRL Handbook, the licensee shall [...]

(c) obtain the approval from the Commission or a person authorized by the Commission before proceeding with the decommissioning.

**Criterion 4.4(2):** A determination of the applicability of the CEAA must be made by CNSC staff. An environmental assessment under CEAA may or may not be required.

**Criterion 4.4(4)** Where decommissioning of the nuclear facility is to take place in discrete phases, and will not reach the end-state objective without reverting to a period of a permanent safe shutdown state, an interim end-state report shall be prepared when each planned interim end state is achieved.

**Criterion 4.3(2):** The storage-with-surveillance plans shall contain as a minimum

- (a) provisions for care and maintenance during permanent safe shutdown state; and
- (b) provisions for inspections, testing and surveillance during permanent safe shutdown state.

**Criterion 4.3(3):** The licensee shall test every system associated with a facility in permanent safe shutdown state at a frequency to substantiate the reliability that is claimed or implied in the documented plans and procedures.

**Criterion 4.4(5)** If the removal of radioactive and other hazardous materials or the dismantling of structures and cleanup of the facility, or both, are deferred, a plan for surveillance, monitoring, physical protection, and maintenance of the facility during such periods shall be developed and implemented to

- (a) maintain the facility in a safe state;
- (b) control the release of materials to the environment; and
- (c) prevent access by unauthorized persons.

**Criterion 4.4(6):** Decommissioning is considered complete when

- (a) the final end state has been achieved and documented;
- (b) the risks to the following have been reduced to meet regulatory requirements:
  - (i) any person who continues to work at the facility or occupies the site;
  - (ii) the public; and
  - (iii) the environment; and
- (c) the facility has been released from nuclear regulatory control.

**Criterion 4.4(7)** The final end state is reached when the planned decontamination, demolition, and dismantling are completed, and all materials, wastes, equipment, and structures have been dispositioned as outlined in the detailed decommissioning plan.

**Criterion 4.4(11)** The licensee shall keep, and retain for 10 years after the date of CNSC staff's acceptance of the end-state report, a record of

- (a) the progress achieved in meeting the schedule for the decommissioning;
- b) the implementation and results of the decommissioning;
- (c) the manner in which and the location at which any nuclear or hazardous waste is managed, stored, disposed of or transferred; and
- (d) the name and quantity of any radioactive nuclear substances, hazardous substances and radiation that remain at the nuclear facility after completion of the decommissioning.

In essence, CNSC staff propose to weaken or remove approval, reporting, monitoring, and record keeping provisions for decommissioning that are contained in the current licence and CRL Handbook:

- The requirement for Commission approval prior to decommissioning Class I and Class II nuclear facilities at CRL would be weakened to a requirement that plans be submitted "for review" by CNSC staff - Criterion 4.4(1)(c);
- Reference to a determination by CNSC staff of the applicability of the *Canadian Environmental Assessment Act* to decommissioning projects would be deleted – Criterion 4.4(2);
- Minimum requirements for storage-with-surveillance plans would be deleted – Criterion 4.3(2), along with monitoring requirements for facilities in storage-with-surveillance – Criterion 4.3(3);
- The requirement to retain records of the manner in which decommissioning wastes are managed would be removed – Criterion 4.4(11); and
- Criteria describing the interim end-of-state and the final end-state to be achieved through decommissioning of a facility would be removed – Criteria 4.4(5), (6) and (7).
- Appendix J, Authority Levels for Making Decisions Concerning the CRL Licence; Appendix M, Approvals Pursuant to a Licence Condition; Appendix D, Documents Version Control (including Table D-1: Documents that require CNSC staff's acceptance before implementation, Table D-2: Documents to be submitted to CNSC staff for information within 15 days of release for use, and Table D-3: Documents to be submitted to CNSC staff for information once a year (in a batch) would all be removed from the CRL Handbook (these contain numerous references to decommissioning plans, activities and approvals).

CSA standard N294 does not address the full suite of approval, reporting, monitoring, and record keeping provisions for decommissioning that are contained in the current licence and CRL Handbook. These proposed changes open the door to potentially serious adverse environmental impacts. We strongly recommend that the existing decommissioning licence conditions and compliance verification criteria be retained. We also recommend that all appendices in the current CRL Handbook that refer to documentation and approval of decommissioning activities be retained. If CNSC proceeds with changes to decommissioning provisions in the CRL site licence and CRL Handbook, a significant number of activities that would normally require an environmental assessment pursuant to Section 67 of the *Canadian Environmental Assessment Act*, will no longer be expressly prohibited.

## Decommissioning and Waste Management Priorities and Challenges

Section 2.2 (“Preliminary Decommissioning Plan”) of Commission Member Document CMD 18-H2 briefly outlines the magnitude of the decommissioning challenges at CRL:

Approximately 160 buildings on the CRL site excluding reactors and underground storage tanks are planned to be removed. They range in size and complexity from complex hot cell facilities such as the Universal Cells and Materials Cells to simple office and storage buildings. Construction materials range from heavily reinforced concrete and steel to simple wooden frames.

The CRL site is unique in many respects. Wastes that are “challenging with respect to technical and safety considerations” include:

- large volumes of scrap low enriched uranium,
- plutonium and mixed plutonium/thorium in storage,
- legacy radioactive liquid waste located in tanks,
- cemented molybdenum-99 medical isotope waste,
- radioactively contaminated PCBs,
- graphite and other moderators (e.g., beryllium) that pose criticality concerns,
- asbestos,
- heavy metals such as mercury and lead. (CNL 2017d).

CNL's intention to ship essentially all the wastes (including high-level waste fuel rods) from other federal facilities (Gentilly-1, Whiteshell, Douglas Point) to Chalk River would further add to waste management challenges at the CRL site (CNL 2017d).

Our group provided a detailed written submission for the 2016 CRL licence renewal hearing, with 32 recommendations, many dealing with decommissioning and waste management (CCRC 2016). At that hearing, in response to a question from Commission Member Velshi as to whether “details around decommissioning plan, liabilities, financial guarantees and so on” would be provided for the subsequent licence hearing, CNSC staff member Dave Newland replied “Yes, exactly.”

Where are those details? We are attempting to provide them in the present submission. We are effectively doing the work that CNSC staff is either unable or unwilling to do.

The first and third recommendations in our 2016 submission were:

1. The Commission should require the licensee to produce a new baseline assessment of costs for addressing nuclear legacy liabilities at CRL.
3. The Commission should require the licensee to develop and make public a spreadsheet that lists all identifiable CRL liabilities in the left-hand column, proposed corrective actions in the middle column, and estimated costs in the right-hand column.

A new baseline assessment of costs should also identify priorities for addressing legacy wastes, enabling a logical and cost-effective sequencing of corrective actions.

The CNSC staff “Environmental Assessment Report” included in CMD 18-H2 describes environmental contaminants leaking from the CRL Waste Management Areas (WMAs), but provides inadequate detail about the actual contents of the WMAs. For example, the EA Report does not even mention the “special burials” of two reactor cores in WMA B and a single reactor core in WMA A (the one that was heavily damaged in the 1952 NRX meltdown).

These “special burials” are source terms for the toxic waste plumes that are contaminating surface water and ground water at many locations on the CRL property. The “special burials” contain “intermediate-level waste” (ILW), with long-lived radionuclides and elevated radiation fields. The lack of adequate detail on legacy waste priorities in the EA Report is mirrored by inaction on the part of the regulator and licensee in developing safer long-term options for addressing legacy ILW challenges.

The project schedule for CRL Decommissioning in the current Comprehensive Preliminary Decommissioning Plan (AECL 2014, Figure 4) calls for siting of an ILW Facility to begin in 2013/14, and ILW Facility design to begin in 2018/19. However, CMD 18-H2 is completely silent on the legacy ILW challenges at CRL. This CNSC staff document contains not one single mention of the ILW found on the CRL site, much less a description of progress on an ILW Facility. The hearing document prepared by CNL (2017b) refers only to CNL’s intent to “Consolidate intermediate-level waste and high-level waste for long-term storage” during the coming licence period.

Lack of attention to the ILW waste challenge at CRL is astounding in light of the recent announcement that CNL’s proposed “Near Surface Disposal Facility” will not contain ILW. Similarly, the proposed consolidation of all federal high-level waste (HLW) at CRL warrants not a single mention in the staff CMD 18-H2. There is no indication that capacity exists for safe storage of significant additional quantities of HLW at CRL. The costs and risks of handling and transporting HLW currently found at other federal reactor facilities would be considerable. The lack of attention to this issue is equally astounding.

The proposed CRL Handbook refers to an outdated 2013 cost estimate of CRL decommissioning liabilities (AECL 2013), which has never to our knowledge been released to the public, despite repeated requests. CNSC staff now propose to simply delete the (already weak) current licence condition 12.3 that “The licensee shall ensure that nuclear legacy liabilities at the CRL site are addressed.”

The Site Operating Company (SOC) contract for CRL says that “CNL shall ensure that the Proposed Annual Program of Work and Budget [...]

- v) specifies an estimate of the required contribution to AECL’s Long-Term Disposal of Radioactive Waste Fund for the Operating Year based on the Work describe in the Proposed Annual Program of Work and Budget, including New Commercial Opportunities; and
- (vi) specifies an estimate of the change in AECL’s radioactive waste and decommissioning liabilities.

Also Included within the Decommissioning and Waste Management section of CNL’s “SOC contract” is the following provision:

7.1.1.1 CNL shall deliver a written report confirming the highest priority risks from the perspectives of health, safety, security and the environment and include these risks as priority items to be addressed in the next Proposed Annual Program of Work and Budget.

We recommend that the Commission require that CNL describe these highest priority decommissioning and waste management risks at CRL and the process used to determine them, and publicly release this information. This information would help ensure that the licensee spends limited financial resources as efficiently and effectively as possible, and meets the licence conditions and criteria.

We find that the CNSC staff assessment of waste management in CMD 18-H2 lacks detail and rigour. The complete absence of information about waste transfers to and from the CRL site is troubling. We note that **Criterion 4.4(11)** requires that the licensee record the “location at which any nuclear or hazardous waste is managed, stored, disposed of or transferred”. **Criterion 12.1(1)** requires the licensee to “implement and maintain a waste management program documenting... transportation... of nuclear wastes.” We recommend that the Commission require CNL and CNSC staff to prepare and publicly release a document describing waste transfers to and from the CRL site.

Are wastes being transferred to licensed facilities? CNL’s Integrated Waste Strategy Summary refers to “continued transfers of heavy water from CRL to La Prade,” adding that “waste may be produced as the result of upgrading processes,” and “some portion of the material may require disposal as waste in the future” (CNL 2017d). The Commission should verify that La Prade is licensed to accept and process radioactive heavy water.

The Integrated Waste Strategy Summary also notes “challenges associated with mixed waste due to limited options... the only available pathway is to send the material to off-site processors with the radioactive component being returned to CNL for storage/disposal.” It then adds, “This may be resolved with the commencement of operations at the proposed NSDF as it is intended that the facility will accept suitable mixed waste” (CNL 2017d).

Neither option - transferring mixed wastes to off-site processors or dumping mixed wastes in the NSDF – is acceptable in our view. We recommend that the issue of mixed waste management receive more attention, with consideration of other options, if any exist.

More generally, information in the Integrated Waste Strategy Summary (CNL 2017d) should be incorporated in CMD 18-H2 and future Commission documents to better inform a consideration of ways to address the more challenging waste management issues at CRL.

In the absence of robust regulatory oversight, there is a risk that the consortium of multinational corporations that now “owns” CNL may actually increase, rather than decrease, the liabilities at the Chalk River site. CNL seems intent on using CRL as a dumping ground for most of the federal government’s own radioactive wastes, as well as private sector (industrial and commercial) and other public sector (university and hospital) radioactive wastes. We recommend that information regularly be provided to the Commission and the public about CNL’s commercial waste activities.

The consolidation of federal radioactive waste at CRL is being implemented in the absence of public consultation or comprehensive environmental assessment. Shipments of low and intermediate level radioactive waste from the Whiteshell Laboratories to CRL have started. Commercial wastes have been shipped to CRL for many years. These waste transport activities are not described in CMD 18-H2.

Safer storage of intermediate-level waste is an urgent priority for reducing environmental risks at CRL. The lack of action to address these risks has already been noted. Shipping additional quantities of ILW to CRL is irresponsible and inconsistent with **Criterion 12.1(3)** in the CRL Handbook: “The licensee shall

not produce, in the course of the licensed activities, or accept from outside clients, waste for which there is no identified and approved treatment, or storage, or disposal facility.”

Of particular concern is the longer-term plan for CRL, enabled by the proposed changes in the licence, may include abandonment of wastes in situ, with no intent to conduct environmental remediation. In 2013 AECL installed an “impermeable cover” over the sand trenches in Waste Management Area C. This 4.5-hectare area, in use between 1963 and 2005, received low-level waste from CRL and across Canada, including solid waste and drummed and bottled liquids. As noted in AECL (2014), there is “limited characterization data for inventories” of the waste in this area, and it is the “source of a groundwater plume”. This plume “affects nearby wetlands and streams (Duke Stream, Bulk Storage Stream and Lower Bass Creek), which eventually discharge into Maskinonge Lake” (CNSC 2017, EA Report, p. 27).

Although page 27 of the CNSC staff EA Report says that “In time, Waste Management Area C (and the remaining Waste Management Areas on the CRL site) will be remediated,” page 11 says, with regard to environmental remediation, “In some cases, removal of contamination will be required and in others, natural decay of radioactivity or natural attenuation of contaminants in the environment will mean that no intervention will be necessary to meet end-state objectives.” CNL officials have indicated their intent to abandon wastes in Waste Management Area C without an effort to remediate the site (Buckley, Personal Communication). Waste abandonment could be enabled by CNSC staff proposals to delete **Licence Condition 12.3**, “The licensee shall ensure that nuclear legacy liabilities at the CRL site are addressed, to delete **Criterion 10.1(6)**, “The licensee shall continue to (a) monitor, mitigate and remediate the lands that have been contaminated by radioactive or hazardous substances,” and to delete **Criterion 4.4(2)**: “A determination of the applicability of the CEAA [to decommissioning activities] must be made by CNSC staff. An environmental assessment under CEAA may or may not be required.”

In past submissions to CNSC licencing hearings on CRL we repeatedly recommended a full environmental assessment of the clean-up of the CRL site, through a public panel review under the provisions of the Canadian Environmental Assessment Act (CEAA). We are repeating this recommendation in the present submission, with a slight modification. We are now requesting that the Commission ask Environment and Climate Change Canada to initiate and lead a public panel review of ways to address the environmental liabilities at the Chalk River Laboratories. We note that these environmental liabilities include a wide variety of heavy metals and toxic organic chemicals as well as radioactive substances (e.g., tetrachlorodibenzofuran, benzo(a)pyrene), polychlorinated biphenyls, lead, selenium, mercury, arsenic, cadmium, etc.). Their clean-up will require expertise that goes beyond that found within the Canadian Nuclear Safety Commission.

## The relationship between the NSDF and the Proposed Licence

CNL’s intent to use the NSDF as Canada’s first permanent disposal facility for non-fuel reactor wastes has proven to be unacceptable to local communities. Many municipalities have passed resolutions in opposition to the project. The recent announcement that ILW would not be placed in the NSDF is unlikely to alleviate concerns about this proposed new facility. CNL’s site licence application indicates that wastes to be placed in the NSDF would be generated using a bulk-demolition approach, and that radiation limits for the NSDF waste acceptance criteria will be set accordingly:

It is CNL's intention that the NSDF Waste Acceptance Criteria will support the bulk-demolition approach... (CNL 2017c, p. 77)

Over 200 comments have been submitted on the draft NSDF environmental impact statement, many focused on the risks of placing very large quantities of nuclear waste in an above-ground mound in a seismically active area next to the Ottawa River, the source of drinking water for millions of people. CNL continues to assert that the NSDF is the linchpin of its waste management strategy.

CNSC's attempt to rule the NSDF "out of scope of this licence consideration" (CNSC 2017, p. 7) is problematic because many of CNSC staff's proposed changes to the current CNL licence and handbook would appear to be designed to enable the NSDF project to proceed. These include weakened regulation of decommissioning activities, removal of requirements to control releases of radioactive and hazardous wastes, removal of the requirement to "minimize the activity of gaseous and liquid radioactive substances that are released to the environment," removal of the prohibition of controlled liquid waste releases to the ground, and removal of the requirement to provide detailed reports on action level exceedances of worker radiation doses within 60 days of their occurrence.

Particularly problematic is the proposed deletion of waste record-keeping requirements. With CNL proposing "permanent disposal" of radioactive wastes, consideration must be given to "permanent record-keeping". Future generations may be faced with environmental remediation challenges if so-called "permanent" disposal facilities do not perform as anticipated. They will need accurate and comprehensive records of the wastes that have been put in these facilities. The regulator should be strengthening record-keeping requirements, not proposing their deletion.

## The Decommissioning Plan

The March 2014 *Comprehensive Preliminary Decommissioning Plan* (CPDP), which CNSC staff propose to include as a compliance verification criterion in the new CRL Handbook, does not mention CNL's current proposal to construct a Near Surface Disposal Facility. Nor does the CPDP refer to CNL's current activities aimed at consolidation of all federal radioactive wastes at the CRL site. And, as noted earlier, there has been no progress on the reference in Figure 4 of the CPDP to a siting process for an intermediate-level waste facility, despite the proposed 2013 start for this activity (AECL 2014).

Nonetheless, CNSC staff claim (pages 10-12 of the "Environmental Assessment Report" section of CMD 18-H2) that CNL has met the requirement of section 3(k) of the *Class 1 Nuclear Facilities Regulations* that a licence application shall contain "the proposed plan for the decommissioning of the nuclear facility or of the site".

This regulatory requirement cannot be met by a plan prepared prior to implementation of the GoCo model (a plan that bears virtually no resemblance to the licensee's current and planned decommissioning activities).

CNSC staff CMD 18-H2 references a letter from the Minister of Natural Resources as the "financial guarantee" for the costs of decommissioning at the Chalk River site. This letter was signed by a Minister representing a previous government and is dated prior to the start date of the current licence. We recommend that the Commission, pursuant to section 24(5) of the *Nuclear Safety and Control Act*, require the licence applicant to provide a financial guarantee in an acceptable form.

## Regulating the Waste Owner

According to the *Radioactive Waste Policy Framework*, the federal government has the responsibility to regulate waste owners “to ensure that they comply with legal requirements and meet their funding and operational responsibilities in accordance with approved waste disposal plans” (NRCan 1996).

Atomic Energy of Canada Limited (AECL) is the “owner” of CRL wastes. CMD 18-H2 states that “AECL retains ownership of the lands, assets and liabilities associated with CNL’s licences” (CNSC 2017, proposed Licence Conditions Handbook, page 9).

CMD 18-H2 makes no mention of AECL’s waste disposal plan. As there are no licensed disposal facilities in Canada, what exactly is meant by a “waste disposal plan”? What is AECL’s plan? Is it the outdated CPDP? Is it the Integrated Waste Strategy? If not, what is it? Who “approves” these plans? Given that CRL wastes are the responsibility of AECL, not CNL, shouldn’t CRL wastes be managed under a separate licence issued to AECL? What exactly is the regulatory basis for waste management at CRL?

Our group has raised these concerns for 15 years. Consider the following passage from our 2003 intervention:

Another example of special treatment is that hearings on matters pertaining to licensing of CRL’s waste management facilities are combined with hearings on other aspects of site operations. Other licensees go through separate public hearing processes on their waste management facilities...

Is there a double standard that exempts a federal Crown Corporation from regulatory procedures that apply to other nuclear industry licensees? Why doesn’t AECL have to go through separate licensing processes for the nuclear waste management facilities it operates? Why is the Commission not holding hearings regarding decommissioning plans and financial guarantees for the waste facilities at CRL? (CCRC 2003)

This creates an impression that the federal government is exempting itself from laws that it requires others to follow. The federal government is by far Canada’s largest owner of radioactive wastes. Using data from the *Inventory of Radioactive Waste in Canada* (CNL 2015) as of the end of 2014, Canada had 670,492 cubic meters of low and intermediate level radioactive waste generated from power reactors, fuel fabrication, nuclear research and development, and radioisotope production and use; including both operations and decommissioning. Of this total, the Government of Canada (AECL) was responsible for 82% (549,310 cubic meters), most of it (525,066 cubic meters) having arisen from nuclear research and development, largely at the Chalk River Laboratories.

According to the current CPDP, “The updated cost of decommissioning the CRL site has a Net Present Value of \$6.1 Billion as of 2013 March” (AECL 2014). This dollar value of the Chalk River liabilities exceeds the \$4.8 billion total of all the non-nuclear environmental liabilities of the Federal Crown (PSPC 2015).

We strongly recommend that CNL and AECL prepare and publicly release a plan that accurately and completely reflects intended decommissioning activities, and their estimated cost, for the CRL site. We recommend that First Nations be consulted on this plan, along with local non-indigenous communities, with the intent that the plan will be approved by the Government of Canada.



## **Small Modular Reactors (SMRs)**

CNL is proposing to build and operate a small modular reactor (SMR) “demonstration facility” (CNL 2017) at CRL. This facility could be operational as early as 2026 (within the proposed licence term). CNL has already signed a number of SMR contracts (Nuclear Energy Insider 2017).

Proposed changes to the CRL licence and Handbook provisions related to safety and environmental qualifications would create unacceptable risks to the public if CNL were to proceed with its stated plan to build and operate an SMR at CRL. In addition to accident risks associated with CNL’s proposal, an SMR could generate significant quantities of low-, intermediate- and high-level wastes that would create new and significant management challenges. This would be inconsistent with Criterion 12.1(3) in the CRL Handbook: “The licensee shall not produce, in the course of the licensed activities, or accept from outside clients, waste for which there is no identified and approved treatment, or storage, or disposal facility.”

CMD 18-H2 says that consideration of SMRs is “out of scope” of the January 2018 licence renewal hearing. Our detailed analysis of CNSC staff’s proposed changes to licensing provisions for the CRL site, indicates a number of areas where safety of reactor operations could be severely compromised. Commissioners should consider carefully the risks of removing regulatory controls from a site where it is proposed to test experimental reactor designs.

Commissioners should also ask CNL what consideration has been given to date to managing SMR wastes.

## Recommendations

1. CNSC staff should issue a revised CMD 18-H2 that includes the current CRL site licence.
2. CNSC staff should include in the revised CMD 18-H2 an expanded section on “Proposed Licence Changes” that fully documents and explains the licence changes they are proposing.
3. CNSC staff should include in the revised CMD 18-H2 a description of, and references to, the standard format and standard licence conditions for Class 1 nuclear facilities, and the process through which these were developed.
4. The Commission should not renew the CRL site licence for a period exceeding three years, and at the next licence hearing should assess whether the GoCo (“Government-owned, Contractor-operated”) model has met the Government of Canada’s objective to “reduce risks and discharge Canada’s radioactive waste liabilities faster.”
5. The Commission should clarify the rationale for the addition of the phrase “prepare a site for... a nuclear facility” in Section III (Licenced Activities) of the proposed new licence.
6. The Commission should consider the legal implications of removing the four conditions proposed for deletion in Section V (Interpretation) of the current licence, and should retain these conditions unless CNSC staff can provide a strong and clear rationale for their deletion.
7. The Commission should retain current licence condition 1.5 (Resolution of Conflicts or Inconsistencies).
8. The Commission should retain all current licence conditions and compliance verification criteria related to management of safety, safety policy, and safety culture in the new CRL site licence and CRL Handbook unless CNSC staff can provide a strong and clear rationale for their deletion.
9. The Commission should retain the original language of licence condition 3.1 (Human Performance) and licence conditions 3.2 (Training) and 3.4 (Minimum Staffing Requirements) in the new CRL site licence; and should retain the compliance verification criteria related to these three licence conditions in the new CRL Handbook (with appropriate changes to reflect shut-down of the NRU Reactor and molybdenum-99 production facility) unless CNSC staff can provide a strong and clear rationale for their proposed changes.
10. The Commission should retain the original language of licence condition 4.16 (Reporting of Annual Compliance Monitoring and Operational Performance) and should ensure that these reports on the CRL site are submitted to the Commission and are publicly available.
11. The Commission should retain the nine current licence conditions related to Operating Performance in the new CRL site licence and should retain related compliance verification criteria in the new CRL Handbook unless CNSC staff can provide a strong and clear rationale for their deletion.

12. The Commission should retain compliance verification criteria related to current licence condition 5.1 (Safety Analysis) in the new CRL Handbook unless CNSC staff can provide a strong and clear rationale for their deletion.

13. The Commission should retain the original language of licence condition 6.1 (Physical Design) in the new CRL site licence and should retain related compliance verification criteria in the new CRL Handbook unless CNSC staff can provide a strong and clear rationale for their deletion.

14. The Commission should retain the five current Fitness for Service licence conditions (five current Fitness for Service licence conditions (7.1 Maintenance, In-Service Inspection and Functional Testing; 7.2 Frequency of Calibration of Radiation Detection Instruments; 7.3 Control of Measuring and Test Equipment; 7.4 Aging Management; and 7.5 Environmental Qualification) in the new CRL site licence and should retain related compliance verification criteria in the new CRL Handbook unless CNSC staff can provide a strong and clear rationale for their deletion.

15. The Commission should retain the requirement in current licence condition 8.2 (Occupational Radiation Exposure Action Levels) that the licensee submit a detailed report to the Commission within 60 calendar days of becoming aware that an occupational radiation exposure action level has been reached.

16. CNSC staff should provide a rationale for not listing the *Canada Labour Code* and the *Canada Occupational Health and Safety Regulations* as compliance verification criteria for the Conventional Health and Safety licence condition, and should confirm that current occupational health and safety criteria in the CRL Handbook would be fully addressed if they are replaced by references to internal CNL documents.

17. The Commission should retain the five current Environmental Protection licence conditions in the new CRL site licence, including a reference to site-wide groundwater monitoring, and should retain related compliance verification criteria in the new CRL Handbook.

18. CNSC staff should explain their proposal not to include references to Ontario's Provincial Nuclear Emergency Response Plan in the new CRL Handbook.

19. The Commission should retain the original language of current licence condition 11.1 (Emergency Management Program and Fire Response) in the new CRL site licence and should retain related compliance verification criteria in the new CRL Handbook unless CNSC staff can provide a strong and clear rationale for their proposed changes.

20. The Commission should retain current Fire Protection criteria (under licence condition 4.11) and Fire Response criteria (under licence condition 11.1) in the new CRL Handbook unless CNSC staff can provide a strong and clear rationale for their deletion.

21. CNSC staff should clarify if CNSC regulatory policy P-290 *Managing Radioactive Waste* is no longer considered to provide useful guidance on managing radioactive waste and whether it has been replaced by another document.

22. The Commission should direct CNSC staff to make CSA standard N292.3, *Management of low- and intermediate-level radioactive waste* and other CSA standards referenced in the CRL Handbook that pertain to decommissioning and waste management freely accessible to the public on the CNSC website.

23. The Commission should retain current licence condition 12.3 (Nuclear Legacy Liabilities); should require the licensee to produce and make public a new baseline assessment of costs for addressing nuclear legacy liabilities at CRL; and should require the licensee to develop and make public a spreadsheet that lists all identifiable CRL liabilities in the left-hand column, proposed corrective actions in the middle column, and estimated costs in the right-hand column.
24. The Commission should retain the current language of waste management licence condition 12.1 in the new CRL site licence, should retain related compliance verification criteria, and should strengthen these criteria by addressing radioactive waste disposal.
25. The Commission should retain current licence conditions 4.3 (Nuclear Facilities in Storage-with-Surveillance State), 4.4 (Nuclear Facilities Undergoing Decommissioning Activities) and 12.2 (Decommissioning) in the new CRL site licence, and should retain related compliance verification criteria in the new CRL Handbook.
26. The Commission should retain the appendices in the current CRL Handbook that refer to documentation and approval of decommissioning and waste management activities, including Appendix D, Appendix M and Appendix J.
27. The Commission should require that CNL describe the highest priority decommissioning and waste management risks at CRL and the process used to determine them, and publicly release this information.
28. The Commission should require CNL and CNSC staff to prepare and publicly release a document describing waste transfers to and from the CRL site, including commercial wastes, and should verify that the La Prade Heavy Water plant is licensed to accept and process radioactive heavy water.
29. CNSC staff should incorporate information in the Integrated Waste Strategy Summary about challenges related to high-level waste, solid and liquid intermediate-level waste, low-level waste, mixed waste, and specific wastes for consideration into CMD 18-H2 and into future CMDs to ensure that strategies and options for addressing decommissioning and waste management challenges at CRL are discussed openly by the Commission, other regulatory bodies and the public.
30. The Commission should ask Environment and Climate Change Canada to initiate and lead a public panel review of the environmental liabilities at the Chalk River Laboratories and ways to address them.
31. The Commission, pursuant to section 24(5) of the *Nuclear Safety and Control Act*, should require the licence applicant to provide a financial guarantee in an acceptable form.
32. The Commission should require that CNL and AECL prepare and publicly release a plan that accurately and completely reflects intended decommissioning activities, and their estimated cost, for the CRL site; and that First Nations be consulted on this plan, along with local non-indigenous communities, with the intent that the plan will be approved by the Government of Canada.
33. The Commission should consider carefully the risks of removing regulatory controls from a site where it is proposed to test experimental reactor designs.
34. The Commission should ask CNL what consideration has been given to date to managing wastes from its proposed small modular reactor demonstration facility.

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## Appendix A: Notes on CSA Standards

### *N288-7 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills*

Does not address remediation of the sources of groundwater contamination (e.g., plumes from leaking waste management areas), as per Criterion 10.1(6) “The licensee shall continue to monitor, mitigate and remediate the lands that have been contaminated by radioactive or hazardous substances.” The Standard states explicitly that “This Standard does not provide guidance on risk management or remediation,” adding that “This Standard provides guidance to identify situations where risk management and remediation might be needed to protect identified receptors, but does not provide further advice on selecting or implementing risk management or remediation options.”

Does address both radioactive and non-radioactive groundwater contaminants and generally has comprehensive guidance for groundwater monitoring programs.

Lacks the text “The application of this Standard... is mandatory when referenced as a requirement in a CNSC licence or via another regulatory requirement.”

### **N288-4 Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills**

Contains no reference to liquid releases as per Criterion 10.3(5) “The licensee shall not make any controlled radioactive liquid releases to the ground on the CRL site.”

Contains no reference to “release path” as per Criterion 10.2(1)(a) “The licensee shall only discharge radioactive substances to the environment by means of the release paths identified in Appendix I to the CRL Handbook and such other release paths as the Commission or a person authorized by the Commission may approve in writing.”

Contains no reference to “minimizing” releases as per Criterion 10.2(1)(c) “The licensee shall use the best practicable means to minimize the activity of gaseous and liquid radioactive substances that are released to the environment.”

Lacks the text “The application of this Standard... is mandatory when referenced as a requirement in a CNSC licence or via another regulatory requirement.”

### **N292.3 Management of low- and intermediate-level radioactive waste**

Contains no reference to maintaining a “waste management framework document identifying the characteristics of all radioactive and hazardous wastes that are produced in the course of the current licensed activities or accepted from outside clients” as per Criterion 12.1(2).

Explicitly excludes issues related to radioactive waste disposal as per Criterion 12.1(3): The licensee shall not produce, in the course of the licensed activities, or accept from outside clients, waste for which there is no identified and approved treatment, or storage, or disposal facility.

Contains no reference to control or containment of wastes as per Criterion 12.1(6)(a) “The licensee shall ensure, to the extent reasonably practicable, that radioactive waste produced is accumulated in a controlled and contained manner such that it cannot escape from such control or containment.”

Contains no reference to leak or escape as per Criterion 12.1(6)(b) “The licensee shall ensure, to the extent reasonably practicable, that no leak or escape of radioactive nuclear substances or radioactive wastes can occur without being detected.”

Contains no reference to minimizing waste as per Criterion 12.1(5)(a): “The licensee shall ensure that the production, in terms of both rate and volume, of radioactive waste is minimized.”

Contains no reference to adequate waste record-keeping as per Criterion 12.1(5)(b): “The licensee shall maintain adequate records of inventory and throughput of radioactive wastes produced...”

Lacks the text “The application of this Standard... is mandatory when referenced as a requirement in a CNSC licence or via another regulatory requirement.”

#### N294 Decommissioning

Contains the text “The application of this Standard... is mandatory when referenced as a requirement in a CNSC licence or via another regulatory requirement.”

Refers to IAEA-TECDOC-1476 (2005) Financial Aspects of Decommissioning in the following way: “The approach specified in IAEA-TECDOC-1476 may be used as a guideline for developing a framework [sic] for a site-specific decommissioning cost estimate.” This IAEA document is not referenced in either the current or proposed new Handbook, although both do refer to CSA standard N294.

Contains no requirements for keeping records on types and amounts of waste generated during decommissioning, or the location where decommissioning wastes are stored or disposed of, as per Criterion 4.4(11) “The licensee shall keep, and retain for 10 years after the date of CNSC staff’s acceptance of the end-state report, a record of

(a) the progress achieved in meeting the schedule for the decommissioning;

(b) the implementation and results of the decommissioning;

(c) the manner in which and the location at which any nuclear or hazardous waste is managed, stored, disposed of or transferred; and

(d) the name and quantity of any radioactive nuclear substances, hazardous substances and radiation that remain at the nuclear facility after completion of the decommissioning.

#### N286 Management System

Contains much weaker “safety culture” provisions than the current CRL Handbook, e.g., compare

##### **Safety culture [Section 4.2 of CSA Standard N286]**

Management shall use the management system to understand and promote a safety culture by

(a) issuing a statement committing workers to adhere to the management system;

(b) defining and implementing practices that contribute to excellence in worker performance;

(c) providing the means by which the business supports workers in carrying out their tasks safely and successfully, by taking into account the interactions between individuals, technology, and the organization; and

(d) monitoring to understand and improve the culture.

**Safety policy and Safety culture [Criteria 2.1(8) to 2.1(11) of current CRL Handbook]**

Criterion 2.1(8): The safety policy shall include a commitment to excellent performance in all activities important to safety, the establishment and perpetuation of a strong safety culture, and control and verification of activities important to safety.

Criterion 2.1(9): The safety policy shall declare the licensee's objectives and the public commitment of licensee management to nuclear safety.

Criterion 2.1(10): The safety policy shall

- (a) be clear about giving safety an overriding priority in all licensed activities;
- (b) include a commitment to continuously develop safety;
- (c) require directives for implementing the policy and monitoring safety performance;
- (d) require safety objectives and targets, clearly formulated in such a way that they can be easily monitored and followed up by the licensee's management;
- (e) require that an acceptable level of safety culture be achieved;
- (f) require clear accountability in safety matters;
- (g) require an independent internal management unit with responsibility for the ongoing proactive oversight and surveillance of nuclear safety activities and compliance with regulatory requirements;
- (h) require that adequate resources are devoted to safety;
- (i) require regular review of practices that contribute to facility safety;
- (j) be communicated to all CRL personnel with tasks important to safety, in such a way that the policy is understood and applied; and
- (k) be communicated to contractors, in such a way that licensee expectations are understood and applied in the contractors' activities.

Criterion 2.1(11): The licensee shall use the management system to promote and support a healthy safety culture by:

- (a) ensuring a common understanding of the key aspects of safety culture within the organization;
- (b) providing the means by which the organization supports individuals and teams in carrying out their tasks safely and successfully, taking into account the interaction between individuals, technology and the organization;
- (c) reinforcing a learning and questioning attitude at all levels of the organization; and
- (d) providing the means by which the organization continually seeks to develop and improve its safety culture.