



CRL 2028 Licence Renewal Application - Supplemental Information

CRL-508760-REPT-012604

Revision 0

Authored by:	Nicholas Walters	2026/06/26
	Regulatory Specialist	Date
	Christine Gallagher	2026/06/26
	Manager, Regulatory Affairs	Date
	Katie Shorter	2026/06/26
	Manager, ERM Licensing Support	Date
Reviewed by:	Sarah Brewer	2026/06/26
	Senior Director, Compliance	Date
	Barbara Scott	2026/06/23
	Section Head, Regulatory Affai	Date
Approved by:	John Osborne	2026/06/29
	Chief Nuclear Officer	Date

This page is for Content Controls that apply to this document. If no Content Controls apply,
none will be listed.

Revision History

Rev. No.	Date	Details of Rev.	Authored By	Reviewed By	Approved By
0	2025/06/30	Issued for Approval.	N. Walters C. Gallagher K. Shorter	S. Brewer B. Scott	J. Osborne
D2	2026/04/15	Issued for “Review and Comment”.	N. Walters C. Gallagher K. Shorter	K. Leroux P. Kompass M. MacKay R. Dufour P. Elder D. Woods M. Chapman	
D1	2026/03/27	Issued for “Review and Comment”.	N. Walters C. Gallagher K. Shorter	K. Leroux K. Schruder J. Unrau D. Waldman M. Thompson R. Chennette	

Table of Contents

Section	Page
1. Land Acknowledgement	7
2. Introduction	7
2.1 Purpose and Scope.....	7
2.2 CNL Ownership.....	8
2.3 CNL Mission.....	8
2.4 Overview of Chalk River Laboratories.....	8
2.4.1 Capabilities at Chalk River Laboratories	9
2.5 Public Information and Disclosure Program	14
2.6 Indigenous Engagement	15
2.7 Sustainability	17
3. Delivering CNL's Missions at Chalk River Laboratories.....	19
3.1 Safety, Professionalism and Operational Excellence.....	19
3.2 Compliance Assurance	19
3.3 Changes at Chalk River Laboratories Since Last Licence Renewal.....	20
3.3.1 Changes to Existing Facilities	20
3.3.2 Facilities in Construction.....	22
3.3.3 Facilities Undergoing Decommissioning.....	22
3.3.4 Environmental Remediation	23
3.3.5 Repatriation Activities.....	23
3.3.6 Integrated Waste Strategy.....	24
3.3.7 Infrastructure Modernization at Chalk River Laboratories.....	25
3.4 Plans for the Next Licence Period	26
3.4.1 Decommissioning and Waste Management Plans	26
3.4.2 Science and Technology Plans	27
3.4.3 Infrastructure Plans	28
3.4.4 Safety and Control Area Plans	29
4. Safety and Control Areas	30

4.1	Management System	30
4.1.1	General Considerations.....	30
4.1.2	Management System	30
4.1.3	Organization.....	31
4.1.4	Performance assessment, improvement and management review	32
4.1.5	Operating Experience	33
4.1.6	Change Management.....	33
4.1.7	Safety Culture.....	34
4.1.8	Configuration Management.....	35
4.1.9	Records Management.....	35
4.1.10	Business Continuity.....	36
4.2	Human Performance Management	37
4.2.1	General Considerations.....	37
4.2.2	Human Performance Program	37
4.2.3	Personnel Training	38
4.2.4	Work Organization and Job Design.....	39
4.2.5	Fitness for Duty	39
4.3	Operating Performance	41
4.3.1	General Considerations.....	41
4.3.2	Conduct of Licensed Activity.....	41
4.3.3	Procedures	41
4.3.4	Operating Limits and Conditions	42
4.4	Safety Analysis	43
4.4.1	General Considerations.....	43
4.4.2	Criticality Safety	43
4.5	Physical Design.....	44
4.5.1	General Considerations.....	44
4.5.2	Design Governance	44
4.5.3	Site Characterization.....	44
4.5.4	Facility Design	45
4.5.5	System and Component Design.....	45

4.5.6	Waste Treatment and Control	45
4.5.7	Control Facilities	45
4.5.8	Structure Design.....	45
4.6	Fitness for Service	46
4.6.1	General Considerations.....	46
4.6.2	Maintenance Program	46
4.6.3	Aging Management Program.....	46
4.6.4	Periodic Inspection and Testing Programs	47
4.7	Radiation Protection	48
4.7.1	General Considerations.....	48
4.8	Conventional Health and Safety	50
4.8.1	General Considerations.....	50
4.9	Environmental Protection.....	51
4.9.1	General Considerations.....	51
4.9.2	Effluent and Emissions Control	51
4.9.3	Environmental Management System	52
4.9.4	Assessment and Monitoring	52
4.9.5	Protection of People	53
4.9.6	Environmental Risk Assessment	53
4.10	Emergency Management and Fire Protection.....	54
4.10.1	Emergency Management.....	54
4.10.2	Fire Emergency Preparedness and Response.....	55
4.11	Waste Management	56
4.11.1	General Considerations.....	56
4.11.2	Waste Characterization	58
4.11.3	Waste Minimization.....	58
4.11.4	Waste Management Practices	58
4.11.5	Decommissioning Plans	59
4.12	Security	61
4.12.1	General Considerations.....	61
4.12.2	Response Arrangements.....	61

4.12.3	Security Practices	61
4.12.4	Security Training and Qualification.....	62
4.12.5	Cyber Security	62
4.13	Safeguards and Non-Proliferation	63
4.13.1	General Considerations.....	63
4.13.2	Nuclear Accountancy and Control	63
4.13.3	Access and Assistance to the IAEA.....	63
4.13.4	Operational and Design Information	63
4.13.5	Safeguards equipment, containment and surveillance	63
4.14	Packaging and Transport.....	64
4.14.1	Package Design and Maintenance	64
4.14.2	Registration for Use	64
4.15	Reporting.....	65
5.	Conclusion.....	66
6.	Acronyms	66
7.	References	68
Appendix A	Major Program Changes and Improvements Since 2018	73

Figures

Figure 1: CNL Executive Team and Corporate Authorities	31
--	----

1. Land Acknowledgement

The Chalk River Laboratories (CRL) site is located on the unceded and unsurrendered territory of the Algonquin Anishinaabe Nation. We recognize their historical and modern-day connection to this land, and as the keepers and defenders of the Ottawa River Watershed and its tributaries.

Canadian Nuclear Laboratories (CNL) operates on sites located on the traditional lands, waterways and ceded and unceded territories of Indigenous Peoples. CNL recognizes and affirms all First Nations, Métis communities and Inuit in this land we now know as Canada.

We acknowledge, respect and seek to better understand Indigenous history, rights and title on the lands where we work and develop projects. We honour and respect the importance of the relationship between Indigenous Peoples and their lands, waters and territories.

CNL is committed to advancing truth and reconciliation through meaningful actions and the continued inclusion of and participation by Indigenous Peoples in the planning and execution of CNL missions. We recognize that reconciliation will take time and resources, but CNL remains committed to working together with Indigenous Peoples to benefit future generations.

2. Introduction

2.1 Purpose and Scope

This supplementary report supports CNL's application [1] to renew the CRL Nuclear Research and Test Establishment Operating Licence [2] for a period of 24 years. It provides:

- A description of the capabilities at CRL that will be maintained into the next licence period.
- A summary of CNL's plans at CRL for the next licence period.
- A description of the facility changes that have occurred at the CRL site during the current licence period.
- An overview of the infrastructure modernization activities that have been conducted at the CRL site during the current licence period.
- An overview of CNL programs that implement applicable requirements under the CNSC's 14 Safety and Control Areas (SCA), in alignment with [REGDOC-1.2.2, Licence Application Guide: Class IB Processing Facilities](#) [3].
- A summary of the program changes and improvements achieved during the current CRL licence period (Appendix A).

The supplementary report is intended to complement the main licence renewal submission by offering a clear, structured account of how CRL continues to meet regulatory expectations and uphold its obligations for safe, secure, and environmentally responsible operation.

2.2 CNL Ownership

Canadian Nuclear Laboratories operates CRL and other federal nuclear sites under the Government-Owned, Contractor-Operated (GoCo) model. In this arrangement, Atomic Energy of Canada Limited (AECL) owns the sites, facilities, and associated liabilities on behalf of the Government of Canada, while CNL is responsible for their day-to-day management, safe operation, and regulatory compliance. CNL is a privately held Canadian corporation whose shares are owned by Nuclear Laboratory Partners of Canada (NLPC). CNL remains the enduring entity that operates CRL and holds the site licence.

2.3 CNL Mission

CNL's purpose is to advance nuclear science and technology for a clean and secure world.

"We will restore and protect Canada's environment by reducing and effectively managing nuclear liabilities. We will provide the world with sustainable energy solutions including the extension of reactor operating lifetimes, hydrogen energy technologies, and fuel development for the reactor designs of tomorrow. Together, with partners, we will demonstrate the commercial viability of advanced reactor designs including Small Modular Reactor (SMR). We will work collaboratively with medical/educational institutions and pharmaceutical companies to pioneer new alpha therapies for cancer treatments that save countless lives. We will leverage all of our capabilities for commercial success in Canadian and international markets." (www.cnl.ca)

2.4 Overview of Chalk River Laboratories

Chalk River Laboratories is Canada's largest federal nuclear science and technology campus and the primary site through which CNL delivers its three core missions:

- Restoring and protecting the environment
- Advancing clean energy for today and tomorrow
- Contributing to the health of Canadians

CRL's science and technology (S&T) programs support the development and demonstration of next generation clean energy solutions, including small modular reactors, advanced reactor fuels, hydrogen production and safety technologies, and tritium science. These activities strengthen Canada's capacity to meet future low-carbon energy needs and contribute to global clean technology innovation. CRL also maintains significant capabilities in nuclear medicine research. Building on decades of Canadian leadership in isotope production, the CRL site supports radiopharmaceutical development, radiochemistry, and preclinical research – including initiatives related to Actinium-225 and targeted alpha therapies that hold significant promise for future cancer treatments.

In parallel, major environmental remediation and decommissioning activities are conducted at CRL on behalf of the Government of Canada. This includes addressing legacy environmental liabilities, decommissioning aging infrastructure, managing historic waste, and advancing long

term waste management solutions. These efforts support long term environmental protection, risk reduction, and responsible stewardship of the laboratory.

CRL also sustains significant capabilities in nuclear safety, security, and emergency response. This includes nuclear forensics, cyber security for critical infrastructure, emergency preparedness and response, and support for Canada's international non-proliferation and safeguards commitments.

Through the combined delivery of these mission areas, CRL provides enduring benefits to Canada by advancing clean energy, supporting public health innovation, reducing environmental and safety risks, strengthening national security, and enabling a highly specialized scientific and technical workforce within a modern federal research campus.

2.4.1 Capabilities at Chalk River Laboratories

CNL maintains a suite of Class I and Class II facilities and radioisotope laboratories at CRL that support a broad and unique range of science, technology, and waste management capabilities essential to Canada's nuclear industry, research, and innovation. These capabilities, detailed in the list below, include operation of research reactors, advanced irradiation services, fuel and material testing, isotope production, radiopharmaceutical development, and robust waste management solutions. CRL is committed to maintaining these capabilities into the next licence period through continued investment in people, relationships, infrastructure, modernization, and adherence to the highest standards of safety, security, and environmental stewardship.

Clean Energy

- **Advanced Reactor Materials Characterization**, including advanced reactor materials testing and characterization, components and systems decontamination, activity transport modelling, high-temperature corrosion and electrochemistry, in-reactor testing, in-core heat transport experiments, and thermal energy storage research.
- **Advanced Fuels & Reactor Physics**, including advanced fuel and target development, advanced fuel fabrication, characterization, performance evaluation and qualification support, fuel target dissolution and fuel rod processing, and experimental reactor physics with nuclear data generation and evaluation.
- **Thermal hydraulics & Safety Analysis**, including thermalhydraulic research and accident simulation in high-pressure and high-temperature loops, reactor and severe accident experiments and analysis, system and sub-channel thermalhydraulics, deterministic and probabilistic safety analysis, safety margin assessment, code development, verification, validation and quality assurance, multi-physics and multi-scale modelling, and best-estimate plus uncertainty and inverse uncertainty quantification.

- **Nuclear Safety Experiments**, including reactor and severe accident experimental programs, system thermalhydraulics, deterministic safety analysis and safety margin evaluation, code verification and validation, and advanced fuel cycle safety research.
- **Operation of Reactor Facilities**, including the safe operation and utilization of reactor facilities to support irradiation services, isotope production, materials testing, experimental programs, and reactor-based science and technology.
- **Fundamental Neutron Research**, including:
 - **Neutron and Reactor-Based Irradiation Programs**, including neutron irradiation for materials testing, capsule and static irradiations to study fuel channel and material properties, and gamma irradiation of materials and components for performance and durability studies.
 - **Neutron Scattering and Beamline Research**, including neutron scattering and neutron beamline studies supporting basic and applied research in materials science, chemistry, fuels, and nuclear technologies.
- **Class II accelerator operations**, including electron accelerator-based pulse radiolysis in liquid systems.
- **Computational Techniques**, including operations research and economics, big data analytics, machine learning, artificial intelligence, large language models, digital twins, and multi-physics, multi-scale modelling applications.
- **Hydrogen and Clean Fuels Technologies**, including hydrogen and syngas production via electrochemical and thermochemical processes, hydrogen storage systems, hydrogen-materials interactions, electrolysis technologies, catalyst development and production, hydrogen safety and risk management, and systems and infrastructure assessment for clean fuels.
- **Deuterium and Heavy Water Technologies**, including heavy water production, deuterium process and economic modelling, heavy water upgrading, and detritiation.
- **Fusion-Related Research**, including research on tritium and deuterium handling in fusion systems, fusion blanket research, materials for fusion reactors and superconducting magnets. Supporting the Unity-2 fusion fuel cycle test system being built by the CNL Joint Venture company, Fusion Fuel Cycles Inc.
- **Tritium Technologies**, including tritium technology research and development for CANDU needs, tritium handling, dispensing, calibration gas supply, separation and concentration, tritium betavoltaics development, breeding and supply enhancement, extraction from non-aqueous media, and detritiation.

- **Nuclear Fuel Fabrication Welding & Joining**, including welding, brazing and joining, machining, nuclear material management and storage, element assembly testing, metallurgical examination, fresh and mixed-oxide fuel fabrication, corrosion, hydriding, fatigue and fracture testing, delayed hydride cracking studies, irradiation surveillance, and fuel performance testing and analysis.
- **Radiation Chemistry and Radiolysis**, including radiation chemistry, gamma irradiation, tracer-based studies of fission products, and containment and reactor chemistry investigations.

Health

- **Isotope Production and Processing**, including isotope production, radioisotope process development and optimization, target irradiation and processing, radiochemistry, and support to medical, industrial, and research isotope supply chains.
- **Radiobiology and Radiation Effects**, including radiobiology research using low-dose, in vivo, ex vivo, organoid and cell systems; gamma irradiation for biological specimens; internal dosimetry; bioassay; tritium studies; toxicity testing using radioisotopes; and health risk modelling.
- **Pre-Clinical Radiopharmaceutical R&D services**, including Good Laboratory Practice-recognized pre-clinical radiopharmaceutical studies, in vitro and in vivo testing, biological effects evaluation, and translational support for radiopharmaceutical development.

Environment

- **Comprehensive radioactive waste management** activities across Low Level Waste (LLW)/Intermediate Level Waste (ILW)/High Level Waste (HLW) and mixed waste.
 - Processing, packaging, transportation, storage and disposal of waste.
 - Legacy waste retrieval, characterization, processing, and repackaging in preparation for modern storage and final disposal.
 - Liquid waste management, which includes conditioning and stabilization.
 - Waste transportation management, including maintenance and operation of packages (on-site flasks and off-site packages/casks).
 - Consolidation of radioactive waste from other CNL sites as well as receipt of non-CNL waste from third-party generators.

- **Decommissioning facilities**, including post-operational clean out, characterization, hazard reduction, system removal, structure demolition, and waste management activities.
- **Environmental remediation**, including characterization, implementation of cleanup technologies/approaches, waste management, as well as:
 - Environmental site assessment and contamination characterization
 - Human and environmental risk assessment for planned land use
 - Evaluation and selection of remediation and risk-management options
 - Remedial action planning and implementation readiness
 - Execution of remediation and risk-management measures
 - Project close-out and confirmation of remediation objective
- **Environmental Monitoring**, including monitoring and analysis of radiological and chemical contaminants in groundwater, surface water, effluents, soils, sediments, air-related samples, and biological media, supported by laboratory and field-based capabilities.
- **Groundwater Treatment and Environmental Remediation**, including groundwater treatment technologies, contaminant mitigation, waste stabilization, and environmental risk reduction.
- **Waste Management Technology Development**, including research and innovation related to testing and deploying enhanced technologies for the lifecycle management of radioactive waste.

Safety & Security

- **Nuclear Forensics and Detection Technologies**, including nuclear and contaminated evidence forensics, forensic material characterization, signature development, field sampling and analysis, reference material development, and operational forensic support.
- **Radiation Detection and Dosimetry**, including neutron generator-based interaction studies, detector development, sensor testing and evaluation, biodosimetry, retrospective dose reconstruction, and dosimeter development and calibration.

- **Crisis Response and Emergency Preparedness**, including technical support for radiological and nuclear emergency response, modelling, analysis, recovery, and consequence management.
- **Cyber Resiliency for Critical Infrastructure**, including cyber resiliency assessment and enhancement for nuclear and other critical infrastructure systems.

Cross-Cutting

- **Post-Irradiation Examination**, including post-irradiation examination of fuel bundles, reactor core components, and material specimens; irradiated fuel receiving and storage; non-destructive and destructive examinations; gamma scanning; isotopic analysis; mechanical testing; surface science; metallography; and microstructural characterization.
- **Remote Handling and Shielded Operations**, including remote handling and direct or remote observation of radioactive materials in shielded environments using hot cells, remote tooling, robotic systems, and advanced visualization and manipulation technologies.
- **Irradiated Materials and Components Characterization and Testing**, including receiving and wet or dry storage, component and specimen machining, pressure tube burst testing, mechanical, thermal, corrosion, oxidation, hydriding and high-temperature testing, meso- and micro-mechanical testing, and advanced materials characterization.
- **Surface, Microstructural, and Materials Characterization**, including surface imaging, elemental and isotopic analysis, depth profiling, analytical electron microscopy, and advanced microstructural analysis.
- **Non-Destructive Examination Technologies**, including radiography, x-ray irradiation, radiation assay of structural materials, electromagnetic and ultrasonic inspection, optical and remote visual inspection, and concrete and underwater inspection capabilities.
- **Online Monitoring and Diagnostics**, including hydrogen effusion probes, structural health monitoring, remote visual inspection systems, and online monitoring of components and systems with fluids.
- **Electro-Mechanical Equipment, Tooling and Manufacturing**, including custom manufacturing equipment, nuclear component and tooling design and fabrication, additive manufacturing for prototyping and end-use components, and tooling for reactor operations, waste management, and decommissioning.

2.5 Public Information and Disclosure Program

CNL is committed to developing and maintaining positive relationships with the local communities where we work, the companies we do business with, as well as the public at large. CNL is committed to communicating in a timely manner and exchanging information with all stakeholders and rightsholders and recognizes the importance of listening and working with interested parties. CNL values the support of and engagement with those communities where we work, as this enables CNL to supply customers with the nuclear science and technology services they need, while contributing to a strong economy, a clean environment, and a healthy society.

This responsibility is guided and fulfilled through CNL's Public Information and Disclosure Program, which outlines public activities that occur at CNL with the objective of addressing the information needs of interested parties. The program has been prepared in accordance with the [REGDOC-3.2.1, Public Information and Disclosure](#) [4].

The Public Information Program outlines the ways in which the public receives communication from CNL, including the public disclosure protocol regarding events and developments involving facilities and activities. These specific elements include:

- Publication of documents describing the radiological and environmental impacts of CNL sites;
- Engagements with local communities, Indigenous Nations, and organizations to convey the specified information; and
- Publication of the results of CNL's monitoring programs on CNL's external website.

While CNL's Public Information Program is comprehensive, opportunities for improvement are continually considered. Public feedback is reviewed and addressed, and the program is modified when trends are identified. This includes the use of meeting evaluation and assessment forms, monitoring of inquiries for trends, ongoing reviews of the performance of communications products, public opinion polling, and the co-development of engagement plans. In all instances, accessibility to timely information on CNL and its operations is maintained.

Information about CRL activities is disseminated in a number of ways:

- CNL's corporate website: www.cnl.ca
- Community Information Bulletins
- Web postings and media releases
- CONTACT newsletter (Chalk River and Whiteshell editions)
- Kids CONTACT newsletters (mailed to Port Hope, Chalk River, and Whiteshell catchments)
- Community meetings and events

- Public engagement activities
- Topical webinars
- Social media (multiple platforms)
- Individual discussions by email, phone and in person
- Visits to the project sites and laboratories
- Paid advertisement in traditional and social media
- Speaking opportunities at conferences and trade events
- CNL posts the following environmental and performance reports to its corporate website:
 - Annual Compliance Monitoring Report summaries for all CNL sites are posted annually
 - Reports on site environmental performance are posted quarterly in the Performance Report section of the external website
 - Event Reports for all CNL sites are posted quarterly in the Event Reports section of the external website

For the CRL site, CNL specifically communicates with:

- Members of the general public
- Indigenous Nations, communities and organizations
- CRL-based staff and CNL employee unions
- Universities and academia
- Nuclear industry and supply chain
- Public interest groups and environmentally focused organizations and agencies (e.g., Concerned Citizens of Renfrew County, Ottawa Riverkeeper, Ducks Unlimited)
- Local government officials and related committees
- Members of the Environmental Stewardship Council
- Community Advisory Panel

2.6 Indigenous Engagement

In accordance with [REGDOC-3.2.2, Indigenous Engagement](#) [5], CNL engages with Indigenous Nations and communities who are rightsholders, or who have an interest in the sites CNL manages or operates. CNL values, recognizes, and enables the ongoing engagement and participation of Indigenous Nations, communities, and organizations on activities related to the general operation of the sites and projects, potential impacts of CNL activities on Aboriginal and/or treaty rights, and on environmental, economic, and employment matters.

For activities and operations at the CRL site, CNL has engaged with the following Indigenous Nations, organizations and governments:

- Algonquins of Pikwàkanagàn First Nation
- Kebaowek First Nation
- Kitigan Zibi Anishinabeg
- Métis Nation of Ontario
- Barriere Lake First Nation
- Timiskaming First Nation
- Wolf Lake First Nation
- Williams Treaties First Nations
 - Alderville First Nation
 - Beausoleil First Nation
 - Chippewas of Georgina Island First Nation
 - Chippewas of Rama First Nation
 - Curve Lake First Nation
 - Hiawatha First Nation
 - Mississaugas of Scugog Island First Nation
- Algonquin Anishinabeg Nation Tribal Council
- Algonquins of Ontario
- Anishinabek Nation
- Algonquin Nation Secretariat

CNL recognizes that the many Indigenous Nations, communities, and organizations with whom we engage have unique needs, resources, and interests. Communications reflect these unique needs and follow mutually agreed-to protocols for information sharing with each Indigenous Nation, community, and organization.

Information sharing with Indigenous Nations, communities, and organizations may include:

- Facilitating dialogue on areas of interest or concern through a variety of engagement forums.
- Sharing information in an accessible, community-relevant format.
- Engaging technical experts for two-way information-sharing.
- Providing various means for Indigenous Nations, communities, and organizations to access information.

CNL proactively provides information regarding business activities and environmental remediation management projects. Notification is accomplished through email, letters,

community engagements, information sharing at virtual meetings, and face-to-face meetings to ensure appropriate distribution of information in accordance with the recipient's desires.

Representatives of the Algonquins of Pikwàkanagàn First Nation, the Algonquins of Ontario, the Métis Nation of Ontario, and the Kitigan Zibi Anishinabeg First Nation are included in Chalk River Laboratories' Environmental Stewardship Council, either as members or observers. Additionally, a representative of the Algonquins of Pikwàkanagàn First Nation participates in CNL's Community Advisory Panel as an observer.

Notably, through initiatives such as the Algonquins of Pikwàkanagàn First Nation's community led environmental monitoring program, Neyagada Wàbandàngakì Guardian Program, launched in 2023, the Nation continues to strengthen its capacity to monitor, share information and steward its traditional territory. The program establishes a regular monitoring presence at CRL, among other environmental, cultural and economic protection and promotion activities and programs. Through on-site monitoring activities and ongoing information sharing, the Neyagada Wàbandàngakì Guardian Program and other Algonquins of Pikwàkanagàn First Nation initiatives enhance community understanding of the site and provide a structured mechanism for communicating findings, results, and project updates to Algonquins of Pikwàkanagàn First Nation members.

Engagement activities with Indigenous Nations, communities and organizations have occurred and will continue with respect to the application to renew the CRL licence. Activities to date have been meaningful, and CNL will provide further updates to CNSC staff and the Commission on these efforts as part of the licence application process.

2.7 Sustainability

Throughout the current site licensing period, CNL has advanced sustainability as a core component of safe, compliant, and responsible nuclear operations. Sustainability has evolved into a structured, enterprise level program aligned with the [Government of Canada's Greening Government Strategy](#) [6] and AECL's Environmental Social and Governance Strategy, supporting regulatory compliance, modernization, stakeholder engagement, and long-term stewardship.

Strategy and Reporting: Since 2021, CNL has published an annual [Sustainability Report](#) [7] outlining performance against sustainability goals and the integration of sustainable practices across AECL managed sites. In 2025, CNL issued its enterprise sustainability strategy to guide priorities and strengthen planning and reporting.

Integration: Sustainability considerations have increasingly been embedded into business planning, risk management, and operational decision making.

Environmental Stewardship: Environmental monitoring, waste management, and pollution prevention practices were enhanced to maintain compliance and reduce environmental

impacts. Improvements in waste diversion, recycling, and materials management reduced CNL's environmental footprint while ensuring robust controls for nuclear and hazardous materials.

Climate: CNL advanced its understanding and management of greenhouse gas emissions by improving data quality, aligning with the [Greenhouse Gas Protocol](#) [8], identifying energy efficiency opportunities, and developing guidance for integrating climate considerations into infrastructure.

Sustainable Procurement: Sustainable procurement practices were strengthened, including increased engagement with Indigenous owned companies, while maintaining safety, quality, and value for money requirements.

Social Responsibility: CNL continued to prioritize worker health and safety, well being, diversity, equity & inclusion, accessibility, and engagement, while maintaining strong relationships with local communities and Indigenous Nations, communities, and organizations.

Overall, CNL has moved from foundational sustainability program development to a more integrated, risk informed, and performance driven approach.

3. Delivering CNL's Missions at Chalk River Laboratories

3.1 Safety, Professionalism and Operational Excellence

CNL is taking important steps to strengthen the culture of safety, professionalism, and operational excellence across all of our sites. This initiative reflects our commitment to protecting workers, the public, and the environment, and ensuring our practices continue to meet the highest standards in the global nuclear industry.

To support this commitment, CNL is advancing a comprehensive program to enhance nuclear professionalism and safety culture. This work is guided by internationally recognized principles from organizations such as the Institute of Nuclear Power Operations (INPO) and is aligned with modern expectations for strong leadership, rigorous oversight, and continuous learning.

As part of this effort, CNL will:

- Establish clear organizational responsibility for nuclear professionalism and safety culture.
- Become a member of INPO to access world-class training, operating experience, and industry best practices.
- Strengthen engagement with Canadian and international nuclear organizations to share lessons learned and benchmark performance.
- Conduct safety culture assessments to identify strengths and opportunities for improvement.
- Reinforce key behaviours—such as consistent procedural compliance, conservative decision-making, and a strong questioning attitude—through leadership visibility, regular communication, and targeted training.

CNL's continuous improvement program will be leveraged to identify and confirm opportunities to reinforce expectations related to nuclear professionalism and safety culture.

These actions are designed to help CNL become a more effective learning organization and to support a sustained culture where safety and excellence guide every decision. Through continuous improvement and collaboration with our industry partners, CNL is working to ensure that our operations remain safe, reliable, and aligned with the expectations of our regulators and the Canadian public.

3.2 Compliance Assurance

Under the new GoCo management, a new Compliance organization has been created, with a Vice President reporting directly to the CNL President and Chief Executive Officer (CEO) (see Section 4.1.3). A mandate of this organization is to improve oversight to help ensure CNL is compliant with requirements. One of the key initiatives is the development of a Due Diligence Program. The scope of the Due Diligence Program includes requirements management,

performance or mission assurance, and training and qualifications. The new organizational design will provide focused oversight and ensure that:

- Regulatory requirements are identified, documented, and effectively implemented.
- Employees and supervisors are adequately trained and qualified for their specific role.
- Supervision continuously promotes compliant behaviours and takes effective action to correct non-compliant behaviour.
- Issues are effectively addressed and in a timely manner.
- Effective key performance indicators and actionable analysis are available and used to identify issues and trends to be addressed.
- A robust assessment process identifies issues and areas for improvement.
- As a learning organization, Lessons Learned and Operating Experience are assessed and implemented.
- Management critically assesses performance and takes effective action.

Part of this effort will involve improving management review of enterprise performance with respect to compliance and safety as well as improving the assessment process.

Collectively, these governance, oversight, and review mechanisms will strengthen the compliance framework and embed accountability, continuous improvement, and learning at all levels of the organization. This integrated approach positions CNL to proactively identify and address risks, sustain regulatory compliance, and continuously enhance safety and operational performance.

3.3 Changes at Chalk River Laboratories Since Last Licence Renewal

3.3.1 Changes to Existing Facilities

There have been numerous changes to the licensed facilities at CRL during the current licence period, as described below:

National Research Universal (NRU) Reactor Facility: Reactor operations ceased on 2018 March 31 which resulted in an immediate cessation of Argon-41 emissions. Fuel was removed from the reactor to the rod bays and this fuel has since been moved to the CRL waste management areas (WMA) for storage. All heavy water in the reactor vessel was removed, processed, packaged and shipped out of the facility. A total of 65 permanent safe shutdown state workplans have been completed in the NRU since the final shutdown of the reactor in 2018. NRU is still under an operating licence and supports on-going commercial work and waste characterization activities in their laboratory, although the LCH reflects NRU as a permanently shutdown facility.

NRU facility status documentation will be submitted to CNSC staff for evaluation and acceptance, to demonstrate that the NRU reactor and support systems have achieved a permanent safe shutdown state. This documentation will also demonstrate that the licence

condition requiring a certified Health Physicist is no longer required, as the conditions necessitating the appointment of a certified Health Physicist no longer exist.

Molybdenum-99 Production Facility: Molybdenum production was paused in 2016 and ceased in 2018. The facility remains in an operational state to complete the removal of target residue material. The majority of the target residue material was retrieved from the Fissile Solution Storage Tank (FISST) in 2020 through the Target Residue Material Repatriation (TRMR) Project. A project is currently underway to recover and solidify this remaining heel material for transfer to the WMA. Once the heel has been addressed, a decision will be made regarding the future use of the facility.

Nuclear Fuel Fabrication Facility (NFFF): Following shutdown of NRU, work in the NFFF ceased. One of the NFFF buildings has been turned over to decommissioning and will be demolished in 2026. The other has continued post-operational clean out activities with removal of legacy nuclear and non-nuclear materials. All fuel was removed from the facility, with only residual material remaining as process holdup. A decision on the facility's future use has not yet been made.

Tritium Facility: The Tritium Facility was modernized, and continues to support various S&T projects and commercial opportunities by providing tritium standards and tritium-related expertise.

Universal Cells and Fuels and Materials Cells: Changes in the Universal Cells and Fuels and Materials Cells has enabled the Actinium-225 initial sales project which is focused on proof of concept for the target fabrication and production processes.

Waste Management Areas: The WMA executed work in relation to the Fuel Packaging and storage project including the retrieval, drying, and storage of high-risk historic waste from tile holes. 22 additional concrete canisters were constructed in the WMAs to enable the movement of fuel waste from Gentilly-1 Waste Facility (G1WF) and Whiteshell Laboratories (WL). The full G1WF fuel inventory was transferred in 2024/25, and shipments from WL began in late 2025 and are expected to continue for several years. A former Modular Above Ground Storage facility in the WMAs has been repurposed as a Sort and Segregation Facility to enable the processing of historical waste packages and support improved waste characterization and disposition. The facility performs several key functions, including segregating mixed LLW and ILW, repackaging waste for long-term storage, conducting size-reduction activities to support safer handling and more efficient packaging, and removing hazardous items from the waste stream. Additionally, WMA C has been re-opened as an operational waste area and is being used for recoverable surface storage. In 2020, a new groundwater treatment facility became operational to address the Strontium-90 plume migrating from the northwest perimeter of WMA B. The previous treatment system captured and treated only approximately 30% of the plume, whereas the new system has been designed to intercept and treat the entire plume.

Waste Treatment Centre: Work continued on system installations and upgrades in support of the Stored Liquid Waste Retrieval Project. One legacy waste tank was emptied and processed through the WTC, and an additional tank containing approximately 40 m³ of liquid waste was emptied and shipped off site for processing.

Zero Energy Deuterium (ZED)-2 Reactor Facility: Work in ZED-2 consisted of routine maintenance activities, system upgrades, and the replacement of obsolete equipment.

Recycle Fuel Fabrication Laboratories: The laboratory installed two new negative pressure, inert atmosphere gloveboxes to support ongoing operational requirements.

Radioisotope Laboratories: The ongoing modernization of the CRL Radioisotope Laboratories has progressed significantly, with more than 50 laboratories renovated since 2018. Upgrades have included comprehensive decontamination, repainting of cabinetry, removal of legacy waste, and the installation of new countertops and seamless flooring.

3.3.2 Facilities in Construction

There are currently three facilities at the CRL site in the construction or planning phase.

The Near Surface Disposal Facility (NSDF) has completed several pre-construction activities, including installation of fencing and completion of additional baseline environmental surveys.

The Advanced Nuclear Materials Research Centre (ANMRC) is being constructed as a modern, purpose-built facility designed using graded, safety-led principles and compliant with current codes and standards. The ANMRC will provide modernized facilities for existing radioisotope laboratories and hot cells, enabling licensed activities currently performed at CRL to be conducted in a lower risk, more efficient environment. Construction is partially complete, and the facility is expected to enter operations in 2032.

The Modernized Combined Electrolysis and Catalytic Exchange facility is presently in the design phase. A [Notice of Intent](#) has been posted on the Impact Assessment Act registry in support of required regulatory processes.

The UNITY-2 Fusion Fuel Cycle Loop System will be a modification of the Tritium Facility. This system will occupy the space of the former CECEUD facility once that facility has been decommissioned. Construction is expected to begin in 2026.

3.3.3 Facilities Undergoing Decommissioning

Since 2018, Decommissioning & Waste Management has delivered one of the most extensive periods of hazard reduction and legacy liability elimination in Canada, safely demolishing more than 70 aging facilities during the current licence period. These 1940 and 1950-era structures—typically composed of concrete substructures with wood or steel superstructures and obsolete electrical and mechanical systems—contained asbestos-containing materials, contaminated process equipment, legacy radiological and chemical inventories, and aging infrastructure that posed environmental, safety, and fire-risk concerns. Through coordinated abatement, system removal, and demolition, these hazards have been permanently eliminated, substantially reducing fire load and long-term risk across both the Controlled and Supervised Areas.

In parallel with demolition progress, major ongoing decommissioning projects have advanced significantly. Within the National Research Experimental (NRX) Reactor, extensive interior removals – such as asbestos, electrical systems, ventilation components, and the service air tank – have reduced the facility’s hazard profile and fire load. Several buildings have reached

demolition ready status, following comprehensive removal of services, mechanical and electrical systems, ventilation systems, and contaminated concrete surfaces.

Similar progress has been achieved in the former Plutonium Recovery Laboratory and NRX Rod Handling Bays, where system removals, asbestos abatement, and cleanout activities have addressed hazards in old operational areas such as the fuel bays, fuel processing “igloo” rooms, and basement zones. The Chemical Engineering Building, one of the more complex decommissioning challenges, has seen major risk reductions through Tritium laboratory removal, hot cell decontamination, glovebox and fume hood dismantlement, perchlorate contaminated ducting removal, and tank and equipment extraction. Decommissioning of the Combined Electrolysis and Catalytic Exchange Upgrading and Detritiation Facility has also begun.

Collectively, this program of work has delivered large scale reductions in environmental risk, worker hazard, and operational liability, while making space available for site modernization and supporting regulatory expectations for the responsible management of legacy nuclear infrastructure. The progress achieved since 2018 helps position CRL to transition confidently into the next phases of site transformation, backed by a demonstrable record of safe, disciplined, and high impact decommissioning execution.

The status of all CRL buildings/facilities, including those that have been turned over to the Decommissioning and Demolition Program, is provided in the [Chalk River Laboratories Overview Decommissioning and Clean-up Plan](#) [9].

3.3.4 Environmental Remediation

Since 2018, the Environmental Remediation team has progressed the site assessment and remediation of various areas across CRL. Site assessment is an early step in the process and the focus recently has been on WMA A, the Liquid Dispersal Areas (LDAs), the Electrical Yard Landfill, Foundation Road Landfill, and the former LDA Pipeline Route. Remediation was completed at the sites of the decommissioned Deep Geological Boreholes in CRL’s outer areas, and these spots are being restored to their original, natural state. WMA E and Blimkie’s Meadow have completed the verification process, and Blimkie’s Meadow has been fully finalized, with all required work completed and final documentation underway. Ambient Radiation and Meteorological Monitoring System towers that were no longer needed have been decommissioned and their footprints remediated. These sites in the outer CRL area will be progressed through closeout as well. The majority of the LDA Pipeline was removed from its buried location. The land along the LDA Pipeline Route was assessed and most of it is in the closeout process. There are two impacted areas of the LDA Pipeline Route remaining that require risk assessment.

3.3.5 Repatriation Activities

CNL has executed multiple fuel repatriation campaigns during the current licence period, supporting the reduction of hazards from the CRL site. These projects have removed over 48 000 kg of nuclear material from the CRL site to the United States during the licensing period

resulting in a permanent reduction of approximately 50 000 TBq of radioactive liability. This included:

- The NRU/NRX Highly Enriched Uranium (HEU) Fuel Repatriation Project, which was completed in 2019 and shipped irradiated NRU/NRX fuel assemblies.
- The TRMR Project, which was completed in 2020 and shipped highly enriched uranyl nitrate liquid, a by-product of medical isotope production.
- The G-1 Booster Rod project, which was completed in 2022 and shipped G-1 Booster Rods, Mark VI and Mark VII Enriched Fast Neutron rods, and Molybdenum-99 targets.
- The Disposition of Unirradiated Nuclear Material Program is an ongoing project which is responsible for liability management of excess unirradiated nuclear materials. The project has shipped:
 - HEU scrap remaining from fuel fabrication at CRL
 - Natural and Depleted Uranium for recycling

Collectively, these projects represent a substantial decrease in the on-site inventory of nuclear materials and an overall reduction in the risk profile of the site.

3.3.6 Integrated Waste Strategy

In the 2018 licence renewal supplementary submission to CNSC staff [10], CNL described its plan to establish an integrated waste strategy for all CNL waste, to ensure that waste generated on site, or received from off-site generators (including other CNL sites) is dealt with safety and appropriately through consolidation at CRL. This commitment has been implemented through the development of CNL's [Integrated Waste Strategy](#) (IWS) [11] which provides a comprehensive lifecycle framework for managing all waste types across CNL operated sites, including CRL. The IWS [11] supports planning, decision making, and communication by documenting current waste management practices and articulating the strategic vision for future projects and activities. Since 2018, CNL has achieved significant progress in implementing key elements of the IWS. Notable advancements include the ongoing licensing process for the NSDF; consolidation of radioactive waste at CRL, such as through the G1WF and WL Fuel Transfer Projects and the transport of LLW and ILW from the WL site; recovery of legacy wastes within operational WMAs; and investments in new waste management infrastructure, including the Sort and Segregation Facility and the Waste Characterization Facility. CNL has also placed increased emphasis on waste minimization across major projects. The IWS is routinely updated to reflect evolving policy, strategic direction, and operational experience. The most recent major update (Revision 2.1) was publicly issued in fall 2023, following the release of [Canada's Policy for Radioactive Waste Management and Decommissioning](#) [12] and the Nuclear Waste Management Organization's (NWMO's) [Integrated Strategy for Radioactive Waste](#) [13].

3.3.7 Infrastructure Modernization at Chalk River Laboratories

Since 2018, CRL has undergone significant modernization efforts, transforming into a modern, sustainable, and high-performance science campus. This modernization combines new construction, major utility upgrades, and the systematic removal of legacy infrastructure to create a safer, more efficient, and more capable national laboratory.

The modernization program has delivered state of the art scientific facilities, as well as new sitewide services such as a sanitary sewage treatment facility and upgraded electrical distribution systems. Supporting this transformation were major investments in CRL campus infrastructure, utilities and digital modernization since 2018, including:

- **Construction of new non-nuclear buildings:**
 - **Science Collaboration Centre** serves as the central planning and collaboration space for CNL's S&T programs. It also houses critical Information Technology (IT) infrastructure to streamline communication and program delivery across CNL's national science and technology portfolio.
 - **Logistics Warehouse (Minwamon Building)** serves as the main processing site for visitors and also provides a consolidated home for shipping and receiving, Inventory/warehousing, security screening, and logistics operations. It allows for enhanced site-wide supply chain performance and supports modern material-handling processes.
 - **Support Facility** centralizes CNL's trades, maintenance, fabrication, and light-manufacturing functions into a single, purpose-built facility.
- **Execution of the Domestic Water Supply Program**, which established a new reliable domestic water supply by connecting CRL to the Town of Deep River's municipal water system.
- **Relocation of Critical IT Infrastructure**, including all servers, storage, telecommunications equipment, and cyber- security assets from a 1960s- era building into a purpose-built modern Data Centre facility.
- **Replacement of the Sewage Treatment Plant** with a modern Sanitary Sewage Treatment Plant that incorporates advanced systems, including centrifuge dewatering, resulting in cleaner effluent and more environmentally responsible operations.
- **Upgrades to Electrical Distribution**, including installation of two new 1,000 kW diesel-powered generators, a step-up transformer, and an automatic transfer switch for upgrading the Powerhouse, which supplies key CRL facilities with compressed air and steam.
- **Upgrades to Firewater Distribution**, including relining and/or replacing more than 4,000 ft of main firewater distribution piping.

- **Installation of New High Speed Fibre Optic Internet**, with installation of new underground duct structures along Plant Road to replace existing CNL and Bell Canada pole line overhead communication infrastructure. This infrastructure was further leveraged through partnership with Cogeco to provide CNL redundant internet connectivity to the CRL site and to construct additional underground duct structures along Mattawa Road, enabling Cogeco to deliver high-speed fibre optic internet to the Town of Deep River and communities further West.
- **Execution of a Natural Gas Conversion Project**, which upgraded multiple boilers, specifically within the CRL Powerhouse, to natural gas and transitioned remote facilities from propane. These changes have reduced greenhouse gas emissions and decreased on-site fuel storage requirements.
- **Modernization of CNL's Fleet of Vehicles and Equipment** through the implementation of centralized databases, automated maintenance and inspection reports, and advanced fuel tracking and remote fuel pump management.
- **Installation of a New Condensing Economizer and Stack** that captures clean boiler exhaust and uses it to re-heat boiler make-up water and returned condensate, significantly improving the efficiency of the Powerhouse by using heat that would otherwise be lost to the atmosphere.
- **Installation of a 3 MW-hr Battery Bank and Microgrid System**, which maximizes energy and cost savings for the site by lowering site electricity demand during periods when the provincial grid is under strain - often referred to as "peak savings." The microgrid works with CNL's building automation system to temporarily reduce or shut down select loads during these peak periods.

Together, these improvements reflect a coordinated effort to modernize CRL's capabilities, improve site safety and environmental performance, and build a flexible research environment that positions Canada's national nuclear lab to advance its work in clean energy, health sciences, and environmental stewardship.

3.4 Plans for the Next Licence Period

3.4.1 Decommissioning and Waste Management Plans

Over the next licence period, CNL will continue remediation of contaminated soils and legacy wastes within the WMAs, with large-scale cleanup dependent on the availability of the NSDF, which is required to receive the recovered low-level waste. CNL will also prepare for recovery and retrieval of legacy wastes from WMA B and other areas to address aging below-grade tile-hole structures that currently store fuel and legacy waste packages, including HEU-bearing cemented material and ILW. These waste streams will require conditioning and repackaging, supported by a series of modernized facilities, including characterization, processing and storage capabilities. Looking ahead over the coming decades, CNL will work in conjunction with the NWMO to enable the future off-site shipment and disposal of HLW to the used fuel Deep

Geological Repository, consistent with CNL's planned 2055–2065 shipping window. In parallel, CNL will participate in NWMO-led processes under the *Integrated Strategy for Radioactive Waste (2023)* [13] for the planning and development of a Deep Geological Repository for ILW, which represents the planned disposal pathway for all CNL ILW.

CNL will continue its long-term program to decommission obsolete and legacy buildings at the CRL site, building on the more than 120 structures already dismantled between 2015 and 2025. Looking ahead, CNL anticipates decommissioning over 100 additional buildings over the next several decades as part of its ongoing strategy to reduce environmental and safety risks while modernizing site infrastructure for future research needs.

Current planning for the NRU involves transitioning the NRU reactor and support systems to decommissioning, while the B150 Rod Storage Bays will remain operational, along with several radioisotope laboratories. NRU facility status documentation will be submitted to CNSC staff for evaluation and acceptance, to demonstrate that the NRU reactor and support systems have achieved a permanent safe shutdown state. This documentation will further demonstrate that the licence condition requiring a certified Health Physicist is no longer required, as the conditions necessitating the appointment of a certified Health Physicist no longer exist.

CNL will continue to plan and implement repatriation activities to return nuclear materials to their country of origin.

Radioactive wastes from other CNL sites will continue to be consolidated at CRL. CNL will also continue to receive radioactive wastes from small Canadian generators, including hospitals and universities.

3.4.2 Science and Technology Plans

During the next licence period, the ANMRC will transition from construction to operations. The ANMRC was determined to be part of the CRL licensing basis and, as such, will operate under the CRL site licence without the need for a separate licence to operate.

As a modern, state-of-the-art research facility, the ANMRC will serve as the backbone of CNL's research and development infrastructure. ANMRC capabilities will enable CNL to deliver key services that support the life extension and long-term reliability of Canada's existing reactor fleet and advance clean-energy innovation for decades to come.

As well, the suite of Class I and Class II nuclear facilities at CRL will be maintained and modernized as required to ensure continued safe, reliable, and regulatory-compliant operations in support of Canada's nuclear science and technology objectives. These facilities will continue to support research and development activities for the nuclear industry, including work related to advanced nuclear reactor concepts, isotope research and development, and clean energy.

CNL is also exploring the possibility of siting the following facilities:

- A Multipurpose Research Reactor

- A demonstration microreactor or SMR
- Clean energy demonstration projects
- A demonstration of fusion technology

As these plans for develop, CNL will continue to update the CNSC including determinations if activities are within the current licensing basis.

3.4.3 Infrastructure Plans

CNL will continue the phased renewal of critical CRL infrastructure to ensure safe, reliable operations while enabling the site's transition to a modern, low- carbon, electrified campus. These investments are foundational to supporting ongoing science, environmental remediation, and future mission growth while addressing aging assets that have reached or exceeded their service life.

CNL will replace the Class IV switchyard with a modern electrical supply system that significantly improves reliability and capacity. This upgrade is essential to support increased electrification across the site and enables the planned move away from fossil- fuel- based steam heating, consistent with long- term sustainability and carbon- reduction objectives. A key enabling project will establish new electrical distribution (power poles, lines, and associated transformers) from the new electrical distribution system to site buildings.

As modernized electrical infrastructure and replacement utility systems come online, heating at the CRL site will transition from steam produced at the Powerhouse to a centralized Low Temperature Hot Water heating distribution system from a new Energy Centre. Once the new Energy Centre is in operation, the existing Powerhouse will be transitioned to decommissioning to reduce greenhouse gas emissions and simplify utility operations across the site. Some buildings will transition to a stand-alone heating system if they are not feasible to connect to the new Low Temperature Hot Water system.

The current firewater infrastructure at CRL relies on pumps that draw Ottawa River water and distribute it through a dedicated underground network. The firewater pumps are situated in the Powerhouse facility and will be relocated to enable future decommissioning of the facility.

Supporting utilities are also being addressed through targeted Utility Distribution Projects. These initiatives focus on Class III power, compressed air, steam and condensate, storm water, and sanitary sewer systems using approaches such as pipe relining or full replacement.

The Building Renewal Program will continue to sustain the reliability of CRL's laboratories and buildings. This program includes replacement of end- of- life assets such as roofs, windows, Heating, Ventilation and Air Conditioning systems and components, electrical panels, and fire detection and protection systems. These upgrades are essential to maintaining safe operations, supporting modern research and remediation activities, and improving the overall facility condition of the campus.

Finally, there will continue to be upgrades, repairs, and improvements made to the roads and grounds on the CRL site, which may include new parking lots or roadways to support mission scope and support safe operations of the site.

Collectively, these infrastructure improvements form an integrated and sequenced program that underpins the safe operation and long-term evolution of the Chalk River site. They reduce reliance on aging systems, enhance resilience and emergency preparedness, and enable the transition to an electrified, low-carbon site.

3.4.4 Safety and Control Area Plans

As new regulatory documents are issued, CNL assesses their applicability to CRL in a systematic and timely manner. In response to CNSC staff requests, CNL prepares and submits gap analyses and, where applicable, associated implementation plans that describe how and when new or revised requirements will be implemented.

The implementation of applicable requirements is managed through established change management processes to ensure that changes are appropriately evaluated, documented, and integrated into the CRL licensing basis. This approach ensures continued compliance with CNSC requirements and the protection of workers, the public, and the environment.

4. Safety and Control Areas

This section provides an overview of CNL's policies, programs, procedures and other documents that describe the safety and control measures applicable at CRL.

4.1 Management System

4.1.1 General Considerations

CNL has a *Management System Manual* [14] that sets the framework of policies, processes, and practices used to ensure that CNL can fulfill its mission and achieve its objectives. The Manual describes the relevant statutory, regulatory, contractual, culture, and corporate frameworks within which CNL exists and operates. CNL's Management System is based on and complies with the requirements of CSA N286:12, *Management system requirements for nuclear facilities* [15], ISO 9001:2015, *Quality Management Systems - Requirements* [16], and ISO 14001:2015, *Environmental Management Systems — Requirements with guidance for use* [17], and all relevant legal and regulatory requirements.

4.1.2 Management System

The Management System Safety and Control Area (SCA) is implemented through the CNL Management System, Quality, Supply Chain, and Information Management Functional Support Areas (FSAs). The CNL Management System ensures that the following principles of CSA N286:12 [15] are applied and considered when executing all CNL work:

- Safety is the paramount consideration guiding decisions and actions.
- The business is defined, planned, and controlled.
- The organization is defined and understood.
- Resources are managed.
- Communication is effective.
- Information is managed.
- Work is managed.
- Problems are identified and resolved.
- Changes are controlled.
- Assessments are performed.
- Experience is sought, shared, and used.
- The Management System is continually improved.

The Management System applies to all work performed by CNL employees, contractors and sub-contractors, as well as third parties engaged through external partnerships, joint ventures, or collaborations that perform work for and/or on behalf of CNL. It verifies that they are trained and competent and have sufficient knowledge of the Management System in order to conduct

the specific work in accordance with applicable licensing and/or regulatory requirements and CNL's requirements as reflected in policies and procedures.

4.1.3 Organization

Responsibility for the management and operations of each element of CNL's organizational structure is assigned to executives and senior management reporting to the President & CEO. CNL's current organizational structure is depicted in Figure 1.

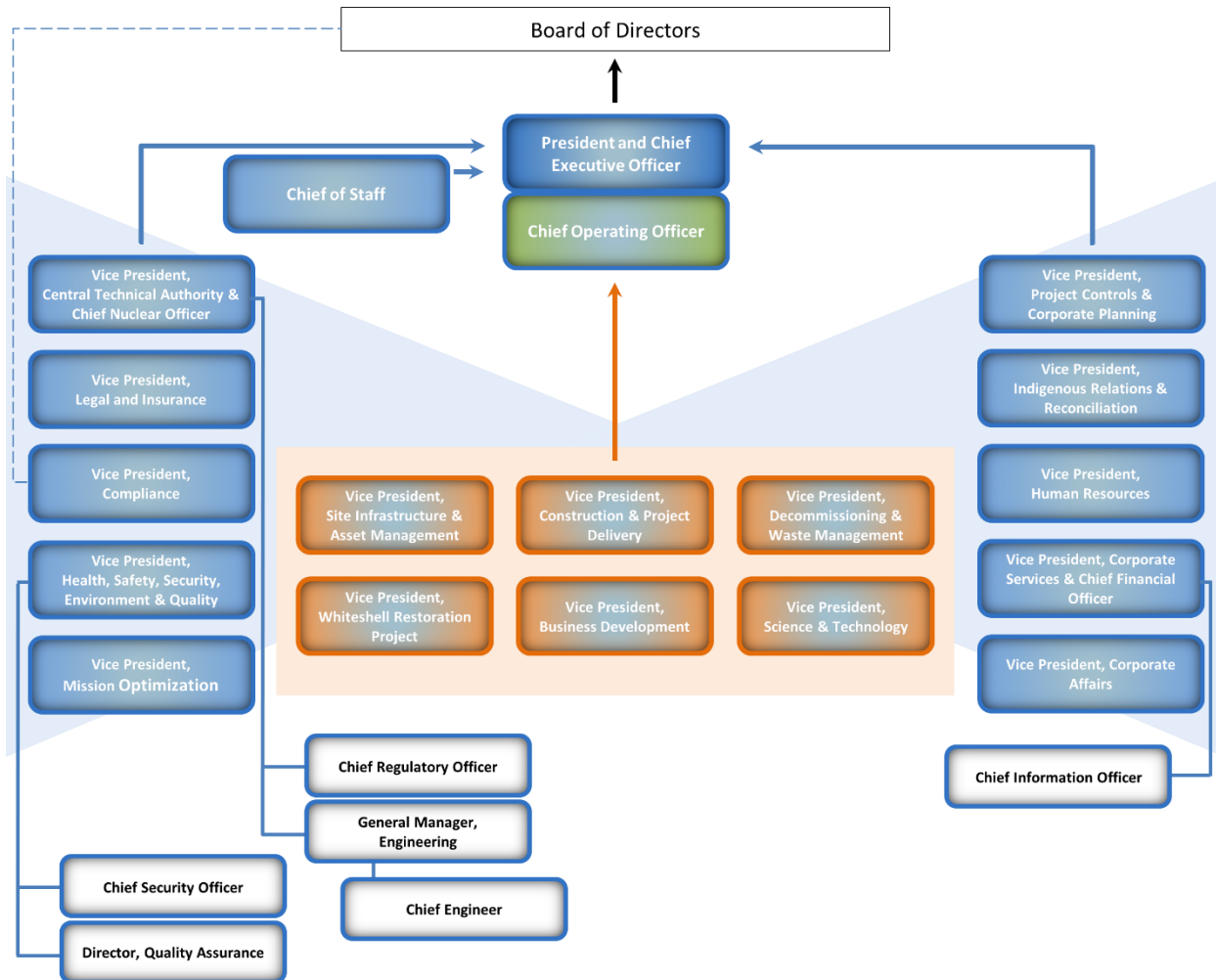


Figure 1: CNL Executive Team and Corporate Authorities

Site Licence Holders are designated Executives and/or Senior Management responsible for the management and control of CNSC-licensed activities at their respective CNL-managed site(s). Site Licence Holders are appointed by the President & CEO with the concurrence of the Chief Nuclear Officer and have the necessary functional authority to discharge responsibility for assuring the safe conduct and compliant operation of all licensed activities at their respective site(s), including, without limitation, the authority for operating or shutting down nuclear facilities and radioisotope laboratories, as the case may be.

CNL has an Authority Management process that ensures the appointment of personnel to Functional Authority roles is controlled and managed appropriately, and that personnel are selected based on consistently high standards and from the best-qualified candidates, that they receive the required training to perform effectively, and that their expected duties and responsibilities are well understood.

4.1.4 Performance assessment, improvement and management review

The Performance Assurance FSA supports CNL's ability to improve operational performance, enhance safety, and reduce the occurrence of unplanned events. The FSA provides an improvement framework to assist in decision-making while promoting organizational learning, innovation, and continual improvement.

The Performance Assurance FSA implements the following comprehensive programs which work collaboratively to establish a system that ensures worker safety and promotes continual improvement:

- **Problem identification and resolution** enables the timely reporting of issues, problems, opportunities for improvement, and events and is inclusive of investigation and corrective action processes. These processes enable CNL to implement measures and mitigations to prevent recurrence.
- **Measuring and monitoring processes** support the creation of leading indicators through the collection and trending of data and promotes continual improvement through the implementation of programmatic reviews and assessments to confirm compliance to requirements and assesses program health.
- **Continual improvement** combines measuring and monitoring data with knowledge gained from benchmarking and lessons learned to ensure CNL effectively and efficiently implements improvement changes.

CNL has a Management Review process that critically assesses the implementation of the Management System to ensure its continuing suitability, adequacy and effectiveness. The review enables assessment of outputs of various Management System assessment processes to ensure the Management System's continued evolution remains aligned with company goals and objectives and enables safe, effective and efficient conduct of work that ultimately achieves planned and desired results.

CNL has an Integrated Assessment Plan that provides a collection of the internal and external assessment activities of CNL's Management System processes that are planned to be carried out at or by CNL. This consolidated plan provides CNL with the following:

- A three-year rolling plan for all assessment activities carried out at CNL. Assessments include self-assessments, internal and external audits, inspections, benchmarking, and program reviews.
- Scheduled list of assessments, in order to consolidate and reduce redundant assessments performed on similar topics.

- Defined assessment cycle that engages the Line Organization and Functional Organization to ensure that they have the resources and the subject matter expertise available to assess the assigned topic.
- Planned validation of work practices to ensure systems and procedures are efficiently optimized.
- Co-ordinated effort between assessment types to ensure appropriate quantity of planned assessment coverage of each of the functional support areas.
- The ability to incorporate emergent assessments activities.

CNL monitors its own compliance by conducting structured self-assessments that include reviewing procedures and records, directly observing work, interviewing staff, and using standardized questionnaires to verify that processes meet regulatory, safety, contractual, and internal requirements. These assessments document evidence-based observations, identify performance gaps or non-compliances, and set corrective actions so issues are formally tracked and resolved. CNL also conducts program reviews to evaluate the overall effectiveness of programs and confirm they are being implemented as intended. CNL uses benchmarking as a performance monitoring and improvement tool, comparing its practices to those of external high-performing organizations to identify actions that close performance gaps, adopt industry best practices, and strengthen the implementation of regulatory requirements. In addition, internal quality audits independently evaluate the implementation and effectiveness of CNL's Management System processes, assess conformity to regulatory, statutory, and CNL-imposed requirements, and identify risks and opportunities. Together, these activities provide senior management with reliable, independent insights that support compliance assurance and continual improvement.

4.1.5 Operating Experience

CNL's Operating Experience process promotes the identification and dissemination of operating experience and lessons to be learned from internal and external industry events in order to improve safety and reliability, and business processes, while reducing time at risk and improving the overall performance of CNL. This process describes the mechanism for receiving, processing, screening, reviewing, evaluating and sharing internal and external operating experience across the CNL organization, as well as to the nuclear industry, while endorsing a learning organization culture.

4.1.6 Change Management

Change Management within CNL ensures that changes are controlled in a consistent and effective manner using an approach that safeguards workers from potential harm during the crucial period of transition. CNL's change management processes represent a core set of concepts, principles, organizational controls, methods, and skills, to provide an orderly, systematic approach to the planning, communicating, documenting, coordinating, scheduling, monitoring, and controlling of changes. CNL has numerous processes to control changes across the organization:

- Organizational changes involving resources and functions are controlled through the Organizational Change Control and the Functional Requirements and Framework Management processes.
- Physical changes to the facilities are controlled through CNL's Engineering Change Control process.
- Changes to facilities or operations, including deviation from design, operating conditions, policies, programs, and methods are assessed under CNL's Licensing Basis Assessment process, to determine whether the changes are permitted within the bounds of the existing licensing basis or whether a licence amendment is required. The licensing basis assessment is documented and made available to CNSC staff upon request. Where required, CNSC staff review the information submitted by CNL to independently determine if the proposed activity remains within the licensing basis.

4.1.7 Safety Culture

A healthy safety culture is an interpretation of how safety is integrated into everyday work and interactions. It is reinforced in how people, including leadership, work together to create a deeper understanding of the culture and its impacts on safety. Core values of safety, teamwork, accountability, integrity, respect and execution excellence form the basis for CNL's safety culture. Monitoring to understand safety culture forms the foundation for building systemic safety improvements over time. CNL has an assessment framework to monitor safety culture which sets out the basis for the systematic review of safety culture against a defined set of characteristics; guides the identification of cultural findings, development of improvement action plans, and assessing effectiveness of these actions; and defines activities involved in assessing the maturity of CNL's organizational safety culture. Collectively these aspects ensure CNL's compliance with [REGDOC-2.1.2, Safety Culture](#) [18].

In 2024, CNL assessed its safety culture through the Safety Perception, Climate, and Chemistry Survey. The results showed that overall safety perceptions remained stable. Several areas demonstrated improvement, while others were sustained, indicating that CNL's safety culture continues to move in a positive direction. These findings reflect the ongoing efforts of CNL's teams and committees dedicated to strengthening safety performance. CNL's Safety Excellence Team continues to lead major safety initiatives, grouped under five themes: Communication & Recognition, Operational Excellence, Psychological Health & Safety, Safe Production, and Safety Leadership.

Continual improvement to safety culture and nuclear professionalism will be driven through visible leadership presence, reinforcement of safety expectations, increased engagement with INPO and industry peers, consistent communication, and integration with CNL's Management System.

CNL is taking important steps to strengthen our culture of safety, professionalism, and operational excellence across all our sites which are outlined in Section 3.1.

4.1.8 Configuration Management

The Configuration Management FSA facilitates orderly management of system and facility information and changes to revise capability, improve performance, reliability or maintainability, extend life, reduce cost, risk and liability, or correct defects within approved safety margins and regulatory requirements.

The Configuration Management FSA ensures that changes are assessed, approved, designed, implemented, commissioned, and placed into service within the safety envelope at all CNL sites in accordance with the design requirements.

The FSA specifies requirements for the following:

- Control, monitoring, and management of design and operational activities required for the configuration control, change control, operation support, and documentation of all facilities, operations, and processes.
- Processes for specifying acceptable replacement parts when an identical replacement is not available.
- Processes for creating or maintaining documentation and plant information models required for controlling safe operating limits, design basis, and configuration.

4.1.9 Records Management

The Information Management FSA develops, implements, and monitors controls that apply to all information assets (IAs), including structured, unstructured, or transitory, and extends to all activities throughout CNL. The Information Management FSA follows the requirements of all major standards CNL is certified against, as well as the other standards that have been adopted as best practices.

The Information Management FSA establishes standards and procedures to facilitate the following:

- Establish ownership and stewardship of IAs.
- Oversee creation, capture, and use of information.
- Aligning data-related initiatives and activities with key business goals.
- Assign sensitivity designations (information protection labels) to IAs.
- Store and protect records to guarantee their accessibility and usability for the length of time required.
- Dispose of records with due diligence when their retention expires.
- Maintain governance of CNL's processes and documented procedures.

4.1.10 Business Continuity

The CNL Business Continuity Management Program subscribes to the Plan-Do-Check-Act model to address potential business disruptions of various scale and magnitude and ensure critical functions either continue or are resumed within an acceptable period of time.

The goal of Business Continuity Plans is to coordinate the recovery of critical business functions in the event of a disruption that interferes with the organization's ability to deliver essential business functions. Disruption durations can be short or long-term and precipitated by events such as fires, floods, earthquakes, pandemics, explosions, labour disputes, terrorism, bomb threat, cyber-attack, severe weather, extended power interruptions, hazardous chemical spills, theft, accident, mass casualty incident, sabotage, technology failures, other natural or man-made disasters and any event which results in a disruption to critical functions. Business continuity plans are created in a tiered fashion to accommodate a scalable response that is proportionate to the business impact(s) of the disruption. The tier 3 plans are the department/branch/facility level plans, tier 2 is the business unit level plans and tier 1 are the company-wide plans.

The plans are put together following rigorous analysis of the potential business impacts, the recovery objectives and staffing requirements to determine the appropriate response to the various scenarios. This includes the immediate response and the business resumption strategy.

4.2 Human Performance Management

The Human Performance Management SCA is implemented through the Performance Assurance, Health Centre, Human Resources (HR), and Training and Development FSAs. It establishes practical methods and techniques for anticipating, preventing, and catching active human errors, as well as identifying and mitigating latent errors attributable to organizational factors.

4.2.1 General Considerations

Selection of qualified personnel is carried out through the HR hiring process. Individuals assigned responsibilities are deemed competent based on their education, training, skills, and experience. Established training programs ensure that personnel receive the instruction necessary to perform their job functions.

Management identifies qualifications and training requirements to support safe operation of the site and to perform work under the CRL licence [2] and in accordance with the Management System. Management verifies training compliance to ensure that only individuals who have completed the required training are assigned specific tasks.

Training programs are regularly monitored and assessed, and personnel competency is reviewed through performance management to maintain effectiveness and skill levels. Records of training, qualifications, and experience are maintained.

The Performance Assurance FSA supports CNL's ability to improve operational performance, enhance safety, and reduce the occurrence of unplanned events. The FSA provides an improvement framework to assist in decision-making while promoting organizational learning, innovation, and continual improvement.

The Health Centre FSA facilitates a safe and healthy workplace for employees and supports employees to maintain, improve, and regain their health when needed.

The HR FSA upholds all HR requirements under federal legislation through the implementation of the CNL Employee Lifecycle processes covering the following phases: Attract and Recruit, Onboard, Empower, Develop and Recognize, and Transition. This includes a robust Fitness for Duty Program (Section 4.2.5).

The Training and Development FSA strengthens organizational capability by providing the programs, resources, and support that enable workers and leaders to develop the competencies required to perform their roles safely, effectively, and in alignment with business needs.

4.2.2 Human Performance Program

The Performance Assurance FSA supports the safety of employees and the public and protection of the environment. Comprehensive programs are in place establishing a system that ensures worker safety and promotes continual improvement as described in Section 3.1.4.

Human performance also provides workers with tools and skills to reduce errors and prevent/eliminate events.

The adequacy of qualified staffing is routinely monitored through established governance forums, such as Curriculum Review Committees (CRCs). These oversight bodies review training completion data, qualification status, upcoming expiries, and staffing risks on a quarterly basis. Through these discussions, emerging gaps in qualified personnel are identified early, and corrective actions or mitigation plans are developed to ensure that each facility and program area maintains the necessary number of competent and authorized workers. This structured, recurring oversight provides senior management with confidence that workforce capability is sustained and aligned with operational and regulatory requirements.

CNL has developed a gap analysis and an implementation plan for [REGDOC-2.2.1, Human Performance](#) [19].

4.2.3 Personnel Training

The Training and Development FSA maintains the training program's governing documents and oversees the implementation of a Systematic Approach to Training (SAT). Training and Development's SAT-based program satisfies the conditions outlined within the CRL Licence Conditions Handbook (LCH) [20] as well as the [Nuclear Safety and Control Act](#) (NSCA) [21], the regulations made under the NSCA, and any other applicable legislative and/or regulatory requirements.

CNL's SAT provides a standardized approach to training and qualification to ensure that personnel are trained, competent and qualified for the work they are assigned. CNL maintains a list of positions and roles that require a SAT-compliant training program. The positions and roles on this list are those that have been identified as performing activities where the consequence of improper performance could potentially pose a severe risk to nuclear safety, security, environment, or the health and safety of persons.

The SAT processes are applied to the development of training plans for positions that perform licensed activities. The CNL SAT is based on fundamental processes and sound practices that systematically assess the need for training, type of training, and the training content, as well as providing standards for the development, implementation, and evaluation of training. A graded approach, commensurate with risk, is used in the application of the SAT. A graded approach supports decisions related to the specific processes used and the rigour and level of detail required in the supporting Training and Development Program documents.

The CNL Training and Development FSA implements the requirements in [REGDOC-2.2.2, Personnel Training](#), Version 2 [22] and other CNL licensing basis documents and ensures compliance with these regulatory requirements at CNL. The main objectives of the Training and Development Program are as follows:

- Ensure human performance effectiveness through highly trained, competent employees;

- Maintain the company-wide training standards required to ensure a rigorous and compliant Training and Development Program;
- Provide training oversight, guidance, and resources to support all CNL missions;
- Evaluate all training plans to ensure quality and compliance with requirements; and
- Maintain a Learning Management System that ensures employee qualifications are recorded and accessible to CNL management.

Curriculum Review Committees (CRCs) are a key governance mechanism within the organization's SAT program, ensuring that training remains effective, current, and aligned with regulatory expectations. As part of the SAT maintenance and evaluation phases, CRCs conduct structured reviews of training content, learning objectives, trainee performance data, and operational feedback to confirm that each program continues to meet job requirements and safety-critical competencies. CRCs also assess and approve all Training Change Requests, evaluating the rationale, impacts, and alignment with SAT principles before updates are implemented. Through this systematic oversight, the committees ensure that changes driven by operational experience, procedural updates, new technology, or regulatory amendments are appropriately analyzed and integrated. This disciplined review process helps maintain the integrity of the SAT program and supports continuous improvement across all training portfolios.

Contractors that will be performing or supervising work on behalf of CNL must have their training requirements, certifications and qualifications reviewed to confirm they have the relevant capabilities, qualifications and experience applicable to the work activities defined in the scope, prior to commencement of work.

4.2.4 Work Organization and Job Design

CNL maintains a number of implementing documents across various programs and FSAs (e.g., fire, security, emergency preparedness, operations) that define minimum staffing for those programs or by operational task. These documents also identify the authorities who define minimum staffing levels and those who have responsibility for maintaining that minimum complement.

4.2.5 Fitness for Duty

CNL has a robust Fitness for Duty Program, which ensures that individuals who may present a safety hazard to themselves or others receive appropriate intervention to effectively manage impairment, psychological wellness, and fatigue. The Fitness for Duty Program applies to CNL employees, visitors to CNL sites, and to contractors who have not expressly assumed responsibility for Fitness for Duty under the applicable contract. Contractors who have expressly assumed responsibility for Fitness for Duty may follow their own program.

The Fitness for Duty Program includes compliance with [REGDOC-2.2.4, *Fitness for Duty, Volume II, Managing Alcohol and Drug Use*](#) [23] for safety-sensitive and safety-critical workers. The CNL safety-sensitive workers as defined by REGDOC-2.2.4, Volume II [23] include:

- | | |
|-----------------------------------|---|
| • NRU Certified Health Physicist | • Emergency Operations Centre Commander |
| • Nuclear Security Officer | |
| • Security Training Officer | • Firefighter |
| • Armourer | • Fire Training Officer |
| • Dedicated Control Room Operator | • Fire Prevention Officer |

The CNL safety-critical workers as defined by REGDOC-2.2.4, Volume II [23] include:

- | | |
|----------------------------------|---------------------------------|
| • Nuclear Response Force Officer | • Tiered Response Force Officer |
|----------------------------------|---------------------------------|

CNL's Fitness for Duty Program is consistent with the "defence-in-depth" concept that underpins and informs all effective nuclear safety programs. The Human Resources FSA provides interpretation of requirements, and the Fitness for Duty Program Administrator advises supervisors and management regarding fitness for duty concerns they may have observed in the workplace.

CNL adheres to [REGDOC-2.2.4, Fitness for Duty, Volume I: Managing Worker Fatigue](#) [24], by setting out clear expectations of hours of work and continual monitoring. CNL records all exceedances of hours of work for safety-sensitive positions as defined by REGDOC-2.2.4, Volume I [24], which include Nuclear Security Officers, Nuclear Response Force Officers, and Tiered Response Force Officers.

CNL adheres to [REGDOC-2.2.4, Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical and Psychological Fitness](#) [25] by ensuring the requirements of this regulatory document are implemented prior to CNL authorizing the person to act as a Nuclear Security Officer at all sites, including CRL.

4.3 Operating Performance

The Operating Performance SCA is implemented through CNL's Conduct of Operations, Construction, Commissioning, and Configuration Management FSAs, and meets the requirements of [REGDOC-2.3.1, *Conduct of Licensed Activities: Construction and Commissioning Programs*](#) [26].

4.3.1 General Considerations

All work activities at CRL are planned, controlled, and defined in approved plans, procedures, instructions, and drawings. Integrated Work Control (IWC) forms the basis for the control of all work performed at CRL and is used for work activities where hazards may be present or introduced. IWC ensures that the level of planning for work activities is commensurate with the risk associated with the work and uses a graded approach to define the work, identify and analyze hazards, develop and implement controls, perform work within controls, and provide feedback and continuous improvement. Through a team approach to job planning, the IWC process ensures that facility activities are carried out safely and efficiently.

Radiation doses to workers and the public, as well as any planned discharges or releases of radioactive or hazardous substances, are controlled through implementation of defined processes under the Radiation Protection and Environmental Protection FSAs.

Structures, systems, and components (SSC) at CRL are routinely inspected and maintained to ensure that they function according to design specifications and regulatory requirements. Refer to Section 4.6 for details.

4.3.2 Conduct of Licensed Activity

The Conduct of Operations FSA ensures that facility operations are managed, organized, and conducted in a manner that results in high levels of safety, performance, and reliability while maintaining compliance with the applicable acts, standards, codes, regulations, and regulatory requirements.

The CRL Site Licence Holder holds overall responsibility for the safe and compliant execution of licensed activities at the site. This responsibility is delegated to Facility Authorities and other personnel who oversee facility operations and enforce adherence to established procedures.

The handling, storage, and transport of nuclear and hazardous substances are controlled through implementation of defined processes under the Transportation of Dangerous Goods, Occupational Safety and Health, Waste Management, Nuclear Criticality Safety, Nuclear Materials and Safeguards Management, and Radiation Protection FSAs.

4.3.3 Procedures

The Conduct of Operations FSA maintains a suite of documents describing the processes and tools to control the development, verification, validation, and implementation procedures, including operating procedures and operating manuals, emergency operating procedures, and infrequently performed operating procedures.

Procedures created through the application of the Conduct of Operations process documents are reviewed and updated as necessary to ensure that they remain current, and appropriate resources are assigned to verify and validate the procedures as they are created or revised.

Procedures governing the decommissioning of facilities at CRL are maintained and updated by the Cleanup FSA, as described in Section 4.11.

4.3.4 Operating Limits and Conditions

The Operating Limits and Conditions for CRL facilities and radioisotope laboratories are described in the Facility Authorization, Operating Envelope documents and Radioisotope Laboratory Protocols. They include limits on operating parameters, requirements relating to minimum operable equipment and minimum staffing, and prescribed actions to be taken by operating personnel. Any exceedance of the operating limits and conditions is investigated to determine the cause, identify appropriate corrective actions, and assess any regulatory reporting requirements.

Operating Limits and Conditions for shutdown facilities or facilities undergoing decommissioning are detailed in Storage with Surveillance Plans and Detailed Decommissioning Plans, as described in Section 4.11.

4.4 Safety Analysis

The Safety Analysis SCA is implemented through CNL's Safety Analysis and Criticality Safety FSAs.

4.4.1 General Considerations

The Safety Analysis FSA is aligned with [REGDOC-2.4.4, *Safety Analysis for Class IB Nuclear Facilities*](#) [27] and [REGDOC-2.4.1, *Deterministic Safety Analysis*](#) [28], and governs all safety analysis activities at CRL by developing and controlling a suite of nuclear safety analysis documents required to support the execution of safety analysis. It ensures systematic evaluation of potential hazards and the effectiveness of preventive measures using deterministic and probabilistic methods, validated analytical tools, and a graded approach commensurate with risk. The program includes planning, hazard identification, and classification of events, execution of analyses, and verification against acceptance criteria.

Independent technical reviews of safety analyses and a robust quality assurance framework, compliant with CSA N286:12 [15] provide confidence in the accuracy and traceability of results.

Safety Analysis Reports (SARs) are maintained and updated for all licensed facilities, including those at CRL. CNL is currently updating SARs for Class IB facilities for compliance with REGDOC-2.4.4 [27].

4.4.2 Criticality Safety

CNL's Nuclear Criticality Safety FSA is aligned with [REGDOC-2.4.3, *Nuclear Criticality Safety*](#) [29] and establishes the framework for preventing accidental nuclear criticality and mitigating its consequences during operations with fissionable material at CRL.

Areas where fissionable material is handled at CRL are categorized as either Nuclear Criticality Controlled Areas (NCCAs) or Non-NCCAs, based on the criteria for categorizing operations with fissionable material in REGDOC-2.4.3 [29]. For each NCCA, a Criticality Safety Document is prepared which defines all limits, restrictions, and Criticality Safety Controls required to maintain subcriticality under normal and credible abnormal conditions. Criticality Safety Documents are prepared in adherence with a robust quality assurance framework and are independently reviewed, providing confidence in the accuracy and traceability of the results. CNL is currently updating Criticality Safety Documents for compliance with REGDOC-2.4.3 [29].

Regular and systematic oversight of operations with fissionable material is achieved through well-defined roles and responsibilities ranging from line management and supervision of the operations to the technical support personnel within the Nuclear Criticality Safety FSA.

4.5 Physical Design

4.5.1 General Considerations

The Physical Design SCA is implemented through CNL's Design Authority and Design Engineering FSA and Pressure Boundary FSA. These FSAs maintain and control the design basis of SSCs at CNL within approved safety margins and regulatory requirements to ensure the protection of workers and the environment, and meets the requirements of:

- [REGDOC-2.5.7, Design, Testing and Performance of Exposure Devices](#) [30]
- National Building Code of Canada, 2020 [31]
- National Fire Code of Canada, 2020 [32]
- CSA N286:12, *Management system requirements for nuclear facilities* [15]

4.5.2 Design Governance

The Design Authority and Design Engineering FSA has the responsibility to ensure the technical integrity of designs and design processes. This includes establishing requirements for planning, executing, verifying, and documenting design activities in compliance with applicable laws, codes, standards and regulatory requirements, among other things.

The CNL Design Authority (Chief Engineer) holds ultimate responsibility for design and engineering decisions across all CNL activities, facilities and practices, with delegated authorities assigned for specific engineering scopes.

Design engineering applies a graded approach based on the safety significance and nature of the design work to be performed, consistent with CSA N286:12 [15]. Design changes, whether permanent or temporary, are managed using an Engineering Change Control process and are controlled by the responsible Delegated Design Authority during all stages of design development and implementation, including changes to facility equipment, SSCs, processes, and controlled computer software.

4.5.3 Site Characterization

The *CRL Site Characteristics* document [33] serves as a comprehensive reference for the site-specific characteristics of the CRL site. It is used together with federal and provincial data sets (e.g., ECCC Canadian Climate Normals or Averages) to support safety-related documentation at CRL, including facility SARs, by providing detailed information on CRL geography, geology, hydrology, seismicity, and meteorological hazards (e.g., tornadoes). Other routine document submissions to CNSC (e.g., SARs and CRL's Environmental Risk Assessment) use up to date climate data and ensure CNL's assessments and work planning account appropriately for climate change.

4.5.4 Facility Design

The design of CRL's Class I and II nuclear facilities are described in the respective facility-specific SARs.

4.5.5 System and Component Design

The characteristic and major components of the systems applicable to the licensed activities are described in the facility-specific SARs.

CNL's Pressure Boundary FSA governs design, procurement, fabrication, installation, inspection, and maintenance of pressure retaining systems and components through documented processes and procedures. The design of pressure-retaining SSCs and their supports at CNL sites, including CRL, is based on CSA N285.0 requirements [34] and associated standards.

CNL maintains a formal agreement with an Authorized Inspection Agency (Technical Standards and Safety Authority) to provide independent oversight of pressure boundary activities at CRL. The program is supported by site-specific quality assurance plans, which detail controls for material traceability, welding, inspection, and compliance verification.

4.5.6 Waste Treatment and Control

CRL has dedicated facilities for the characterization, treatment, and control of wastes including the Waste Treatment Centre (WTC) and the Waste Management Areas (WMA).

The Waste Management FSA governs processes for waste characterization and minimization. Refer to Section 4.11 for more information.

4.5.7 Control Facilities

Any control rooms in the licensed facilities are identified in the respective facility-specific SARs or facility authorization documents.

4.5.8 Structure Design

Facility structures and designs are described in the respective facility-specific SARs.

4.6 Fitness for Service

4.6.1 General Considerations

The Fitness for Service SCA is implemented through CNL's Fitness for Service FSA, which encompasses the maintenance, system health, and aging management processes.

These processes work together in a systematic and integrated manner to ensure that equipment and services are available as per their design intent and are functioning within the operating limits and conditions.

4.6.2 Maintenance Program

CNL's Maintenance Program ensures that all SSCs remain fit for service and capable of performing their design functions through a structured approach defined by several interrelated procedures. The procedures:

- establish a graded approach for classifying SSCs based on criticality and failure consequences.
- ensure SSCs remain fit for service by detecting, precluding, or mitigating degradation through preventive maintenance including periodic maintenance, predictive maintenance, and planned maintenance.
- provide the systematic process for initiating, planning, scheduling, executing, and closing out maintenance work.
- govern continuous improvement by analyzing feedback from preventive and corrective maintenance activities, calibration results, and condition monitoring data to optimize maintenance strategies.

Together, these procedures address SSC monitoring, corrective maintenance, work planning and scheduling, work execution, post-maintenance verification and testing. This integrated framework ensures SSCs continue to meet design intent and regulatory requirements throughout their lifecycle.

A computerized maintenance management system is used to control the initiation, planning, scheduling, execution, and close-out of maintenance work at CRL and to maintain electronic records of maintenance history.

4.6.3 Aging Management Program

Aging Management at CRL is executed through CNL's Fitness for Service FSA and aligns with the requirements of [REGDOC-2.6.3, Aging Management](#) [35].

The SSCs screened and selected for the aging management program are those that are all of the following:

- Within Class I nuclear facilities
- Are systems important to safety

- Are categorized as maintenance Category 1

The performance, reliability, and condition metrics for systems important to safety in Class I nuclear facilities are documented in System Performance Monitoring Plans. System Health Reports are generated to identify the results from condition monitoring, the effectiveness of aging management strategies, and actions to improve effectiveness.

Aging Management Plans for buildings in decommissioning are captured in the Detailed Decommissioning Plans and Storage with Surveillance Plans.

Facility Authorities manage the implementation of aging management in their facilities and ensure that performance monitoring activities specified in the System Performance Monitoring Plans and System Health Reports are executed.

4.6.4 Periodic Inspection and Testing Programs

Periodic inspection and testing of SSCs important to safety is performed under the maintenance process, as described above. Pressure vessels, boilers, and pressure piping are inspected by the Technical Standards and Safety Authority as described in Section 4.5.5.

4.7 Radiation Protection

The Radiation Protection SCA is implemented through CNL's Radiation Protection FSA. This FSA implements and supports the radiation protection requirements stipulated in the [Radiation Protection Regulations](#) [36] and other applicable requirements.

4.7.1 General Considerations

The Radiation Protection Program includes five key process objectives that ensure CNL is meeting all regulatory requirements. For each objective a suite of program documents has been developed for implementation. The implementation of these processes is commensurate with the radiological hazards associated with CNL's licensed activities. These objectives are to:

1. Optimize the care and control of radioactive material and the radiation protection provided to CNL and non-CNL personnel entering licensed CNL sites, members of the public, and the environment during normal operations. Minimize the radiological consequence resulting from unplanned events or emergencies. Processes have been developed to include:
 - Prohibiting the consumption of food around radioactive nuclear substances;
 - Preventing contaminated clothing from leaving the workplace;
 - Setting performance criteria for ventilation systems;
 - Protecting workers using personal protective equipment and clothing; and
 - Implementing safety codes with respect to x-ray emitting devices.
2. Keep the dose received by and committed to persons as low as reasonably achievable (ALARA) given social and economic factors. This is accomplished through:
 - Management control over work practices;
 - Personnel qualification and training;
 - Control of occupational and public exposure to radiation; and
 - Planning for unusual situations.
3. Ascertain the quantity of radioactive material released from CNL control. This is a shared objective with the Environmental Protection SCA (refer to Section 4.9) and Waste Management SCA (refer to Section 4.11) and includes the following:
 - Monitoring air effluents and liquid emissions;
 - Monitoring of waste for off-site disposal;
 - Control of movements of non-waste equipment and materials;
 - Monitoring of non-human biota; and
 - Personnel contamination monitoring.

4. Ensure that worker and public exposure to ionizing radiation is managed. It includes the function of informing workers of the risks of ionizing radiation, so that the workers can manage their exposures to the best of their ability. Specifically, these processes include:
 - Ensuring regulatory dose limits are not exceeded;
 - Creating and reporting on action levels;
 - Notifying workers of the risks and responsibilities regarding nuclear radiation;
 - Posting of radiation warning signs at the boundaries of areas;
 - Labelling and signage of containers and devices;
 - Managing the exposure for pregnant and breastfeeding workers;
 - Ensuring radiation measuring devices are selected, tested, and calibrated correctly; and
 - Ascertaining, recording, reporting, and notification of worker doses through CRL Licensed Dosimetry service.
5. Ensure processes are in place to safely use radioactive nuclear substances which includes the following:
 - Ensuring safety when operating x-ray emitting and exposure devices;
 - Leak testing sealed sources and shielding;
 - Ensuring radiation survey meters are calibrated annually; and
 - Use and design requirements for Class II facilities prescribed equipment.

4.8 Conventional Health and Safety

The Conventional Health and Safety SCA is implemented through CNL's Occupational Safety and Health (OSH), Electrical Safety, and Health Centre FSAs. Together these FSAs implement and support the conventional health and safety requirements stipulated in the [Canada Labour Code](#) [37], [Canada Occupational Health and Safety Regulations](#) [38], and other applicable requirements in accordance with the *Safety and Health Policy* [39]. Other FSAs, including Human Resources, Training and Development, and Emergency Preparedness, implement a limited number of additional requirements under the [Canada Labour Code](#) [37] and the [Canada Occupational Health and Safety Regulations](#) [38].

4.8.1 General Considerations

The OSH FSA consists of teams and processes that work together to protect the health and safety of employees and others on site. Key groups include OSH Programs and Standards, which develops safety policies and procedures, and OSH Field Services, which support hazard identification, implementation of controls, and performance monitoring. The OSH FSA provides the rules and tools to (1) manage specific types of hazards, such as asbestos management and hazardous energy control (lock out/tag out), and (2) safety perform specific types of work, including work at heights and confined space entry. Contractors performing work at CNL's sites must either comply with CNL's OSH policies and procedures or their own OHS policies and procedures that have been assessed by CNL for equivalency.

CNL's Industrial Hygiene staff investigates, evaluates, and prescribes controls to protect personnel from exposure to hazardous substances at work, including chemical, physical and biological agents (e.g., asbestos, lead, organic vapour, dust).

The Electrical Safety FSA sets out procedures for safely working with and around electrical equipment, performs risk assessments such as Ark Flash Analyses, manages risks from electrical hazards, defines training requirements, and acts as the authority having jurisdiction for granting approvals for experimental equipment.

The Health Centre FSA facilitates a safe and healthy workplace for employees and supports employees to maintain, improve, and regain their health when needed. It leads initiatives to improve physical wellness and mental health and, in cases of injury, provides treatment and manages any accommodations and progressive return to work.

CRL has a Site Safety and Health Committee that serves as the primary forum for joint employee-management consultation on workplace health and safety concerns. Its mandate is to promote and continuously improve the health and safety of all CRL personnel and to develop practical solutions to identified issues. In addition, CNL has a Health and Safety Policy Committee, which is the principal forum for collaborative development of health and safety policies and programs across the organization.

4.9 Environmental Protection

The Environmental Protection SCA is implemented through CNL's Environmental Protection FSA. This FSA implements and supports the Environmental Protection requirements stipulated in the [Nuclear Safety and Control Act](#) [21], [Radiation Protection Regulations](#) [36], [Canadian Environmental Protection Act](#) [40] and other applicable laws and regulations.

4.9.1 General Considerations

The Environmental Protection FSA provides the processes and framework to implement CNL's *Environmental Policy* [41]. A graded approach to requirements is applied based upon environmental risks or events that could occur at any given location and considering the amount of control or influence that CNL has on the activity.

The Environmental Protection FSA at CRL is designed to implement the requirements of the following standards:

- [REGDOC-2.9.1, Environmental Principles, Assessments and Protection Measures](#) [42]
- CSA N288.4, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills* [43]
- CSA N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills* [44]
- CSA N288.6, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills* [45]
- CSA N288.7, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills* [46]
- CSA N288.8, *Establishing and implementing action levels for releases to the environment from nuclear facilities* [47]

The Environmental Protection FSA is continuously updated to meet new or updated requirements.

Where required, the assessment of activities proposed at CRL occurs pursuant to the [Impact Assessment Act](#) [48].

4.9.2 Effluent and Emissions Control

Controls on environmental releases are established to provide protection to the environment and to respect the principles of sustainable development and pollution prevention. The effluent and emissions preventive and control measures are established on the basis of best industry practice, incorporating the application of ALARA, process optimization, continuous improvement and the results of an Environmental Risk Assessment (ERA). In conjunction with specific regulatory monitoring requirements, the ERA provides the technical foundation and structure for identifying the need for, and details of, effluent and emissions monitoring. The effluent monitoring program is conducted in accordance with CSA N288.5, *Effluent monitoring*

programs at Class I nuclear facilities and uranium mines and mills [44], as required by the CRL licence [2].

Environmental action levels are developed in accordance with CSA N288.8, *Establishing and implementing action levels for releases to the environment from nuclear facilities* [47] as required by the CRL licence [2]. Dose constraints and reference release limits are specified in the LCH [20]. CRL is currently conducting a gap analysis and developing an implementation plan for [REGDOC-2.9.2, Controlling Releases to the Environment](#) [49].

4.9.3 Environmental Management System

An Environmental Management System (EMS) is a framework used for the protection of the environment. This framework is used to develop and implement an environmental policy and to manage those elements of an organization's activities, products, or services that can interact with the environment. The EMS provides an organization with a systematic method of achieving its environmental obligations and performance goals.

Under the CNL Management System, the EMS for CRL is registered to the ISO 14001:2015 standard for Environmental Management Systems [17].

4.9.4 Assessment and Monitoring

Environmental monitoring consists of a risk-informed set of integrated and documented activities to sample, measure, analyze, interpret and report one or all of:

- The concentration of nuclear and hazardous substances in environmental media to assess one or both of:
 - The exposure of receptors to those substances
 - The potential effects on human health, safety and the environment, including calculation of the dose to public
- The intensity of physical stressors and/or their potential effect on human health and the environment
- The physical, chemical and biological parameters of the environment normally considered in the design of the environmental monitoring necessary to support the interpretation of the results

The environmental monitoring program at CRL is conducted in accordance with CSA N288.4, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills* [43]. The environmental monitoring program encompasses three integrated components: (1) environmental monitoring, (2) effluent/emission verification monitoring, and (3) groundwater monitoring. Together, these three components provide data for the CRL site's contaminant pathways monitoring, enabling the monitoring of contaminant levels in abiotic and biotic compartments in the environment.

In addition, CNL maintains an extensive Biodiversity Monitoring Program to support regulatory compliance, environmental protection, and informed decision making. The program is aligned

with requirements under the [Species at Risk Act](#) (SARA) [50], [Migratory Birds Convention Act](#) (MBCA) [51], and the [Fisheries Act](#) [52], as well as applicable provincial guidance and industry best practices. Biodiversity monitoring includes targeted surveys to document species presence, distribution, and habitat conditions for terrestrial and aquatic valued ecosystem components, including species at risk, migratory birds, and fish and species habitat. Collected data are used to assess ecological trends, support impact assessments, guide mitigation measures, and meet regulatory reporting obligations.

4.9.5 Protection of People

CNL maintains a comprehensive environmental monitoring program to verify that radiation doses to members of the public as a result of radioactive releases from the CRL site remain ALARA, taking into account both social and economic factors. The program demonstrates that the radiation dose to the most exposed members of the public (i.e., representative persons) due to CRL operations does not exceed regulatory limits, and also serves to verify that non-radiological releases do not pose hazards to human health, and that neither radiological nor non-radiological releases pose hazards to the environment.

4.9.6 Environmental Risk Assessment

An ERA is a systematic process that identifies, quantifies, and characterizes the risk posed by contaminants (nuclear or hazardous substances) and physical stressors in the environment. It is a practice or methodology that provides science-based information to support decision-making and to prioritize the implementation of mitigation measures. An ERA is conducted in accordance with CSA N288.6, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills* [45], as required per the CRL licence [2]. A human health risk assessment is completed as a sub-element of an ERA for both nuclear and hazardous substances. CRL's ERA was updated and submitted to CNSC staff in 2025 January, with CNSC acceptance received in 2025 November. A copy of the ERA is available on the [CNL website](#).

4.10 Emergency Management and Fire Protection

The Emergency Management and Fire Protection SCA is implemented through CNL's Emergency Preparedness and Fire Protection FSAs.

4.10.1 Emergency Management

Under the Emergency Preparedness FSA, CNL has a comprehensive Emergency Preparedness Program for the prevention and mitigation of, preparedness for, response to, and recovery from abnormal and emergent events, including on-site and off-site emergencies. The Program meets the requirements of [REGDOC-2.10.1, Nuclear Emergency Preparedness and Response](#), Version 2 [53].

Emergency response procedures have been established at CRL to address various emergency situations. The *Chalk River Laboratories Site Emergency Response Plan* [54] describes the actions and associated responsibilities to ensure a timely and appropriate response to emergencies, including nuclear emergencies and conventional emergencies. Various other emergency procedures, including building emergency procedures, are maintained to outline response actions to be taken to minimize potential environmental, health and safety impacts. Depending on the nature and scale of an emergency, the appropriate emergency response procedure is activated and notifications provided to communities surrounding the site based on the requirement under the Provincial Nuclear Emergency Response Plan Implementing Plan for other radiological emergencies. The emergency response procedures are reviewed, updated, and tested in the form of drills and exercises in accordance with the CRL five-year drill and exercise plan. Emergency response procedures and plans identify the equipment required for response to abnormal events. The equipment readiness is routinely verified.

CRL has a primary and alternate Emergency Operations Centre (EOC) for centralized decision-making and communication for control and recovery from emergency events that originate at CRL, for off-site transportation accidents involving radioactive materials and support under the Federal Nuclear Emergency Plan (FNEP). Routine training is conducted to ensure adequate succession planning for all CRL EOC positions. CRL Emergency Management staff continue to ensure that all EOC's are tested and maintained.

The Radiation Assessment Team (RAT) is available to respond to radiation emergencies on site, transportation accidents involving radioactive material offsite, and requests in support of the mutual aid agreements with other Canadian nuclear utilities such as Bruce Power, Ontario Power Generation, New Brunswick Power, Hydro Québec. The CRL RAT also provides required responses under the FNEP, as well as for exercises and training with both internal CNL groups and with external groups such as groups listed under the FNEP. A complete inventory of all RAT equipment is taken annually; instruments are checked for functionality and calibrated as per calibration requirements in applicable regulatory requirements.

Following the shutdown of NRU Reactor, CNL conducted an analysis confirming that no events could result in offsite consequences exceeding the public dose limit. This analysis was shared with CNSC staff as well as the provinces of Ontario and Quebec. Consequently, the Provincial

Nuclear Emergency Response Plan was revised, and the requirement to distribute Potassium Iodide tablets to surrounding communities was removed in Ontario. The emergency response capabilities have been reduced commensurate with the site's new risk profile.

4.10.2 Fire Emergency Preparedness and Response

CNL has a company-wide Fire Protection Program to prevent or minimize fire-related risks to people, property, and programs. The program operates through three lines of defence:

- education and training,
- standards and code compliance, and
- emergency response.

Key components of the Program include Fire Operations (i.e., response and training), Fire Protection Systems (i.e., installation and maintenance of fire safety systems), and Technical Services (i.e., hazard assessments and code reviews). The program also applies the defence-in-depth principle described in CSA N393, *Fire protection for facilities that process, handle, or store nuclear substances* [55] which emphasizes prevention, detection, consequence mitigation, and control measures to ensure robust fire protection.

In addition to CSA N393 [55], the Fire Protection Program ensures compliance with the *National Building Code of Canada* [31] and the *National Fire Code of Canada* [32], which establish baseline requirements for fire protection system, safety, and fire prevention.

The fire response capabilities at CRL are governed by CSA N393 [55] and are documented in a fire response needs analysis which is submitted to the CNSC. Additionally, the CRL fire brigades have respective training needs analyses and training plans, and various fire and emergency related standards, procedures, and detailed work instructions which influence the site firefighting strategies and address the response readiness of Fire Operations.

The CRL fire brigade is capable of providing fire suppression and other designated services to mitigate loss-of-life and property damage 24 hours per day, 7 days per week (24/7) and which meet the requirements of NFPA 600, *Standard on Facility Fire Brigades* [56] and NFPA 1081, *Standard for Facility Fire Brigade Member Professional Qualifications* [57]. The CRL Fire Brigade is considered a safety-sensitive position and meets the requirements of [REGDOC-2.2.4, Fitness for Duty, Volume II: Managing Alcohol and Drug Use](#) [23]. Mutual Aid and Fire Service Agreements are in place between CRL and local municipalities to provide reciprocal assistance during emergencies.

4.11 Waste Management

The Waste Management SCA is implemented through CNL's Waste Management and Cleanup FSAs. Together these FSAs cover the processes required to implement and support the waste management requirements stipulated in the [Nuclear Safety and Control Act](#) [21], [Nuclear Fuel Waste Act](#) [58], [Nuclear Liability and Compensation Act](#) [59], and other applicable laws and regulations.

4.11.1 General Considerations

The Waste Management and Cleanup FSAs are designed to implement the requirements of the following standards:

- [REGDOC-2.11, Framework for Radioactive Waste Management and Decommissioning in Canada](#) [60]
- [REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#) [61]
- [REGDOC-2.11.1, Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste](#), Version 2 [62]
- [REGDOC-2.11.2, Decommissioning](#) [63]
- CSA N292.0, *General principles for the management of radioactive waste and irradiated fuel* [64]
- CSA N292.1, *Wet storage of irradiated fuel and other radioactive materials* [65]
- CSA N292.2, *Interim dry storage of irradiated fuel* [66]
- CSA N292.3, *Management of low- and intermediate-level radioactive waste* [67]
- CSA N292.8, *Characterization of radioactive waste and irradiated fuel* [68]
- CSA N294, *Decommissioning of facilities containing nuclear substances* [69]

The purpose of the Waste Management FSA is to ensure that (1) activities, facilities, and records corresponding to the planning, generation, handling, processing, transporting, storage, and disposal of wastes are performed or managed in a manner that protects workers, the public, and the environment, in compliance with applicable regulatory and licence requirements; and (2) the waste hierarchy is effectively implemented.

The Waste Management FSA establishes requirements and guidelines pertaining to waste management at CNL. Consistent company-wide processes are established and implemented at CNL for all stages of the waste management lifecycle. The FSA also maintains supporting procedures, standards and implementing documents.

The Waste Management FSA includes the Waste Characterization Program that focuses on the development and execution of waste characterization plans.

CNL's Waste Management FSA, together with other company-wide programs, address the six principles of radioactive waste management set out in REGDOC-2.11 [60]:

- generation of radioactive waste is minimized to the extent practicable by the implementation of design measures, operating procedures and decommissioning practices,
- management of radioactive waste is commensurate with the waste's radiological, chemical and biological hazard to the health and safety of persons, to the environment and to national security,
- assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time during which the maximum impact is predicted to occur,
- predicted impacts on the health and safety of persons and the environment from the management of radioactive waste are no greater than the impacts that are permissible in Canada at the time of the regulatory decision,
- measures needed to prevent unreasonable risk to present and future generations from the hazards of radioactive waste are developed, funded and implemented as soon as reasonably practicable, and
- trans-border effects on the health and safety of persons and the environment that could result from the management of radioactive waste in Canada are not greater than the effects experienced in Canada.

The Cleanup FSA ensures a CNL wide approach to effective land use planning, decommissioning, demolition, environmental remediation, end-state reporting and internal land transfer post decommissioning or environmental remediation. The FSA ensures there is adequate and appropriate Indigenous, public, and stakeholder engagement, which is conducted as part of the planning process and considered throughout the facility lifecycle.

CNL's approach to Environmental Remediation meets the requirements set out in REGDOC-2.11.2, [Decommissioning](#) [63], CSA N294:19, *Decommissioning of facilities containing nuclear substances* [69], and REGDOC-3.3.1, [Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities](#) [70], and aligns with the Federal Contaminated Sites Action Plan. The key steps of environmental remediation at CRL include environmental site assessment (gathering information of the site to build a comprehensive picture of the degree, nature, and extent, of contamination), environmental risk assessment (establishing whether environmental remediation or risk management is required based on the planned land use and the assessed level of human and environmental risk), remedial options evaluation (determining the preferred remedial/risk management option), remedial action planning (developing the necessary information to execute remediation or risk management), environmental remediation/risk management execution (implementing the selected remedial/risk management option and verifying the planned end-state before restoring the site) and project closeout.

The implementation of the Cleanup FSA is covered by four processes which are graded commensurate with the hazards of the site, facility or activity. These processes are land use, decommissioning, environmental site assessment and remediation, and closeout.

The Land Use process ensures that all CNL managed sites have a consistent approach in developing and maintaining Site Overview Cleanup Plans with robust, relevant, achievable, and verifiable land uses (interim or final end-states). The Land Use process ensures that overview cleanup planning takes a holistic lifecycle approach so that that project-level implementation is aligned with the site's goals.

The Decommissioning process ensures a consistent approach to facility decontamination, dismantlement, and demolition and the Environmental Site Assessment and Remediation process ensures a consistent approach to land area characterization, assessment and remediation. Together these two processes ensure projects meet their planned land uses and end-states aligned with the targets within the site's Overview Cleanup Plan.

The Closeout process provides verification and documentation of the end-states and land uses ensuring consistency and provides the records to support licence changes, when appropriate.

4.11.2 Waste Characterization

CNL maintains an implementing document which establishes the minimum requirements for characterizing solid and liquid waste, including materials that may become waste, to ensure safe handling, storage, processing, transportation, and disposal, consistent with CSA N292.8 [68] and other regulations and standards. CNL ensures that adequate data are available to inform decision-making for safety assessments, current and future waste handling activities, including handling, packaging, storage, processing, transportation, decommissioning, disposal, site remediation, or other waste management objectives, as applicable, consistent with CSA N292.8 [68] and REGDOC-2.11.1 Volume III [62]. Waste characterization begins during planning for waste generation where feasible and may occur at any stage of the waste management lifecycle ahead of disposal, to ensure timely and accurate data collection. A graded approach is applied to ensure characterization efforts are proportionate to waste complexity and risk.

4.11.3 Waste Minimization

This is a shared objective with the Environmental Protection SCA (refer to Section 4.9).

CNL uses the Waste Hierarchy for waste management decision making applying waste minimization techniques to reduce the quantity of all waste classes requiring disposal, to as low as practicable. Across all CNL-operated sites, these techniques are considered in order, at the onset of all planned work and at source. The techniques are: prevent, reduce, reuse, recycle, and dispose. The Waste Management FSA adheres to CNL's *Environment Policy* [41] that states that waste should be dealt with at the highest practicable level in the hierarchy. The Waste Hierarchy is applied at all stages of the waste management lifecycle.

4.11.4 Waste Management Practices

CNL applies comprehensive, company-wide programs that cover all lifecycle stages of waste management – planning, generation, transportation, processing, storage, and end-of-life disposal. Measures to protect workers, the public, and the environment are incorporated into each stage.

CNL optimizes waste handling through detailed planning, characterization, and verification processes to ensure waste meets Waste Acceptance Criteria and regulatory requirements. Processing steps such as size reduction and segregation further enhance efficiency and safety.

CNL's programs recognize that waste management stages are not always linear and evaluates each step both individually and as part of an integrated system. Interdependencies are addressed within CNL's IWS [11] which applies to all CNL managed radioactive and non-radioactive waste streams for the full waste management lifecycle. This establishes integration and alignment with the goals and requirements of CNL's primary business missions, including lifecycle cost optimization.

CNL maintains documentation throughout the waste lifecycle, ensuring traceability and regulatory compliance for all waste streams.

4.11.5 Decommissioning Plans

For modern facilities, decommissioning is considered throughout the lifecycle of a facility. The Decommissioning Process begins during planning of a proposed nuclear facility, continues throughout the construction and operations of the facility, culminates in active decommissioning, and concludes when the predefined end-states have been achieved. CNL is responsible for many legacy facilities that were built at a time when the requirement to consider decommissioning as part of design was not in place. In most cases CNL entered the Decommissioning Process during the operations phase by developing preliminary decommissioning plans. REGDOC-2.11.2 [63] recognizes the unique challenges of these legacy facilities.

The Cleanup FSA guides sites through the Decommissioning Process and maintains process documents. The Decommissioning and Demolition Program ensures that each site is decommissioning and demolishing facilities in a consistent and safe manner that is aligned with site goals in order to reach the target next land use and end state safely and effectively. A graded approach is used for the decommissioning activities based on the licence or legal requirements, complexity, level of risk and the residual hazards present, and applies to a variety of facilities, including buildings, systems, and engineered structures (infrastructure). The decommissioning plan defines areas to be decommissioned and the general structure and sequence of the principal decommissioning work packages envisioned.

In accordance with CRL Licence Condition 11.2, a comprehensive preliminary decommissioning plan for the CRL site is maintained and reviewed and revised as required, at least every five years.

Planning for decommissioning focuses on managing the entire waste lifecycle – from generation and processing to storage and safe disposal – while addressing long-term liability. A waste management strategy must be developed as part of the planning for decommissioning, detailing anticipated waste volumes, classifications (e.g., clean, LLW, ILW, HLW), waste streams, and disposition pathways. The strategy includes a commitment to apply the waste hierarchy and may be documented in a stand-alone plan or within the Detailed Decommissioning Plan.

The waste management plan covers short- and long-term considerations and includes:

- Identified waste streams and estimated quantities
- Waste characteristics
- A systematic process for moving waste from generation to final disposition

As required by REGDOC-2.11.2 [63] and CSA N294:19 [69], the decommissioning planning includes a safety assessment to identify radiological and non-radiological hazards to workers, the public, and the environment from routine decommissioning activities and credible abnormal conditions. These assessments are prepared using a graded approach.

The safety assessments:

- Identify hazards from planned activities, abnormal conditions, and natural events
- Evaluate risks and define mitigation measures
- Confirm safety functions and defence-in-depth controls
- Address interdependencies between decommissioning actions
- Demonstrate measures to maintain hazards at acceptable levels during and after decommissioning

Results of the assessment support the decommissioning planning by informing strategy selection, safety procedures, inspection programs, and competency requirements, ensuring decisions are made using an integrated, risk-informed approach.

4.12 Security

The Security SCA is implemented through the Security and Nuclear Cyber Security FSAs. Together, these two FSAs cover the processes required to implement and support the security requirements stipulated in applicable laws and regulations and the CRL licence.

Information regarding the Security SCA is considered confidential-prescribed information and will be provided under separate cover when required.

4.12.1 General Considerations

The Security FSA is responsible for ensuring the protection of CNL personnel, facilities and nuclear materials in accordance with the CNL *Security Policy* [71]. CRL is considered a high-security site and as such, CNL has implemented a robust security FSA to meet the requirements of the [Nuclear Security Regulations](#) [72] and the following REGDOCS:

- REGDOC-2.12.1, *High-Security Sites, Volume I: Nuclear Response Force*, Version 2 [73]
- REGDOC-2.12.1, *High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices* [74]
- [REGDOC-2.12.2, Site Access Security Clearance](#) [75]
- [REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material](#) [76]

The details of CRL's Security FSA are outlined in the *Chalk River Laboratories Site Security Report* [77] and *Chalk River Laboratories Tactical Response Plan* [78]. In addition, a Transportation Security Plan [79] has been developed to support the on-site transportation of material as required under the [Packaging and Transport of Nuclear Substances Regulations](#) [80] and *Nuclear Security Regulations* [72]. Copies of these documents have been submitted to CNSC staff and will not be described further in this attachment due to the security nature of the information.

CNL recognizes that the revised [Nuclear Security Regulations](#) [81] were published in 2025 October and is formulating implementation plans for the new regulations, pending publication of the supporting REGDOCs anticipated in late 2026 or early 2027.

4.12.2 Response Arrangements

CRL completes appropriate notifications to local law enforcement agencies including the Deep River Police and the Ontario Provincial Police. This includes annual site visits to ensure familiarization with the CRL site. As a high-security site, Memoranda of Understanding are in place and a sealed source security plan is submitted to CNSC staff.

4.12.3 Security Practices

The Security FSA is responsible for the development and implementation of security policies, procedures, and emergency plans to ensure compliance with applicable laws and regulations as well as the CNL *Security Policy* [71] and industry best practice.

The Security FSA is also responsible for administering security awareness programs, conducting minor investigations and supporting major investigations, providing technical direction to support security needs on a company wide basis and analysing operational experience trends and data used to monitor performance.

CNL's Personnel Security Services is responsible for safeguarding employees and information, facilities, and assets by providing efficient security screening and investigative services. Personnel Security Services provides support to the programs and business processes in accordance with the needs of the organization, regulators, key stakeholders and Government of Canada policies and regulations.

4.12.4 Security Training and Qualification

At CRL, Physical Security Operations is comprised of Nuclear Security Officers, Nuclear Response Force Officers, supervisors, training cadre, and is led by the Security Operations Manager. Training for these positions is provided to meet the requirements of the *Nuclear Security Regulations* [72] and REGDOCS listed in the CRL LCH [20]. The Nuclear Security Officers and Nuclear Response Force Officers are subject to the requirements of REGDOC-2.2.4, *Fitness for Duty*, Volumes I [24], II [23], and III [25].

Training of non-security personnel at CRL includes a suite of Security Awareness training modules and the Continuous Behavioural Observation Program which has been designed to prevent and mitigate insider threats by developing staff's ability to recognize and respond to indicators that could pose a risk to the safety and security of personnel, assets, operations or facilities. These training modules require a refresher on a 3-year frequency.

4.12.5 Cyber Security

CNL has implemented a Nuclear Cyber Security FSA that is compliant with CSA N290.7-14, *Cyber-security for nuclear power plants and small reactor facilities* [82], and is in the process of implementing the 2021 version of this standard as applicable to CRL activities. The roles and responsibilities for the Cyber Security program have been defined.

The Nuclear Cyber Security FSA provides standards, processes, and oversight over Cyber Essential Assets (CEAs) for systems important to nuclear safety, nuclear security, emergency preparedness, safeguards and auxiliary assets, that, if exploited could adversely affect those previously listed.

Training is provided to all staff involved with the management and use of CEAs. In addition, a suite of training modules have been rolled out to all staff to ensure understanding of cyber security and IT threats.

4.13 Safeguards and Non-Proliferation

The safeguards and non-proliferation SCA is implemented through the Nuclear Materials and Safeguards Management FSA and is responsible for the management and tracking of fissionable materials and supporting international non-proliferation agreements.

4.13.1 General Considerations

CNL's Nuclear Materials and Safeguards Management FSA meets the requirements of CNSC [REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*](#) [83], [REGDOC-2.4.3, *Nuclear Criticality Safety*](#) [29], the [General Nuclear Safety and Control Regulations](#) [84], and other applicable legal and regulatory requirements.

4.13.2 Nuclear Accountancy and Control

Nuclear materials accounting at CNL is ensured through Physical Inventory Taking and using the Integrated Nuclear Materials Accounting System (INMAS) along with three facility specific systems. The Nuclear Materials and Safeguards Management FSA ensures that required accountancy information is submitted to the CNSC and International Atomic Energy Agency (IAEA) in accordance with prescribed timelines.

4.13.3 Access and Assistance to the IAEA

CNL provides access and assistance to the IAEA through requests from CNSC staff or from the IAEA directly depending on the type of inspection or safeguards activity being conducted. CNL ensures that knowledgeable staff and required resources, including any equipment or machinery to perform the scope of work indicated in the notification, are available for the duration of the verification activity.

4.13.4 Operational and Design Information

CNL provides to the CNSC Design Information Questionnaires, an annual/quarterly submission of the Operation Program and updates to the additional protocol [85] using the IAEA Protocol Reporter. These submissions are reviewed by appropriate CNL staff to ensure the submissions are accurate.

4.13.5 Safeguards equipment, containment and surveillance

Where possible, CNL provides the resources necessary to install and protect IAEA safeguards equipment and all support services, including but not limited to Class III power, internet, heating, cooling and shelter.

4.14 Packaging and Transport

The Packaging and Transport SCA is implemented through CNL's Transportation of Dangerous Goods FSA and is responsible for developing and maintaining processes to ensure that all work involving the transportation and packaging of dangerous goods is performed consistently and in compliance with legal and regulatory requirements, including the:

- [Transportation of Dangerous Goods Regulations](#) [86]
- [Packaging and Transport of Nuclear Substances Regulations](#), 2015 [80]

CNL has standards that contain the information and guidance necessary to implement safe and uniform transportation of dangerous goods both on and off the CRL site. CNL is requesting consolidation of the Licence to Transport nuclear material shipments within the boundaries of the CRL site into the CRL site operating licence, as described in Attachment B of [1].

Employees who are responsible for handling, receiving, or transporting dangerous goods at CRL are adequately trained and hold valid training certificates or work under the direct supervision of a worker who has a training certificate.

4.14.1 Package Design and Maintenance

CNL has a procedure governing the procurement, storage, use, maintenance, decommissioning and disposal of transport packaging. All packaging used by CRL is reviewed and approved by the Transportation of Dangerous Goods FSA prior to being procured or used. Changes to packaging are made in accordance with CNL's engineering change control process. When packaging designs require Competent Authority approval, the Transportation of Dangerous Goods FSA prepares and submits packaging certification requests and packaging certification renewals to the CNSC and Foreign Competent Authorities.

Maintenance for packaging is planned and executed under maintenance procedures by the Fitness for Service FSA as described in Section 4.6, and through normal operating processes used by the facility/organization. Packaging inspections are conducted at appropriate intervals depending on the complexity of the packaging, including prior to shipments, upon receipt of shipments, or annually through maintenance inspections.

4.14.2 Registration for Use

Upon receipt of a transport package design certification, the Transportation of Dangerous Goods FSA submits an *Application for Registration of Use* to become Registered Users.

4.15 Reporting

CNL maintains a strong reporting culture rooted in transparency, accountability, and timely communication. Regulatory reporting is governed by the *CNL Reporting to Regulatory Agencies* [87] procedure, which defines roles, responsibilities, and review requirements to ensure accurate and timely reporting across the organization. Through the application of this procedure, CNL ensures full compliance with CNSC reporting requirements, including those in [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills](#) [88] as well as all reporting requirements defined in the CRL LCH [20].

The reporting process includes review and approval of submissions, verification of completeness and accuracy, and mechanisms to ensure prompt notification of reportable events. Reportable events and regulatory commitments are tracked through CNL's corrective action program to ensure appropriate follow-up, resolution, and prevention of recurrence.

5. Conclusion

This supplementary report demonstrates that CNL has comprehensive programs to protect the environment, safeguard the health and safety of persons, and maintain national security while fulfilling Canada's international obligations. The information presented confirms that CNL has implemented robust Management Systems aligned with applicable regulatory requirements and licence conditions, and clear evidence that CNL is fully qualified to continue conducting nuclear activities at CRL safely and responsibly. In addition, the report demonstrates that CNL has proactively and transparently engaged with the public and Indigenous communities in advance of the hearing process, ensuring that local and Indigenous perspectives are understood and considered early, consistent with the CNSC's emphasis on meaningful engagement as part of the broader licensing context.

6. Acronyms

AECL	Atomic Energy of Canada Limited
ALARA	As Low As Reasonably Achievable
ANMRC	Advanced Nuclear Materials Research Centre
CEA	Cyber Essential Asset
CRC	Curriculum Review Committee
CRL	Chalk River Laboratories
CNL	Canadian Nuclear Laboratories
CSA	Canadian Standards Association
CNSC	Canadian Nuclear Safety Commission
EMS	Environmental Management System
EOC	Emergency Operations Centre
ERA	Environmental Risk Assessment
FNEP	Federal Nuclear Emergency Plan
FSA	Functional Support Area
G1WF	Gentilly-1 Waste Facility
GoCo	Government-Owned, Contractor-Operated
HEU	Highly Enriched Uranium
HLW	High Level Waste
HR	Human Resources
IA	Information Asset

IAEA	International Atomic Energy Agency
ILW	Intermediate Level Waste
ImpAct	Improvement Action
INPO	Institute of Nuclear Power Operations
IT	Information Technology
IWC	Integrated Work Control
IWS	Integrated Waste Strategy
LCH	Licence Conditions Handbook
LDA	Liquid Dispersal Area
LLW	Low Level Waste
NCCA	Nuclear Criticality Controlled Area
NFFF	Nuclear Fuel Fabrication Facility
NRU	National Research Universal
NRX	National Research Experimental
NSCA	Nuclear Safety and Control Act
NSDF	Near Surface Disposal Facility
NWMO	Nuclear Waste Management Organization
OSH	Occupational Safety and Health
RAT	Radiation Assessment Team
RP	Radiation Protection
S&T	Science and Technology
SAR	Safety Analysis Report
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SSC	Structures, Systems, and Components
TRMR	Target Residue Material Repatriation
WL	Whiteshell Laboratories
WMA	Waste Management Area
WTC	Waste Treatment Centre
ZED-2	Zero Energy Deuterium

7. References

- [1] Letter, J. Osborne (CNL) to C. Salmon (CNSC Registrar), *Application for Renewal of the Nuclear Research and Test Establishment Operating Licence for Chalk River Laboratories*, CRL-CNNO-26-0034-L, 2026 June 30.
- [2] Canadian Nuclear Safety Commission, *Chalk River Laboratories Nuclear Research and Test Establishment Operating Licence*, NRTEOL-01.01/2028, Expiry Date: 2028 March 31.
- [3] Canadian Nuclear Safety Commission, *Licence Application Guide: Class IB Processing Facilities Regulatory document*, REGDOC-1.2.2, 2024 January.
- [4] Canadian Nuclear Safety Commission, *Public Information and Disclosure*, REGDOC-3.2.1, 2018 May.
- [5] Canadian Nuclear Safety Commission, *Indigenous Engagement*, REGDOC-3.2.2, 2022 February.
- [6] Treasury Board of Canada Secretariat, *Greening Government Strategy: A Government of Canada Directive*.
- [7] Canadian Nuclear Laboratories, *2025 Sustainability Report – Built to Innovate*, FY 2024-2025.
- [8] World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD), *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (Revised Edition), 2004.
- [9] *Chalk River Laboratories Overview Decommissioning and Cleanup Plan*, 225-508300-PLA-001, Revision 2, 2023 June.
- [10] Letter, D. Cox (CNL) to J. LeClair (CNSC), *Application for Renewal of the Nuclear Research And Test Establishment Operating Licence for the Chalk River Laboratories - 2018 (Supporting Information for CNSC Staff)*, CRL-CNNO-17-0010-L, 2017 May 15.
- [11] *Canadian Nuclear Laboratories Integrated Waste Strategy*, CW-508600-PLA-002, Revision 2.1, 2023 October.
- [12] Natural Resources Canada, *Canada's Policy for Radioactive Waste Management and Decommissioning*, 2023.
- [13] Nuclear Waste Management Organization, *Integrated Strategy for Radioactive Waste*, 2023 June.
- [14] *Canadian Nuclear Laboratories Management System Manual*, 900-514100-MAN-001, Revision 4.0, 2026 June.
- [15] Canadian Standards Association, *Management system requirements for nuclear facilities*, CSA N286:12, 2012 (R2022).
- [16] International Organization for Standardization, *Quality management systems — Requirements*, ISO 9001:2015, 2015.

- [17] International Organization for Standardization, *Environmental management systems — Requirements with guidance for use*, ISO 14001:2015, 2015.
- [18] Canadian Nuclear Safety Commission, *Safety Culture*, REGDOC-2.1.2, 2018 April.
- [19] Canadian Nuclear Safety Commission, *Human Performance*, Version 2, REGDOC-2.2.1, 2024 January.
- [20] Canadian Nuclear Safety Commission, *Licence Conditions Handbook for Chalk River Laboratories*, NRTEOL-LCH-01.01/2028, CRL-508760-HBK-002, Revision 5, 2024 October 31.
- [21] *Nuclear Safety and Control Act*, S.C. 1997, c. 9.
- [22] Canadian Nuclear Safety Commission, *Personnel Training*, Version 2, REGDOC-2.2.2, 2016 December.
- [23] Canadian Nuclear Safety Commission, *Fitness for Duty, Volume II: Managing Alcohol and Drug Use*, Version 3, REGDOC-2.2.4, 2021.
- [24] Canadian Nuclear Safety Commission, *Fitness for Duty: Managing Worker Fatigue*, REGDOC-2.2.4, 2017.
- [25] Canadian Nuclear Safety Commission, *Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness*, REGDOC-2.2.4, 2018.
- [26] Canadian Nuclear Safety Commission, *Conduct of Licensed Activities: Construction and Commissioning Programs*, REGDOC-2.3.1, 2016 January.
- [27] Canadian Nuclear Safety Commission, *Safety Analysis for Class IB Nuclear Facilities*, REGDOC-2.4.4, 2022 October.
- [28] Canadian Nuclear Safety Commission, *Deterministic Safety Analysis*, REGDOC-2.4.1, 2014 May.
- [29] Canadian Nuclear Safety Commission, *Nuclear Criticality Safety*, Version 1.1, REGDOC-2.4.3, 2020 September.
- [30] Canadian Nuclear Safety Commission, *Design, Testing and Performance of Exposure Devices*, Version 1.1, REGDOC-2.5.7, 2020 September.
- [31] National Research Council of Canada, *National Building Code of Canada*, 2020.
- [32] National Research Council of Canada, *National Fire Code of Canada*, 2020.
- [33] *CRL Site Characteristics*, CRL-03510-SAB-001, Revision 5, 2018 June.
- [34] Canadian Standards Association, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants/Material Standards for reactor components for CANDU nuclear power plants*, CSA N285.0:23, 2023.
- [35] Canadian Nuclear Safety Commission, *Aging Management*, REGDOC-2.6.3, 2014 March.
- [36] *Radiation Protection Regulations*, SOR/2000-203.

- [37] *Canada Labour Code*, R.S.C., 1985, C. L-2.
- [38] *Canada Occupational Health and Safety Regulations*, SOR/86-304.
- [39] *Safety and Health – Policy*, 900-510400-POL-001, Revision 4.3, 2025 November 19.
- [40] *Canadian Environmental Protection Act*, S.C. 1999, c.33
- [41] *Environment – Policy*, 900-509200-POL-001, Revision 3.3, 2025 November 19.
- [42] Canadian Nuclear Safety Commission, *Environmental Principles, Assessments and Protection Measures*, Version 1.2, REGDOC-2.9.1, 2020 September.
- [43] Canadian Standards Association, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*, CSA N288.4, 2010 (R2015).
- [44] Canadian Standards Association, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*, CSA N288.5, 2011 (R2021).
- [45] Canadian Standards Association, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills*, CSA N288.6, 2012 (R2017).
- [46] Canadian Standards Association, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills*, CSA N288.7, 2015 (R2020).
- [47] Canadian Standards Association, *Establishing and implementing action levels for releases to the environment from nuclear facilities*, CSA N288.8, 2017 (R2022).
- [48] *Impact Assessment Act*, S.C. 2019, c.28, s.1
- [49] Canadian Nuclear Safety Commission, *Controlling Releases to the Environment*, REGDOC-2.9.2, 2024 March.
- [50] Canadian Minister of Justice, *Species at Risk Act*, S.C. 2002, c.29.
- [51] Canadian Minister of Justice, *Migratory Birds Convention Act*, S.C. 1994, c.22.
- [52] Canadian Minister of Justice, *Fisheries Act*, R.S.C., 1985, c. F-14, Last amended on 2024 November 17.
- [53] Canadian Nuclear Safety Commission, *Nuclear Emergency Preparedness and Response*, REGDOC-2.10.1, Version 2, 2016 February.
- [54] *Chalk River Laboratories Site Emergency Response Plan*, CRL-508730-PLA-001, Revision 6.0, 2026 February.
- [55] Canadian Standards Association, *Fire protection for facilities that process, handle, or store nuclear substances*, CSA N393, 2013 (R2018).
- [56] National Fire Protection Association, *Standard on Facility Fire Brigades*, NFPA 600.
- [57] National Fire Protection Association, *Standard for Facility Fire Brigade Member Professional Qualifications*, NFPA 1081.
- [58] *Nuclear Fuel Waste Act*, S.C., 2002, c.23

- [59] *Nuclear Liability and Compensation Act*, S.C. 2015, c.4, s.120
- [60] Canadian Nuclear Safety Commission, *Framework for Radioactive Waste Management and Decommissioning in Canada*, Version 2, REGDOC-2.11, 2021 March.
- [61] Canadian Nuclear Safety Commission, *Waste Management, Volume I: Management of Radioactive Waste*, REGDOC-2.11.1, 2021 January.
- [62] Canadian Nuclear Safety Commission, *Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste*, Version 2, REGDOC-2.11.1, 2021.
- [63] Canadian Nuclear Safety Commission, *Decommissioning*, REGDOC-2.11.2, 2021 January.
- [64] Canadian Standards Association, *General principles for the management of radioactive waste and irradiated fuel*, CSA N292.0, 2019 (R2024).
- [65] Canadian Standards Association, *Wet storage of irradiated fuel and other radioactive materials*, CSA N292.1, 2016 (R2021).
- [66] Canadian Standards Association, *Interim dry storage of irradiated fuel*, CSA N292.2, 2013 (R2023).
- [67] Canadian Standards Association, *Management of low- and intermediate-level radioactive waste*, CSA N292.3, 2014 (R2024).
- [68] Canadian Standards Association, *Characterization of radioactive waste and irradiated fuel*, CSA N292.8, 2021.
- [69] Canadian Standards Association, *Decommissioning of facilities containing nuclear substances*, CSA N294, 2019.
- [70] Canadian Nuclear Safety Commission, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities*, REGDOC-3.3.1, 2021 January.
- [71] *Security – Policy*, 900-508710-POL-001, Revision 4.5, 2026 May 21.
- [72] *Nuclear Security Regulations*, SOR/2000-209
- [73] Canadian Nuclear Safety Commission, *High-Security Sites, Volume I: Nuclear Response Force*, Version 2, REGDOC-2.12.1, 2018 September.
- [74] Canadian Nuclear Safety Commission, *High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices*, REGDOC-2.12.1, 2018 April.
- [75] Canadian Nuclear Safety Commission, *Site Access Security Clearance*, REGDOC-2.12.2, 2013 April.
- [76] Canadian Nuclear Safety Commission, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material*, Version 2.1, REGDOC-2.12.3, 2020 September.
- [77] *Chalk River Laboratories Site Security Report*, EPS-14000-RPT-17, Revision 24, 2024 January 30.
- [78] *Chalk River Laboratories Tactical Response Plan*, 119-508710-PLA-002368, Revision 1,

2025 April 01.

- [79] *CRL Transportation Security Plan*, 119-508710-PLA-020, Revision 0, 2028 April.
- [80] *Packaging and Transport of Nuclear Substances Regulations*, SOR/2015-145.
- [81] *Nuclear Security Regulations*, SOR/2025-219.
- [82] Canadian Standards Association, *Cyber-security for nuclear power plants and small reactor facilities*, CSA N290.7, 2014 (R2021).
- [83] Canadian Nuclear Safety Commission, *Safeguards and Nuclear Material Accountancy*, REGDOC-2.13.1, 2018.
- [84] *General Nuclear Safety and Control Regulations*, SOR/2000-202.
- [85] *Protocol additional to the agreement between Canada and the International Atomic Energy Agency for the application of safeguards in connection with the treaty on the non-proliferation of nuclear weapons*.
- [86] *Transportation of Dangerous Goods Regulations*, SOR/2001-286
- [87] *CNL Reporting to Regulatory Agencies*, 900-514300-MCP-006, Revision 0.3, 2023 July.
- [88] Canadian Nuclear Safety Commission, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*, Version 1.1, REGDOC-3.1.2, 2022 July.

Appendix A Major Program Changes and Improvements Since 2018

SCA	Program Improvements Since 2018
Management System	Improvements under the Management System SCA include: • Conducted a comprehensive assessment of the functional requirements under all SCAs to confirm that requirements are adequately reflected in CNL's implementing procedures, and that the implementing procedures are adhered to in the conduct of work. • Established the Safety Excellence Team, representing working groups from all of CNL's major missions and sites to ensure that the concerns of workers are heard and addressed. • Executed improvements to the Improvement Action (ImpAct) corrective action program to provide additional functionality and reporting capabilities. Also implemented a new triage process for all issues.
Human Performance Management	Improvements under the Human Performance Management SCA include: • Procured and implemented a new cloud-based Learning Management System platform. • Increased use and effectiveness of Curriculum Review Committees to ensure regular evaluation, approval of changes, and alignment with operational and regulatory requirements.
Operating Performance	Improvements under the Operating Performance SCA include: • Developed and implemented a new Conduct of Operations Program. • Developed and implemented an Integrated Work Control (IWC) process. • Standardized the operating documents for radioisotope laboratories by transitioning Radioisotope Laboratory Protocols to Operating Envelope documents.
Safety Analysis	Improvements under the Safety Analysis SCA include: • Developed a robust, structured qualification program for Nuclear Criticality Control Officers.

SCA	Program Improvements Since 2018
Physical Design	N/A
Fitness for Service	Improvements under the Fitness for Service SCA include: • Executing an Aging Management Implementation Plan to meet the requirements of REGDOC-2.6.3, <i>Aging Management</i> [35]. • Completed Building Condition Assessments on more than 80 buildings at CRL. • Developed or revised System Performance Monitoring Plans and System Health Reports.
Radiation Protection	Improvements under the Radiation Protection SCA include: • Implemented the Radiological Work Permit to capture and communicate the radiological hazards and controls to workers as part of the Integrated Work Control. • Implemented a new radioactive source database to track radioactive sources across CNL sites. • Registration and implementation of Radioactive Material Storage areas. • Implemented a system for digital Radiation Protection logs, zoning and other RP compliance. • Updated radiological controls associated with radioactive material emitting high energy alpha radiation.
Conventional Health and Safety	Improvements under the Conventional Health and Safety SCA include: • Implemented the Electrical Safety FSA to establish and oversee the processes, procedures, and training necessary for the safe handling, operation, and maintenance of electrical equipment, while identifying and controlling risks associated with electrical hazards across CNL sites. • Developed a Health and Safety Management System standard with the goal of aligning CNL with ISO 45001. • Developed and implemented processes to manage hazards such as asbestos, perchlorate, and lead, in addition to developing standards for hazardous energy control, safety signage, and safety barriers.

SCA	Program Improvements Since 2018
Environmental Protection	Improvements under the Environmental Protection SCA include: • Updated and submitted the CRL Environmental Risk Assessment to the CNSC staff. • Implemented a new Environmental Data Management System. This system is the repository for all environmental related data generated from the compliance monitoring programs conducted but also encompasses data collected for other purposes (e.g., characterization, research, radiation protection, etc.). • Implemented 10-year Sustainable Forest Management Plan.
Emergency Management and Fire Protection	Improvements under the Emergency Management and Fire Protection SCA include: • Executed the Fire Hazard Assessment Completion Plan for buildings at CRL to meet the requirements of CSA N393 [55]. • Collaborated with the Town of Deep River to establish a standalone and self-sufficient fire response capability for the town, providing the residents of the area with an appropriate fire emergency response service. • Received approval from the Renfrew County Mutual Aid Group to become a member, marking a significant milestone in regional collaboration. • Identified as a regional fire training centre. • Implemented a Fire Protection Oversight Plan, including required assessments. The Fire Protection Oversight Committee is being stood up in early 2026 to provide an added level of oversight of the Fire Protection Program at the executive level. • Provided significant resources from CRL to support the Whiteshell Laboratories Fire Recovery effort, including Firefighters, fire prevention officers, and firefighting equipment to assist the fire operations team throughout the transition to an autonomous fire response team.
Waste Management	Improvements under Waste Management SCA include: • Implemented Central Waste Sorting at CRL to support sustainable waste minimization and recycling initiatives.

SCA	Program Improvements Since 2018
	• Developed and implemented a waste inventory that refines CNL's future waste arisings. • Launched CNL's Land Use Program to ensure a consistent approach to establishing and achieving the right next land uses and end states for sites being decommissioned and remediated. • Stood up of the Cleanup FSA which focuses on the entire lifecycle rather than demolition of a facility. • Released the <i>Chalk River Laboratories Overview Decommissioning and Cleanup Plan</i> [9], providing a more holistic view of the site and updates on decommissioning and environmental remediation.
Security	Improvements under the Security SCA include: • Implemented new access cards for all staff and contractors. • Developed and executed a Security Program Oversight Plan, which charted the improvement of themed areas regarding the oversight, assessment, and resourcing of the CNL Security Program. • Implemented major improvements to the Nuclear Cyber Security program, achieving compliance with N290.7-14 [82]. • Conducted an assessment of existing cyber essential assets (CEAs) and cyber security systems in CNL's Class I facilities. • Updated cyber security training for CEA and non-CEA systems.
Safeguards and Non-Proliferation	Improvements under the Safeguards and Non-Proliferation SCA include: • Created a new secure work environment in compliance with nuclear cyber security standards.
Packaging and Transport	• N/A
Public Information and Disclosure Program	Highlights under the Public Information and Disclosure Program include: • AOPFN, AECL and CNL signed an historic long-term relationship agreement that formalized relations and established working

SCA	Program Improvements Since 2018
	groups to serve as the basis for ongoing engagement and collaborations • A Neyagada Wàbandàngakì Guardian Program was established to enable regular AOPFN-led monitoring at designated AECL sites. The Guardian Program supports the integration of Algonquin knowledge into CNL activities, notably environmental monitoring, including biodiversity, and cultural programs. The Guardian Program also provides the AOPFN oversight on the activities at CRL. • The CRL Community Advisory Panel was launched in 2021 to increase understanding, grow appreciation of CNL's communities' diverse perspectives, and enable members of the community to access first-hand knowledge about CNL activities and provide their feedback and insights.