



UNCLASSIFIED/NON CLASSIFIÉ

ORIGINAL

CMD: 23-H3

Date signed/Signé le : 13 JANUARY 2023

A Licence Renewal

Un renouvellement de permis

**Royal Military College of
Canada**

**Collège militaire royal du
Canada**

SLOWPOKE-2 Reactor

Réacteur SLOWPOKE-2

Commission Public Hearing

Audience publique de la Commission

Scheduled for:
19 April 2023

Prévue pour :
19 avril 2023

Submitted by:
CNSC Staff

Soumis par :
Le personnel de la CCSN

Summary

This CMD presents information about the following matters of regulatory interest with respect to the Royal Military College of Canada (RMC) SLOWPOKE-2 reactor:

- Renewal of the Class IA Non-Power Reactor Licence NPROL-20.00/2023 to operate the RMC SLOWPOKE-2 reactor for a period of 10 years.

CNSC staff recommend the Commission consider taking the following actions:

- Renew the Non-Power Reactor Licence for a period of 10 years to authorize RMC to operate its facility until June 30, 2033.
- Accept an increase to the maximum allowable excess reactivity of the reactor from 4.0 to 4.3 mk in RMC's operating limits and conditions (OLC).
- Accept the financial guarantee as set out in section 5.2 of this CMD.
- Authorize the delegation of authority as set out in section 5.5 of this CMD.

The following items are attached:

- Current Licence NPROL-20.00/2023
- Proposed Licence NPROL-20.00/2033
- Draft Licence Conditions Handbook

Résumé

Ce CMD présente de l'information sur un ensemble de questions d'ordre réglementaire concernant le réacteur SLOWPOKE-2 du Collège militaire royal du Canada (CMR):

- Renouvellement du permis d'exploitation d'un réacteur de faible puissance NPROL-20.00/2023 pour permettre l'exploitation du réacteur SLOWPOKE-2 du CMR pour une période de 10 ans.

La Commission pourrait considérer prendre les mesures suivantes :

- Renouveler le permis d'exploitation d'un réacteur de faible puissance du CMR pour une période de 10 ans jusqu'au 30 juin 2033
- Accepter une augmentation de l'excès de réactivité maximum du réacteur de 4.0 à 4.3 mk inscrit dans les limites et conditions d'exploitation (LCE).
- Accepter la garantie financière tel qu'elle est établie à la section 5.2 du présent mémoire.
- Déléguer les pouvoirs de la façon prévue à la section 5.5 du présent mémoire.

Les pièces suivantes sont jointes :

- Permis actuel NPROL-20.00/2023
- Permis proposé NPROL-20.00/2033
- Ébauche du manuel des conditions de permis

Signed/signé le

13 January 2023

Kavita Murthy

Director General

Directorate of Nuclear Cycle and Facilities Regulation

Directrice générale de la

Direction de la réglementation du cycle et des installations nucléaires

This page was intentionally left blank.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. OVERVIEW.....	4
1.1 Background	4
1.2 Activities to be licensed	9
1.3 Highlights.....	9
1.4 Assessment of RMC’s Licence Application	10
1.5 Overall Conclusions.....	10
1.6 Overall Recommendations	11
2. ENVIRONMENTAL PROTECTION REVIEW	11
3. GENERAL ASSESSMENT OF SCAS	12
3.1 Management System.....	12
3.2 Human Performance Management.....	15
3.3 Operating Performance	19
3.4 Safety Analysis	22
3.5 Physical Design	26
3.6 Fitness for Service.....	29
3.7 Radiation Protection	32
3.8 Conventional Health and Safety	37
3.9 Environmental Protection	39
3.10 Emergency Management and Fire Protection	44
3.11 Waste Management	48
3.12 Security	52
3.13 Safeguards and Non-Proliferation	55
3.14 Packaging and Transport	59
4. INDIGENOUS AND PUBLIC CONSULTATION AND ENGAGEMENT... 	61
4.1 Indigenous Consultation and Engagement.....	61
4.2 CNSC Public Consultation and Engagement	62
4.3 Licensee Public Information Program.....	63
4.4 Participant Funding Program	65
5. OTHER MATTERS OF REGULATORY INTEREST.....	66
5.1 Cost Recovery	66
5.2 Financial Guarantees	66
5.3 Improvement Plan and Significant Future Activities	67
5.4 Nuclear Liability Insurance	68
5.5 Delegation of Authority	68
5.6 Proposed Licence Period	68
6. OVERALL CONCLUSIONS AND RECOMMENDATIONS.....	69
REFERENCES	71

GLOSSARY.....	72
A. SAFETY PERFORMANCE RATING LEVELS.....	74
B. BASIS FOR THE RECOMMENDATION(S).....	75
B.1 Regulatory Basis.....	75
B.2 Technical Basis.....	82
C. SAFETY AND CONTROL AREA FRAMEWORK.....	83
C.1 Safety and Control Areas Defined	83
C.2 Specific Areas for this Facility Type.....	85
D. SUPPORTING DETAILS	87
D.1 Inspections (2013 – 2023)	87
CURRENT LICENCE.....	89
PROPOSED LICENCE CHANGES	90
PROPOSED LICENCE.....	91
DRAFT LICENCE CONDITIONS HANDBOOK.....	92

This page was intentionally left blank.

EXECUTIVE SUMMARY

The [Royal Military College of Canada \(RMC\)](#) is situated on the traditional lands of the Haudenosaunee, Anishinaabe and Huron-Wendat peoples. RMC and the CNSC acknowledge the significance of these lands to the Indigenous peoples.

The RMC SLOWPOKE-2 reactor is a small research reactor located at the Sawyer Science and Engineering Building of the Royal Military College of Canada in Kingston, Ontario. It has been in operation since 1985 and is used for neutron activation analysis, neutron radiography, neutron tomography and nuclear and radiation protection training.

RMC requested the renewal of its Non-Power Reactor Licence NPROL-20.00/2023 on February 23, 2022 [1]. The current operating licence for the facility was issued July 1, 2013 [2] and will expire on June 30, 2023. RMC also requested a change to its operating limits and conditions, specifically an increase to the maximum excess reactivity of the reactor core, from 4.0 mk to 4.3 mk.

During the current licence period, CNSC staff verified RMC's compliance with regulations and licence conditions through various compliance activities. There were no incidents involving the safety of the reactor, personnel, the public or the environment reported to the CNSC. RMC has maintained satisfactory performance in all 14 safety and control areas (SCA). Since 2013, CNSC has presented the licensee's compliance performance to the Commission in regulatory oversight reports on a three-year basis (2015, 2018 and 2021).

CNSC staff reviewed RMC's request to increase the maximum excess reactivity and concluded that the change is within the design basis.

In Part 1 of this Commission Member Document (CMD), CNSC staff present the conclusion of its review of the licence application and of the licensee's performance over the current period. Based on these reviews, CNSC staff determined that the application complies with regulatory requirements and that RMC's performance during the licensing term was satisfactory and met regulatory requirements.

Following from these conclusions, CNSC staff recommend that the Commission take the following actions:

1. Conclude, pursuant to paragraphs 24(4)(a) and (b) of the [Nuclear Safety and Control Act](#) (NSCA), that RMC:
 - i. is qualified to carry on the activities authorized by the licence.
 - ii. will make adequate provisions for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
2. Accept an increase to the maximum allowable excess reactivity of the reactor from 4.0 to 4.3 mk in RMC's operating limits and conditions (OLC).
3. Accept the financial guarantee as set out in section 5.2 of this CMD.

4. Delegate authority as set out in section 5.5 of this CMD.
5. Approve the issuance of the proposed 10-year licence NPROL-20.00/2033 for the operation of the RMC facility, effective July 1, 2023 to June 30, 2033.

Part 2 of this CMD provides licensing-related documentation pertaining to this hearing, such as proposed licence changes, the proposed licence and the current licence. A draft licence conditions handbook is also included for information purposes only. Referenced documents in this CMD are available to the public upon request, subject to confidentiality considerations.

CMD STRUCTURE

This Commission Member Document (CMD) is presented in 2 parts.

Part 1 of this CMD includes:

1. An overview of the matter being presented;
2. Overall conclusions and overall recommendations;
3. General discussion pertaining to the safety and control areas (SCAs) that are relevant to this submission;
4. Discussion about other matters of regulatory interest; and
5. Addenda material that complements items 1 through 4.

Part 2 of this CMD provides all available information pertaining directly to the current and proposed licence, and the proposed Licence Conditions Handbook (LCH).

1. OVERVIEW

1.1 Background

The Royal Military College of Canada (RMC) is licensed to operate a SLOWPOKE-2 reactor under licence no. NPROL-20.00/2023. The small research reactor is located at the Sawyer Science and Engineering Building (Sawyer Building) of the RMC in Kingston, Ontario. The property and the reactor belong to the Crown and are administered by Department of National Defense (DND) in the name of the Commandant of RMC.

The RMC SLOWPOKE-2 reactor was designed and built by Atomic Energy of Canada Ltd. (AECL). The reactor was commissioned in September 1985, and it has operated for 36 years using the original Low Enriched Uranium (LEU) fuel core. In 2021, RMC undertook and successfully completed the refueling of the reactor. The new fuel is expected to extend the life of the reactor for another 35 years.

RMC Location and Layout

Figure 1 shows an aerial view of the site and the peninsula on which the Facility is located with respect to the City of Kingston, and Fort Henry, a UNESCO Heritage site.

Figure 1: Location of the RMC Campus



(Source: Google Maps)

The City of Kingston lies to the west and north of RMC. The part of the city to the west of RMC has a mix of small businesses and residential units. Directly to the east of RMC lies Navy Bay and Fort Henry. Lake Ontario lies to the south of the peninsula on which RMC is located.

Figure 2 shows a closer view of the RMC campus and the Sawyer Building where the SLOWPOKE-2 reactor is located.

Figure 2: RMC SLOWPOKE-2 reactor location



(Source: RMC)

Figure 3 shows the layout of the SLOWPOKE 2 Facility in the Sawyer Building. The reactor itself is identified as the circle, with the reactor head and the beam tube identified as 1 and 2 respectively. The reactor itself is in a concrete well underneath the building slab of the reactor room.

Figure 3: RMC SLOWPOKE-2 reactor location within Sawyer Building



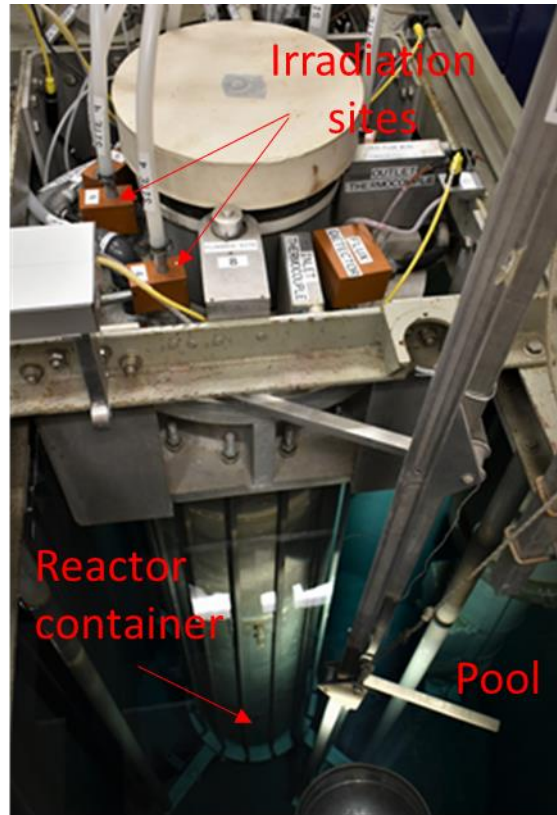
(Source: RMC)

Reactor Design

The RMC SLOWPOKE-2 is a 20-kW thermal sealed-container-in-pool type research reactor. The reactor is light water cooled and moderated and uses LEU at 19.89% U-235 enrichment for fuel. The core is cooled by natural convection and is surrounded by a beryllium reflector. The design of the SLOWPOKE-2 reactor is inherently safe through its self-limiting characteristic through a strong negative thermal power coefficient and is considered a low-risk facility. The safety analysis confirms that no credible event could result in any significant radiological release from the facility.

Figure 4 shows a view of the reactor pool and systems, including the pneumatically controlled irradiation sites.

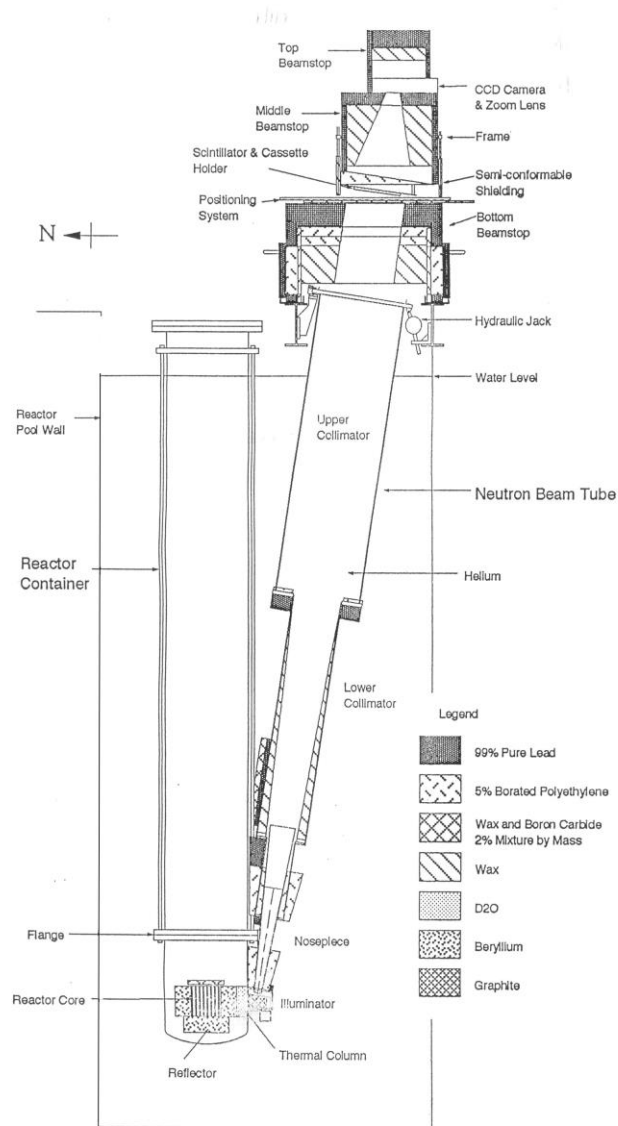
Figure 4: The RMC SLOWPOKE-2 reactor



(Source: RMC)

The open pool shown above provides easy access for in-pool irradiations and to the Tangential Neutron Beam Tube, shown on Figure 5.

Figure 5: RMC SLOWPOKE-2 reactor with neutron beam tube



(Source: RMC)

The RMC SLOWPOKE-2 reactor has been used for nuclear and radiation protection education and training, neutron activation analysis, neutron radiography, and neutron tomography. The neutron beam tube seen above allows for thermal neutrons to be funneled from the reactor core through the beam tube and up to a sample where an image is taken. This imaging has found several applications, including non-destructive analysis of aircraft parts.

1.2 Activities to be licensed

There is no change in RMC's proposed activities for the new licence period. Part IV of the proposed licence lists the authorized activities, as follows:

- (i) operate the RMC SLOWPOKE-2 reactor and associated facilities, located in the Sawyer Science and Engineering Building at the Royal Military College of Canada, in Kingston, Ontario;
- (ii) produce, possess, transfer, use, package, manage, and store the nuclear substances that are required for, associated with or arise from the activities described in (i); and
- (iii) possess, transfer and use prescribed equipment and information that are required for, associated with or arise from the activities described in (i).

In the proposed licence, standardized licence condition G.1 requires the licensee, unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission"), to conduct the activities described in Part IV of the licence in accordance with the licensing basis for the facility, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence; and
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application.

Standardized licence condition G.2 requires the licensee to give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

RMC has requested the renewal of its Class IA Non-Power Reactor Operating Licence for a period of 10 years, which is consistent with the current licence period.

1.3 Highlights

Between 2013 and 2023, CNSC staff conducted 9 inspections (see Appendix D) and several other compliance activities, such as desktop reviews and nuclear material inspections, covering all 14 Safety and Control Areas (SCA) and other areas of regulatory interest, such as the Public Information and Disclosure program. At the time of finalizing this CMD, there have been no events reported to the CNSC during the 10-year period. The radiation exposures have been well below the regulatory limits and action levels for nuclear energy workers (NEW) and members of the public. CNSC rated RMC's performance as satisfactory in all 14 SCAs, as reported in CNSC's Regulatory Oversight Reports [3, 4, 5] in 2016, 2018 and 2021.

In 2020, RMC undertook a project to refuel the reactor as the original fuel core was becoming exhausted after 35 years of operation. As the fuel is being used, the reactivity of the core becomes progressively reduced to a point where it is no longer possible to produce a neutron flux that is sufficient for irradiations, radiography and other applications. The fuel is then considered exhausted, or spent, and replacement is necessary.

CNSC staff conducted an inspection during the refueling operation and several other licensing and compliance activities were completed in areas that include safety analysis, criticality control, radiation protection, security and packaging & transport. The project was completed in 2021 without incident. The RMC SLOWPOKE-2 reactor was restarted successfully in August 2021, and the new LEU fuel is expected to last another 35 years.

1.4 Assessment of RMC's Licence Application

CNSC staff have reviewed all aspects of RMC's application [1] for the renewal of its licence and determined that it complies with regulatory requirements for a Class IA licence application. The licence application also needs to demonstrate that RMC will make adequate provisions for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. CNSC staff determined that RMC's licence renewal application and supporting documents provide sufficient information to demonstrate that appropriate safety and control measures are in place at RMC to meet CNSC's regulatory requirements, and that RMC is qualified to operate the SLOWPOKE-2 reactor.

1.5 Overall Conclusions

CNSC staff have reviewed RMC's performance over the current licence period and reported the results to the Commission in public meetings through Regulatory Oversight Reports [3, 4, 5]. CNSC staff's assessments of performance and compliance are based on desktop reviews of RMC's submissions, including annual compliance reports, program documents, and the results of CNSC inspections. CNSC staff have determined that RMC's performance during the licensing term was satisfactory and consistently met regulatory requirements.

RMC has made adequate provisions for the protection of the environment, the health and safety of persons and the maintenance of national security. RMC has implemented all required measures to meet international obligations that Canada has agreed. CNSC staff determined that RMC has all the programs in place to continue to safely carry out the activities requested in its licence application.

CNSC staff conclude that RMC is qualified and capable of performing the activities authorized in the proposed licence.

1.6 Overall Recommendations

CNSC staff recommend that the Commission:

1. Conclude, pursuant to paragraphs 24(4)(a) and (b) of the [Nuclear Safety and Control Act](#) (NSCA), that RMC:
 - a) Is qualified to carry on the activities authorized by the licence; and,
 - b) Will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
2. Accept an increase to the maximum allowable excess reactivity of the reactor from 4.0 to 4.3 mk in RMC's operating limits and conditions (OLC).
3. Accept the financial guarantee as set out in section 5.2 of this CMD.
4. Delegate authority as set out in section 5.5 of this CMD.
5. Approve the issuance of the proposed 10-year Non-Power Reactor Licence NPROL-20.00/2033 for operation of the RMC SLOWPOKE-2 reactor, effective July 1, 2023, to June 30, 2033.

2. ENVIRONMENTAL PROTECTION REVIEW

CNSC staff reviewed the application for a licence renewal to identify the type of environmental review required. As part of this process, CNSC staff must assess whether an integrated impact assessment or a federal lands review under the [Impact Assessment Act](#) (IAA) is required. For this licence renewal application, neither are required because the application does not include activities listed in the IAA [Physical Activities Regulations](#) that require an impact assessment or that meet the definition of a project on federal lands.

CNSC staff conduct environmental protection reviews (EPR) for all licence applications with potential environmental interactions, in accordance with CNSC's mandate under the NSCA and associated regulations. The EPRs help support the Commission's conclusion on whether the proposal provides adequate protection of the environment and the health of people.

An EPR was conducted for this licence application. More information on CNSC staff's EPR can be found in section 3.9 of this CMD.

CNSC staff have found that the information provided by RMC regarding environmental protection is sufficient to meet the applicable regulatory requirements under the NSCA and associated regulations for the licence renewal.

CNSC staff will continue to verify and ensure that, through ongoing licensing and compliance activities and reviews, the environment and the health of persons are protected and will continue to be protected over the proposed licence period.

3. GENERAL ASSESSMENT OF SCAs

The functional areas of any licensed facility or activity consist of a standard set of safety and control areas (SCAs). Each SCA is comprised of “specific areas” of regulatory interest, which may vary between facility types. The SCA framework is defined in Appendix C, and the specific areas that comprise the SCAs for this facility are identified in Appendix C.2.

The following sections discuss the review and assessment of RMC’s proposed measures and controls and past performance in each SCA. The sections also discuss the compliance verification activities that were conducted over the current licence period. A list of inspections, and the SCAs verified for each inspection, is provided in Appendix D.

3.1 Management System

The Management System SCA covers the framework that establishes the processes and programs required to ensure an organization achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.

The specific areas that comprise this SCA at RMC are discussed in this CMD and include:

- Management System
- Organization
- Performance Assessment, Improvement and Management Review
- Operating Experience (OPEX)
- Change Management
- Safety Culture
- Configuration Management
- Records Management
- Management of Contractors
- Business Continuity

3.1.1 Trends

The following table indicates the overall rating trends for the Management System over the current licensing period:

MANAGEMENT SYSTEM								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has implemented a Management System for the SLOWPOKE-2 reactor that meets the requirements of CSA standard N286-12, <i>Management System Requirements for Nuclear Facilities</i> [6]. The management system SCA at RMC met applicable CNSC requirements and received a “satisfactory” rating during the entire licence period.								

3.1.2 Discussion

Regulatory Requirements

Paragraph 3(d) of the [Class I Nuclear Facilities Regulations](#) (CINFR) states that an application for a licence to operate a Class I nuclear facility shall contain “the proposed management system for the activity to be licensed.”

The [General Nuclear Safety and Control Regulations](#) (GNSCR), section 3 contain requirements that form the basis of a management system.

During the licence period, the CNSC published [REGDOC-2.1.1, Management System](#), which refers to CSA N286-12 *Management system requirements for nuclear facilities* [6], and [REGDOC-2.1.2, Safety Culture](#). Both documents apply to the RMC SLOWPOKE-2 facility.

3.1.3 Summary

A summary of the licensee’s past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.1.3.1 Past Performance

CNSC staff conducted 7 inspections with compliance verification items related to the management system over the licence period. These resulted in 3 notices of non-compliance (NNC) in the areas of annual program reviews (2013), document updates (2014), and procedure version control and access (2014). The non-compliances were of low safety significance, as they did not directly impact the safety of the facility, personnel, the public or the environment. RMC implemented corrective actions which CNSC staff reviewed and assessed as appropriate and effective.

In 2018, CNSC staff requested RMC to implement the requirements of CSA N286-12 *Management system requirements for nuclear facilities* [6]. This standard has requirements for management systems to include topics on

organization, performance assessment, improvement and management review, operating experience (OPEX), change management, safety culture, configuration management, records management, management of contractors and business continuity, which apply to the RMC facility. Also in 2018, CNSC published REGDOC-2.1.2, *Safety Culture*. Both documents were included in an update to RMC's LCH. In response to CNSC staff's request, RMC updated its management system in 2018, which CNSC staff have since assessed as satisfactory.

In 2019, CNSC staff published REGDOC-2.1.1, *Management System*, which refers to CSA N286-12 *Management system requirements for nuclear facilities* [6]. This regulatory document does not duplicate the generic requirements of CSA N286-12 but provides specific expectations and guidance.

CNSC staff conclude that RMC's management system meets all regulatory requirements and expectations.

3.1.3.2 Regulatory Focus

CNSC staff will continue to monitor RMC's performance in this SCA through the execution of regulatory oversight activities, focusing on continued compliance with the CSA N286-12 standard and CNSC's regulatory documents.

3.1.3.3 Proposed Improvements

The current management system and programs at RMC are considered adequate. CSA N286-12 and REGDOC-2.1.2 are already referenced as CVC in the current LCH. REGDOC-2.1.1, *Management System* was published later (2019) and is referenced as CVC in the new proposed LCH.

3.1.4 Conclusion

CNSC staff conclude that RMC continues to maintain and implement a documented management system in accordance with CNSC regulatory requirements.

Based on CNSC staff assessments of RMC's licence renewal application, supporting documents and performance, CNSC staff conclude that RMC has implemented appropriate measures and programs to meet CNSC expectations under this SCA.

CNSC staff will continue to monitor the RMC's performance through desktop reviews and onsite compliance verification activities.

3.1.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 1.1 requires RMC to implement and maintain a management system. Compliance verification criteria (CVC) for this licence condition are included in the proposed LCH.

3.2 Human Performance Management

The Human Performance Management SCA covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee personnel are in all relevant job areas and these personnel have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

The specific areas that comprise this SCA at RMC include:

- Personnel Training
- Personnel Certification
- Work Organization and Job Design
- Fitness for Duty

3.2.1 Trends

The following table indicates the overall rating trends for the Human Performance Management over the current licensing period:

HUMAN PERFORMANCE MANAGEMENT								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC maintains a training system and programs that are based on Systematic Approach to Training (SAT). The satisfactory trend for this SCA has remained stable for RMC over the licensing period. RMC has ensured that the training programs have been updated and improved over the course of the current licensing period. RMC continues to maintain certification for workers employed in certified position while ensuring that the number of certified workers is sufficient. There were no personnel certification concerns raised during the licence period of 2013-2023.								

3.2.2 Discussion

Regulatory Requirements

Subsection 12(1) of the [GNSCR](#) requires that a licensee shall: (a) ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the [NSCA](#), the regulations made under the NSCA and the licence; and (b) train the workers to carry on the licensed activity in accordance with the NSCA, the regulations made under the NSCA and the licence.

Paragraph 3(d.1) of the [CINFR](#) requires that an application for a licence contain the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty. Paragraphs 6(m) and 6(n) of the CINFR require that licence applications include the proposed

responsibilities of, and qualification requirements and training program for workers, including the procedures for the requalification of workers; and the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.

Subsections 9(2) and 9(3) of the CINFR establishes provisions and conditions under which the Commission or a designated officer may certify persons referred to in paragraph 44(1)(k) of the NSCA and renew certificates. Subsection 9(4) stipulates the duration of certificates of five years after the issuance date. Paragraph 14(2)(e) of the CINFR requires every licensee to keep a record of the status of each worker's qualifications, requalification and training, including the results of all tests and examinations completed in accordance with the licence.

RMC is required to implement and maintain training programs for workers in accordance with the requirements set out in [REGDOC-2.2.2 Personnel Training](#), which was published in December 2016 and incorporated in RMC's revised LCH in 2019.

3.2.3 Summary

RMC maintains training governance documentation that address regulatory training and qualification requirements, including processes for implementing the various phases of a training system based on SAT in accordance with the requirements of [REGDOC-2.2.2 Personnel Training](#).

Overall, RMC has implemented a robust methodology to assure and continue to assure that workers are qualified to perform their duties safely. CNSC staff conclude that RMC is performing satisfactorily with respect to this SCA.

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.2.3.1 Past Performance

Personnel Training, Work Organization and Job Design, Fitness for Duty

The RMC SLOWPOKE-2 facility has a staff of 3 employees who directly support the licensed activities. There are 2 more employees who occasionally support the facility as part of their broader roles at RMC, and 1 contractor.

Since 2009, RMC has implemented and maintained a SAT based training system and program to provide assurance that workers are qualified to perform their duties safely. A SAT-based training system provides interdependent functions consisting of analysis, design, development, implementation and evaluation.

RMC maintains training governance documentation that address regulatory training and qualification requirements, including processes for implementing the various phases of a SAT in accordance with the requirements of [REGDOC-2.2.2, Personnel Training](#).

During the current licensing period, CNSC staff conducted several compliance verification activities, including 8 inspections that included compliance

verification criteria on personnel training. One inspection, conducted in January 2022 was specifically focused on RMC's personnel training programs. The inspection covered a cross-section of all applicable requirements under REGDOC-2.2.2 to ensure the key principles of the training program (performance oriented, systematically developed) are met. These principles include components such as work organization and job design, which constitute specific areas of the Personnel Training SCA.

As a result of these inspections, CNSC staff issued 5 NNCs in the areas of training design and development, program implementation, documentation and record keeping. The non-compliances were of low safety significance, and RMC developed corrective action plans which were reviewed and accepted by CNSC staff. CNSC staff are satisfied with RMC's response to the inspection findings. CNSC staff also conducted periodic document reviews of RMC's training to ensure that a SAT-based training system is adequately implemented.

RMC implements an employee fitness-for-duty program as part of the broader DND human resources department. CNSC staff have assessed this program component as part of inspections and desktop reviews, and no issues have been noted. RMC has provided a robust methodology to assure workers are qualified to perform their duties safely. CNSC staff conclude that RMC is performing satisfactorily with respect to this SCA.

Personnel Certification

The RMC SLOWPOKE-2 licence requires that any person appointed to the position of Reactor Operator, Reactor Engineer or Reactor Technician holds a certification issued under the NSCA, and its regulations.

To become a certified worker, a candidate must meet personnel selection criteria and successfully complete the training program and certification requirements described in RMC's licence and LCH. The CNSC then certifies the candidates who meet these requirements and who have demonstrated their competence to safely perform the duties of the certified position. Once certified by the CNSC, certified workers undergo continuing training to ensure that they maintain the knowledge and skills to safely perform their duties. Roles and responsibilities of certified personnel are described in the licensee's *Reactor Manual for the SLOWPOKE-2 Facility at RMC* (Reactor Manual).

RMC has maintained a sufficient number of certified workers while also ensuring that the certified workers continue to remain competent through ongoing training, which includes any changes to the SLOWPOKE-2 facility and operational procedures, and by ensuring continuing performance of duties.

Certain maintenance operations on the reactor are defined as nuclear maintenance in the LCH and must be conducted by, or under the direct supervision of, a person certified by the CNSC as a reactor engineer or reactor technician. The reactor engineers and reactor technicians are employees of the Canadian Nuclear Laboratories (CNL) and are certified to perform maintenance work at the SLOWPOKE-2 facility at RMC, such as they did during the 2021 refueling.

Below is a table showing the number of certified workers at RMC as of June 13, 2022. Note that the Reactor Engineer and Reactor Technicians are CNL employees. They are certified to work on the RMC reactor for specific nuclear maintenance tasks that are specified in the LCH. Also note that the 6 certified reactor operators that are authorized to operate the reactor in automatic mode include the 3 operators who are certified to operate the reactor in manual mode.

Table 1: Number of Certified Workers in Each Certified Position (2022)

Reactor Operator (Auto Mode)	Reactor Operator (Manual Mode)	Reactor Engineer	Reactor Technician
6	3	1	2

CNSC staff monitor the licensee's performance in the Personnel Certification area through regular compliance verification activities such as inspections on the licensee's training program and review of the licensee's program documentation and annual compliance reports. There have been no non-compliances related to personnel certification, and there are no outstanding concerns or areas of improvements that have been identified by CNSC staff.

RMC continues to maintain certification for workers employed in certified position while ensuring that the number of certified workers is sufficient. CNSC staff conclude that over the licensing period, the licensee's performance in the Personnel Certification specific area and the number of certified workers that are currently employed at the SLOWPOKE-2 reactor facility met regulatory requirements.

3.2.3.2 Regulatory Focus

CNSC staff will continue to monitor and evaluate RMC's compliance with regulatory requirements through regulatory oversight activities including inspections, review of compliance reports, and updates to licensing basis program documentation.

3.2.3.3 Proposed Improvements

The current programs at RMC are considered adequate for this SCA. No improvements for the personnel training or personnel certification specific areas are proposed.

3.2.4 Conclusion

Overall, RMC has strengthened the training program over the licensing period and provided a robust methodology to assure that workers are qualified to perform their duties safely. RMC's performance in the Personnel Certification specific area and the number of certified workers that are currently employed at the SLOWPOKE-2 reactor facility met the regulatory requirements. CNSC staff conclude that RMC is performing satisfactorily with respect to this SCA.

3.2.5 Recommendation

Two standardized licence conditions are included in the proposed licence for this SCA. Licence condition 2.1 requires the licensee implement and maintain a training program. Licence condition 2.2 requires the licensee to ensure that persons appointed to the positions of reactor engineer, reactor technician, and reactor operator hold certifications in accordance with the requirements of the NSCA.

CVC for these licence conditions are included in the proposed LCH, included in Part 2 of this CMD.

3.3 Operating Performance

The specific areas that comprise this SCA at RMC include:

- Conduct of Licensed Activity
- Procedures
- Reporting and Trending
- Outage Management Performance
- Safe Operating Envelope

3.3.1 Trends

The following table indicates the overall rating trends for the Operating Performance over the current licensing period:

OPERATING PERFORMANCE								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has maintained an operating program in accordance with CNSC regulatory requirements over this licence period. RMC continues to be rated SA in this SCA								

3.3.2 Discussion

Regulatory Requirements

The NSCA and its regulations require the licensee to ensure that policies, programs, practices and procedures are in place for the safe operation and maintenance of its nuclear facility.

Paragraph 6(d) of the CINFR requires that an application for a licence to operate a Class I nuclear facility contain the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

The occupational and industrial safety aspects of RMC's operations are regulated under the [Canada Labour Code](#), and its associated [Canada Occupational Health and Safety Regulations](#).

[REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills](#) was published in 2018 and revised in 2022, and provides requirements for reporting on Operating Performance.

3.3.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.3.3.1 Past Performance

Conduct of Licensed Activity

During the current licence term, RMC operated its facility in compliance with its licensing basis. CNSC staff verified RMC's compliance with the requirements of this SCA as part of compliance activities, which included desktop reviews of annual reports, operation reports and inspections. CNSC staff confirmed through these activities that RMC has implemented and maintained an effective operating program, ensuring licensed activities are conducted safely and in compliance with regulatory requirements.

CNSC staff conducted 7 inspections with compliance verification criteria under this SCA. One NNC related to design requirements around facility renovations, and one recommendation in the area of digital storage media were issued for the Operating Performance SCA. The non-compliance was of low safety significance and RMC implemented corrective actions to address the finding and recommendation in a timely manner. CNSC staff verified that RMC took appropriate corrective measures and all non-compliances were resolved promptly.

Procedures

RMC's management system consists of high-level program documents supported by lower-level procedures and work instructions. Program and procedural documentation are subject to periodic auditing by RMC management to ensure programs are implemented and remain adequate and effective.

The LCH identifies the information regarding version control of licensing basis documents, including codes, standards or other documents that are used as compliance verification criteria, and stipulates requirements for providing change notification, which triggers reviews by CNSC staff. This ensures that changes continue to align with regulatory requirements and the RMC licensing basis.

Procedure adherence and adequacy has been a standard verification item in all inspections that CNSC staff conducted at RMC.

Based on these reviews, CNSC staff conclude that RMC adequately maintains its procedures and program documents to ensure the safe operation of the RMC facility.

Reporting and Trending

In December 2018, CNSC staff requested RMC to implement the requirements of REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*. This regulatory document sets out regulatory requirements and guidance for routine compliance reporting, as well as non-routine reporting such as event and action level exceedances. Prior to the implementation of REGDOC-3.1.2, detailed requirements for reporting unplanned situations or events were included in RMC's LCH and were based on section 29 of the [GNSCR](#).

RMC did not report any incidents over the current licence period as there were no such occurrences. RMC continues to provide annual compliance reports in accordance with REGDOC-3.1.2.

Outage Management Performance

In 2021, after 36 years of operation, RMC undertook a project to refuel the SLOWPOKE-2 reactor. The project involved the removal of the fuel core, shipment of the spent fuel core to the Canadian Nuclear Laboratories (CNL) in an approved container, fabrication and installation of the new core by CNL, and adjustment of the reactivity through the insertion of beryllium shims. These operations were performed by personnel certified by the CNSC, which included the reactor engineer, the reactor technician and the reactor operator, in addition to an extensive team of physicists, engineers, technicians, health physicists and other support staff.

Several compliance and licensing activities were completed in the areas including safety analysis, nuclear criticality safety, radiation protection, security and packaging and transport. CNSC staff conducted an inspection during the outage and refueling operation and there were no non-compliances identified as part of this inspection.

The commissioning tests were completed, and the reactor was returned to service on September 10, 2021, after a 5-month outage.

Safe Operating Envelope

The operating limits and conditions define the conditions that must be met to prevent situations or events that might lead to accidents, or to mitigate the consequences of accidents, should they occur. RMC maintains a set of Operating Limits and Conditions (OLC) that are included in Appendix A of the current licence. RMC has not exceeded or contravened any of the OLCs during the current licence period.

As part of its application for the renewal of its licence, RMC requested an increase to the maximum allowable excess reactivity of the reactor from 4.0 to 4.3 mk¹ in order to facilitate periodic reactor shimming operations and optimize the effective life of the fuel. RMC has submitted a technical analysis in support of

¹ mk, or milli-k is a unit to measure reactivity ρ , defined as follows: $\rho = (k-1)/k \cdot 10^{-3}$, where $k = (\text{neutrons produced in one generation})/(\text{neutrons produced in the previous generation})$

this increase. CNSC staff reviewed the analysis and confirmed that there is no impediment to increasing the limit as requested. This is further discussed in section 3.4 on safety analysis.

OLCs are usually listed in licensee documents, which are assessed by CNSC staff. For RMC, the OLCs were extracted from the Reactor Manual and listed in an appendix of the current licence and therefore, a change in operating limits is subject to Commission approval. CNSC staff recommend that the Commission accept the increase in the maximum excess reactivity from 4.0 to 4.3 mk. Also, to be consistent with other licences and standard practices, CNSC staff propose removing the OLCs from the licence and including them in the LCH instead, under the Operating Performance SCA.

3.3.3.2 Regulatory Focus

CNSC staff continue to monitor RMC's performance in this SCA through regulatory oversight activities including inspections, desktop reviews of relevant program documentation and periodic reports.

3.3.3.3 Proposed Improvements

The current programs at RMC are considered adequate for this SCA. No significant improvement projects have been identified by RMC for the requested licence period. The proposed LCH include the OLCs under the Operating Performance section.

3.3.4 Conclusion

Based on CNSC staff assessments of RMC's application, supporting documents and past performance, CNSC staff conclude that RMC continues to implement and maintain an effective operating program in accordance with regulatory requirements.

3.3.5 Recommendation

Two standard licence conditions are included in the proposed licence for this SCA. Licence condition 3.1 requires RMC to implement and maintain an operating program, which includes a set of operating limits.

Licence condition 3.2 requires RMC to implement and maintain a program for reporting to the Commission or a person authorized by the Commission. Delegation of authority with respect to "a person authorized by the Commission" is discussed in section 5.5 of this CMD. CVC for both licence conditions are included in the proposed LCH.

CNSC staff recommend that the Commission accept an increase to the maximum allowable excess reactivity of the reactor from 4.0 to 4.3 mk in RMC's OLCs.

3.4 Safety Analysis

The Safety Analysis SCA covers the maintenance of the safety analysis that supports the overall safety case for the facility. Safety analysis is a systematic

evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards. The results of the safety analysis are documented in the licensee's Safety Analysis Report (SAR).

The specific areas that comprise this SCA at the RMC SLOWPOKE-2 facility are:

- Deterministic Safety Analysis
- Hazard Analysis
- Nuclear Criticality Safety

3.4.1 Trends

The following table indicates the overall rating trends for the Safety Analysis over the current licensing period:

SAFETY ANALYSIS								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC's SAR effectively identifies facility hazards and Structures, Systems and Components (SSC) relied upon for safety to control or mitigate these hazards. RMC's performance continues to be rated SA for this SCA.								

3.4.2 Discussion

Regulatory Requirements

Paragraph 3(1)(i) of the GNSCR requires a description and the results of any test, analysis or calculation performed to substantiate the information included in the application. Paragraph 6(a) of the CINFR requires that an application for a licence to operate include a description of the structures at the nuclear facility, including their design and their design operating conditions. Paragraph 6(b) of the CINFR requires that an application for a licence to operate include a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions. Paragraph 6(c) of the CINFR requires that an application for a licence to operate include a final SAR. A safety analysis must include an analysis of the postulated sequences and consequences of conditions that could arise from initiating events and associated hazards.

The CNSC published [REGDOC-2.4.1, *Deterministic Safety Analysis*](#) in 2014, which applies to the RMC SLOWPOKE-2 facility. In September 2020, [REGDOC-2.4.3, *Nuclear Criticality Safety*](#) was published, replacing RD-327 *Nuclear Criticality Safety*, and also applies to RMC.

3.4.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.4.3.1 Past Performance

RMC's application for a licence renewal included a SAR for the RMC reactor. The SAR provides a description of the facility and building layouts, processes, operating limits, and scenarios based on hazards and postulated initiating events. In addition, the SAR provides an assessment of potential consequences and demonstrates the safety case through defence in depth. CNSC staff assessed the information provided in the SAR and determined that RMC has adequately assessed the hazards associated with licensed activities and demonstrated an adequate level of protection over a broad range of operating conditions. RMC's SAR meets the requirements of REGDOC-2.4.1, *Deterministic Safety Analysis*.

During the current licence period, CNSC staff conducted desktop reviews of the safety analysis documentation and program. CNSC staff performed a compliance inspection during the RMC refueling project, which included verification that the licensee has implemented the criticality safety barriers and protective systems as specified in the RMC facility's SAR. There were no non-compliances identified as part of this inspection.

As discussed under the Operating Performance section above, RMC requested a change in its operating limits, which are listed under Appendix A of NPROL-20.00/2023. The change implies increasing the maximum excess reactivity limit from 4.0 to 4.3 mk, which would facilitate periodic reactor shimming operations and optimize the effective life of the fuel. This change request is supported by a corresponding safety analysis. CNSC staff reviewed the supporting analysis and found it to be valid and technically sound. CNSC staff also noted that the licensee has submitted both the analytical simulations and the measured data that were obtained from a similar SLOWPOKE-2 reactor. The simulations and the measured data demonstrate that the requested change to 4.3 mk maximum excess reactivity would not affect the safety of the reactor, with a significant margin. CNSC staff confirm that there is no impediment to increasing the limit as requested and CNSC staff recommend that the Commission accept this change under the Operating Performance SCA (see section 3.3).

Based on its review of the submitted application and supporting documents, CNSC staff conclude that the radiological and non-radiological risks associated with RMCs operation of the reactor facility remain low.

Deterministic safety analysis

RMC has performed several safety assessments to ensure the safety of its operations as part of the continued improvement of safety analysis. These assessments have included updates to assessment for aircraft impacts, flooding risk analysis, earthquake risk analysis, and tornado.

Selection of these accident conditions have been performed using a hazard analysis approach. Demonstration of safety in credible scenarios was performed using deterministic approaches.

Hazard analysis

RMC's SAR provides information on site characterization, including details on the geology, seismology, meteorology, hydrology, etc. This information is taken into consideration in the safety assessment and design of the facility.

The hazard analysis is part of the SAR and covers a number of factors that could be hazardous to the facility, its staff and the public. In May 2022, CNSC staff requested RMC to update the SAR to cover events such as high winds and tornadoes. RMC provided the analysis and demonstrated that no such event could credibly compromise the inherent safety of the RMC SLOWPOKE-2 reactor. The RMC SAR was updated with this information.

Upon CNSC staff's request, RMC also provided information on potential flooding events. RMC provided information which is based in part on the analysis that RMC produced as part of the lessons learned from the 2011 Fukushima event, and also based on RMC's Environmental Risk Assessment (discussed under section 3.9). RMC demonstrated that potential flood damage is mitigated by design, where the water would need to rise by over 1.8 m to reach the reactor level. Also, all electrical control units are above floor level and electrical connections are waterproof where possible. RMC concluded that there is no credible flooding scenario where the safety of the reactor could be compromised by flooding and that there would be no significant release of radionuclides resulting from such events. CNSC staff reviewed the analysis and are satisfied that RMC's conclusions are adequately supported.

Nuclear Criticality Safety

During the licensing period, the CNSC regulatory document; RD-327 Nuclear Criticality Safety was updated and published as REGDOC-2.4.3, *Nuclear Criticality Safety* in September 2020. RMC has reviewed the nuclear criticality safety program to ensure that it meets the requirements of REGDOC-2.4.3. The program was reviewed by CNSC staff and found to be satisfactory.

During the 2021 refueling of the RMC reactor, the licensee needed to perform operations with fissionable materials outside of the reactor. To ensure safety during those operations, the licensee has identified applicable nuclear criticality safety requirements as stated in REGDOC-2.4.3 and performed a criticality safety analysis, which CNSC staff reviewed. Based on this analysis, the licensee implemented appropriate criticality safety controls during the entire process of refueling and CNSC staff verified its implementation during the refueling inspection.

3.4.3.2 Regulatory Focus

CNSC staff continue to monitor RMC's performance in this SCA through regulatory oversight activities including onsite inspections and desktop reviews of

RMC's compliance reporting, and revisions to relevant program documentation pertaining to safety analysis.

3.4.3.3 Proposed Improvements

The current programs at RMC for this SCA are considered acceptable. No specific improvements are being proposed.

3.4.4 Conclusion

RMC has processes in place to identify and evaluate potential safety hazards associated with the operation of these facilities. The facility has not been modified to require further analysis during the licensing period. However, RMC updated its SAR to reflect some additional hazards associated with climate change, and RMC produced the safety case required to increase the maximum excess reactivity. CNSC staff assessed RMC's documentation and analyses under the safety analysis SCA and found that it meets regulatory requirements. RMC remains in compliance with regulatory requirements for the Safety Analysis SCA.

3.4.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Standardized licence condition 4.1 requires RMC to implement and maintain a safety analysis program. CVC for this licence condition are included in the proposed LCH.

3.5 Physical Design

The physical design SCA relates to activities that impact the ability of systems, components and structures to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

The specific areas that comprise this SCA at RMC include:

- Design Governance
- Site Characterization
- Facility Design
- Structure Design
- System Design
- Components

3.5.1 Trends

The following table indicates the overall rating trends for the Physical Design over the current licensing period:

PHYSICAL DESIGN								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has maintained a physical design program in accordance with CNSC requirements over the previous licence period. RMC's performance continues to be rated SA for this SCA.								

3.5.2 Discussion

Regulatory Requirements

RMC is required to implement and maintain a physical design program such that the design of its facility and any subsequent changes remain within the licensing basis. Paragraph 3(1)(d) of the GNSCR requires that an application for a licence shall contain a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.

The CINFR require that an application for a licence shall contain, under paragraphs:

- 3(a), a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;
- 3(b), plans showing the location, perimeter, areas, structures and systems of the nuclear facility;
- 6(a), a description of the structures at the nuclear facility, including their design and their design operating conditions;
- 6(b), a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;
- 6(c), a final safety analysis report demonstrating the adequacy of the design of the facility; and
- 6(d), proposed measures, policies, methods and procedures for operating and maintaining the facility.

Additional requirements under this SCA are provided by national codes and standards including the [National Building Code of Canada](#) (NBCC) and [National Fire Code of Canada](#) (NFCC) for structural design. RMC does not have pressure retaining systems and therefore, the [Technical Standards and Safety Act](#) or standards for pressure retaining component design do not apply.

RMC is required to notify the CNSC of any proposed changes with potential to impact the fire protection program and submit an accompanying third-party assessment of the potential impact of these changes.

CNSC staff confirm that RMC has implemented and maintained an adequate physical design program with appropriate change control processes in place to ensure changes are executed safely and within RMC's licensing basis.

3.5.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.5.3.1 Past Performance

Design Governance

AECL is the Design Authority of the SLOWPOKE-2 Reactor at RMC. AECL delegates the technical aspects, such as nuclear maintenance, reactivity adjustments, fuel fabrication, etc. to CNL. Outside of the reactor container itself, any system addition, design, modification or procurement is governed by RMC's Change Control process under the Management System.

RMC has a safety committee for the SLOWPOKE-2 reactor, which provides oversight of safety and control processes. The RMC Management System describes the structure of the organization, including the roles and responsibilities of Facility staff. There have been no physical changes to the design of the SLOWPOKE-2 Reactor over the current licence period.

Site Characterization

RMC's SAR and the Reactor Manual together provide the information on site characterization, including details on the geology, seismology, meteorology, hydrology, etc. This information is considered in the safety assessment and design of the facility.

The aerial view of the site location (section 1.1, Figure 1) shows the RMC facility on Point Frederick of Lake Ontario, with the City of Kingston to the west and north. The area of the city to the west of RMC has a mixture of small businesses and residential units, and the northern area is mainly residential. Directly to the east of RMC lies Navy Bay and Fort Henry, a UNESCO Heritage site.

Facility, structure, components and system design

The RMC SAR and Reactor Manual describe RMC's various systems and components. These documents also outline the design aspects that achieve the safety objectives of the facility design, design principles, defence-in-depth, and measures to ensure conformance with design criteria. The SLOWPOKE-2 reactor is inherently safe by design, meaning that the reactor is self-limiting in power and therefore, does not require human intervention to remain within its safe limits of operation. If a power excursion were to occur due to the unavailability of the control system or the two shutdown systems or any other event, the temperature of the core would rise which, because of the negative coefficient of reactivity in

temperature, decreases the reactivity to the point that the core becomes sub-critical and the reactor shuts down. Once the core cools down, the reactivity increases and the core becomes critical again, the temperature rises to eventually shut down again. This would create oscillations with decreasing amplitude, eventually reaching a steady state until the reactor shuts down out of fuel exhaustion and accumulation of fission products.

Over the current licence period, no changes to facility design requiring CNSC approval have been proposed.

3.5.3.2 Regulatory Focus

CNSC staff continue to monitor RMC's performance in this SCA through regulatory oversight activities including onsite inspections and desktop reviews of relevant program documentation.

3.5.3.3 Proposed Improvements

The current programs at RMC for this SCA are considered acceptable. RMC has not indicated any plans to modify the facility or its activities for the future licence term. No specific improvements are being proposed.

3.5.4 Conclusion

Based on CNSC staff assessments of RMC's application, supporting documents and past performance, CNSC staff conclude that RMC continues to implement and maintain programs for facility design in accordance with regulatory requirements.

3.5.5 Recommendation

CNSC staff are recommending 1 standardized condition in the proposed licence for this SCA. Licence condition 5.1 requires the licensee to implement and maintain a design program. CVC for this licence condition are included in the proposed LCH.

3.6 Fitness for Service

The fitness for service SCA covers activities that impact the physical condition of SSCs to ensure that they remain effective over time. This area includes programs that verify all equipment is available to perform its intended design function when called upon to do so.

The specific areas that comprise this SCA at RMC include:

- Equipment Fitness for Service/Equipment Performance
- Maintenance
- Aging Management
- Periodic Inspection and Testing

3.6.1 Trends

The following table indicates the overall rating trends for the Fitness for Service over the current licensing period:

FITNESS FOR SERVICE								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has maintained a fitness for service program in accordance with CNSC requirements over this licence period. RMC continues to be rated as SA in this SCA.								

3.6.2 Discussion

Regulatory Requirements

RMC is required to implement and maintain a fitness for service program to cover activities that affect the physical condition of SSC to ensure that they remain effective over time.

Paragraph 6(d) of the CINFR requires that an application to operate a Class I nuclear facility contain the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. Further requirements are provided under the [NBCC](#) and the [NFCC](#). Specific aspects of CSA N286-12 [6] and CSA N393-13: *Fire protection for facilities that process, handle, or store nuclear substances* [7] are also applicable for this SCA.

[REGDOC-2.6.3, Aging Management](#), published in 2014, sets out guidance and the requirements of the CNSC for managing aging of SSCs for reactor facilities. It also provides guidance as to how these requirements may be met.

3.6.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.6.3.1 Past Performance

Equipment Performance, Maintenance

CNSC staff verified that RMC has a maintenance program in place that ensures equipment continues to function as designed, remains available, meets the designed intent of the safety analysis and minimizes equipment failures.

Preventive maintenance is used to detect early warning signs of aging infrastructure by identifying assets requiring maintenance, refurbishment or replacement due to factors such as obsolescence, or deterioration.

During the current licensing period, CNSC staff performed 5 inspections that included compliance verification items related to this SCA. There were no non-compliances identified in this area. RMC performs and records maintenance on all SSCs of the reactor. Preventative maintenance and tests for the reactor and structures supporting the reactor and auxiliary equipment are done in accordance with procedures that CNSC staff have reviewed. RMC maintains an electronic database of miscellaneous and unusual events related to fitness for service that may occur.

CNSC staff verified that equipment tests and calibrations are done on schedule or as required. Maintenance associated with the conventional building services such as electricity, heat, water, air quality, and structural integrity is the responsibility of Construction Engineering located at CFB Kingston.

CNSC staff have reviewed RMC's documents related to the maintenance and aging management of the facility and conclude that RMC's fitness for service program meets regulatory requirements.

Equipment Fitness for Service/Aging Management

Aging management concerns are reviewed and reported periodically by RMC staff. Aging and obsolescence issues are handled under the authority of the RMC SLOWPOKE-2 Facility Director, who identifies required improvements in the Planned Lifecycle Management Updates of the RMC SLOWPOKE-2 Committee Meeting Summary.

During the refueling of the SLOWPOKE-2 reactor at RMC in August – September 2021, cameras were used to inspect critical areas of the reactor, including the inside and outside of the reactor container, the walls and bottom of the reactor pool, and the exterior of the Neutron Beam Tube. RMC conducted a detailed examination of major parts of the reactor infrastructure that would usually not be available because of inaccessibility and lack of appropriate equipment. This inspection confirmed that there have been no aging issues related to the SSCs of the reactor facility.

Periodic Inspection and Testing

CNSC staff determined that equipment tests and calibrations are done as scheduled. Pool and reactor container water chemistry is monitored in accordance with program documents. Periodic inspections on special components are done as the availability to perform the inspection allows.

Tests for special systems, such as the fire suppression system, the water deionizer systems, the heat exchangers for the reactor pool, and the backup gas generator are done by contractors with the appropriate expertise.

3.6.3.2 Regulatory Focus

CNSC staff continue to monitor RMC's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation.

3.6.3.3 Proposed Improvements

The current program at RMC for this SCA is considered acceptable. CSA N393-13, *Fire protection for facilities that process, handle, or store nuclear substances* [7] is included in the proposed LCH as CVC. No other improvements are proposed within this SCA.

3.6.4 Conclusion

Based on CNSC staff assessments of RMC's application, supporting documents and past performance, CNSC staff conclude that RMC continues to implement and maintain an effective fitness for service program in accordance with regulatory requirements, and appropriate processes are in place to ensure that the RMC SLOWPOKE-2 facility remains fit for service.

3.6.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 6.1 requires the licensee to implement and maintain a fitness for service program. CVC for this licence condition are included in the proposed LCH.

3.7 Radiation Protection

The Radiation Protection SCA covers the implementation of a radiation protection (RP) program in accordance with the [Radiation Protection Regulations](#) (RPR). The program must ensure that contamination levels and radiation doses received by individuals are monitored, controlled, and maintained as low as reasonably achievable (ALARA).

The specific areas that comprise this SCA at RMC include:

- Application of ALARA
- Worker Dose Control
- Radiation Protection Program Performance
- Radiological Hazard Control

3.7.1 Trends

The following table indicates the overall rating trends for the Radiation Protection over the current licensing period:

RADIATION PROTECTION								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
Performance levels for this SCA have been consistent from year to year, with satisfactory ratings given from 2013 to 2021. RMC has implemented and maintained an effective radiation protection program as required by the RPR .								

3.7.2 Discussion

Regulatory Requirements

The RPR require licensees to implement an RP program. As part of that program, licensees must keep effective and equivalent doses received by and committed to persons ALARA, taking into account social and economic factors, through the implementation of management control over work practices, personnel qualification and training, control of occupational and public exposures to radiation, and planning for unusual situations. The RPR also prescribe dose limits for NEWs and persons who are not NEWs. [REGDOC-2.7.1, Radiation Protection](#) and [REGDOC-2.7.2, Dosimetry, Volume I: Ascertaining Occupational Dose](#) were published in 2021 and set out guidance to meet these regulations.

The CINFR require that an application for a licence to operate a Class I nuclear facility shall contain, under paragraphs:

- 6(e), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances;
- 6(h), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measure that will be taken to prevent or mitigate those effects.

3.7.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.7.3.1 Past performance

RMC has developed a *Radiation Safety Manual* which describes the responsibilities of individuals managing and overseeing the research; the procedures to be followed; and the training requirements for all workers in the facility. The different aspects of RMC's RP program are discussed below.

Application of ALARA

As required by the RPR, RMC has implemented their *Radiation Safety Manual* which provides a commitment to apply ALARA techniques for all activities. The application of ALARA is managed through routine monitoring and regular reviews of dose records to confirm that no adverse trends or exceedances have occurred.

CNSC staff are satisfied with RMC's efforts in applying the ALARA principle to keep doses to workers ALARA over the current licensing period.

Worker Dose Control

The RP program is designed to manage radiation exposures to the operators as well as the workers and students who have access to the facility. RMC uses a licensed dosimetry service to monitor, assess, record and report doses of ionizing radiation received by facility workers. All SLOWPOKE-2 facility workers are assigned a Personal Alarming Dosimeter (PADs) as well as a licensed dosimeter for monitoring exposure to gamma and neutron radiation.

RMC staff at the SLOWPOKE-2 facility are designated as NEWs, while other persons having access to the facility are treated as non-NEWs. Doses to workers and visitors are monitored to ensure compliance with the CNSC's regulatory dose limits and with keeping radiation doses ALARA. Table 1 depicts the total effective dose statistics for NEWs at the RMC SLOWPOKE-2 facility.

Table 2: Average and maximum effective doses received by NEWs over the current licensing period

Dose Statistic	AVERAGE AND MAXIMUM EFFECTIVE DOSES TO WORKERS									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	Regulatory Limit
Average Effective Dose (mSv)	0	0.03	0.02	0	0	0	0	0	0	NA
Maximum Individual Effective Dose (mSv)	0	0.42	0.29	0	0	0	0	0	0	50 mSv/year

During the licensing period, there were no radiation exposures exceeding the regulatory effective dose limit of 50 mSv/y for NEWs and 1 mSv/y for non-NEWs. The doses received by NEWs and non-NEWs are well below the regulatory limits. The increase in recorded doses in 2014 and 2015 were due to reactor maintenance over that period. Also, no incidents have resulted in a reportable dose in excess of the RMC action level of 0.25 mSv per quarter.

The maximum effective dose received by a worker during the current licensing period was 0.42 mSv, or approximately 1 percent of the regulatory limit of 50 mSv in a one-year dosimetry period. Exposure to radiation is controlled by ensuring workers are trained and qualified, taking radiation protective measures, limiting access to the SLOWPOKE-2

facility, establishing action and administrative control levels for workers to ensure doses do not exceed the regulatory dose limits and remain ALARA.

During the current licence period, there have been three, five-year dosimetry periods: from 2010 to 2015, 2016 to 2020, and 2021 to 2025. The maximum effective dose received by a NEW over any of the five-year dosimetry periods was 0.69 mSv. This radiation dose represents 0.7% of the CNSC regulatory effective dose limit of 100 mSv in a five-year dosimetry period.

During the 2021 refueling, CNL workers established radiation protection zones within the facility in accordance with radiological work assessments performed by CNL. These zones were controlled by CNL's radiation protection surveyors. There was no recordable dose associated with the 2021 refueling project, either with RMC or CNL workers. The following table provides the dose recorded for CNL staff during the refueling project. Note that all CNL staff involved in the refueling were NEWs.

Table 3: Dose recorded for CNL staff during the 2021 refueling

Parameter	Result
Total staff on the project:	14
Collective whole body:	1.79 mSv
Collective shallow:	2.37 mSv
Max individual whole body:	0.65 mSv
Max individual shallow:	1.35 mSv

CNCS staff are satisfied that the dose to persons is being controlled and is well below the regulatory limits.

Radiation Protection Program Performance

RMC has developed a *Radiation Safety Manual* to provide guidance for protection from ionizing radiation. The procedure defines the responsibilities for safety, it identifies the sources of radiation, and the radiation material controls and associated safety procedures. This document applies to the entire RMC including the SLOWPOKE-2 facility. CNSC staff have reviewed the *Radiation Safety Manual* and no actions on this matter are outstanding.

CNSC staff assessed the RP program performance at RMC during the current licence period through 7 compliance inspections which included aspects of the Radiation Protection SCA, and various compliance verification activities such as desktop reviews of annual compliance reports. One NNC related to radiation signage and fume hood maintenance was issued during a 2015 inspection. The NNC was of low safety significance and corrective actions were implemented satisfactorily shortly after.

Action levels for radiological exposures and contamination control are established as part of the RMC RP program. If reached, these levels trigger RMC staff to establish the cause

and, if applicable, restore the effectiveness of the RP program. No action levels were reached during this licence period.

CNSC staff are satisfied with the performance of RMC's RP program over the current licence period.

Radiological Hazard Control

Radiation and contamination monitoring requirements are implemented as part of RMC's Radiation Protection Program. Since NEWs at the facility may handle unsealed radioactive materials as part of their activities, there is a need to control surface contamination which is accomplished through the application of designated work practices areas and by surface contamination surveys with appropriate equipment. In addition, dose rate measurements are performed to ensure that dose rates are below expected levels. Routine monitoring while performing open-source radiological work has confirmed that work activities were effectively performed while minimizing the spread of contamination.

CNSC staff are satisfied that radiological hazards at RMC are being controlled in accordance with regulatory and licensing requirements

3.7.3.2 Regulatory Focus

CNSC staff will continue to monitor performance in the Radiation Protection SCA through regulatory oversight activities including inspections and desktop reviews of RMC's compliance reporting and revisions to relevant program documentation.

3.7.3.3 Proposed Improvements

The current program at RMC for this SCA is considered acceptable. No specific improvements are being proposed. [REGDOC-2.7.1, Radiation Protection](#) and [REGDOC-2.7.2, Dosimetry, Volume I: Ascertaining Occupational Dose](#) are introduced as guidance in the proposed LCH.

3.7.4 Conclusion

CNSC staff assessed RMC's application and documentation under the radiation protection SCA and found them to be acceptable. RMC's performance, based on the outcome of compliance verification activities, has been satisfactory. CNSC staff conclude that the overall performance for this SCA is satisfactory and that RMC is qualified to carry out the activities in the proposed licence.

3.7.5 Recommendation

One standardized licence condition is included in the proposed licence for the RP SCA. Licence condition 7.1 requires the licensee to implement and maintain a radiation protection program, which includes a set of action levels. As part of this licence condition, the licensee is required to notify the Commission within 7 days of becoming aware that an action level has been exceeded. CVC for this licence condition are provided in the proposed LCH.

3.8 Conventional Health and Safety

The conventional health and safety SCA covers the implementation of a program to manage workplace safety hazards and to protect workers.

The specific areas that comprise this SCA at RMC include:

- Performance
- Practices
- Awareness

3.8.1 Trends

The following table indicates the overall rating trends for the Conventional Health and Safety over the current licensing period:

CONVENTIONAL HEALTH AND SAFETY								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has maintained a conventional health and safety program that meets the requirements of the NSCA and in accordance with CNSC requirements over the licence period.								

3.8.2 Discussion

Regulatory Requirements

RMC must have, under the NSCA and its associated regulations, policies, programs, methods and procedures in place for the safe operation and maintenance of its facilities. The CINFR require that an application for a licence shall contain, under paragraph 3(f), the proposed worker health and safety policies and procedures.

In addition, RMC's activities must comply with the [Canada Labour Code](#), and the associated [Canada Occupational Health and Safety Regulations](#).

Conventional health and safety programs at Class 1A facilities fall under the dual regulatory oversight of the CNSC and Employment and Social Development Canada. RMC must submit hazardous-occurrence investigation reports to both regulators, in accordance with their respective reporting requirements. As required by paragraph 29(1)(h) of the [GNSCR](#), licensees are to report serious illnesses or injuries incurred or possibly incurred as a result of a licensed activity to the CNSC.

RMC's occupational health and safety program applies to all work performed by RMC employees and contractors. In addition to reporting of serious illnesses, injuries and safety occurrences, RMC is subject to compliance reporting in

accordance with [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills](#).

In 2019 the CNSC published [REGDOC-2.8.1, Conventional Health and Safety](#), which also applies to RMC.

3.8.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.8.3.1 Past Performance

Performance

In its application, RMC indicated that the SLOWPOKE-2 Facility complies with the orders in the DND general safety program published in the DND General Safety Program-Policy and Program volumes, as well as with REGDOC-2.8.1, *Conventional Health and Safety*. In addition, RMC indicated it follows and conforms to the occupational health and safety rules and regulations stipulated by Part II of the [Canada Labour Code](#) and to Canada's [Occupational Health and Safety Regulations](#).

RMC has not reported a lost-time injury during the current licence period and has also indicated that in its 37 years of operation, it has not had a lost-time injury, or worktime lost due to a workplace health hazard or safety occurrence. During the pandemic, RMC developed a COVID-19 hazard prevention procedure, which includes various control measures for everyone entering the facility, including mask use, infection prevention, disinfection, and other workplace controls. Throughout the pandemic, RMC has provided updates to CNSC staff on the status of workers and control measures being put in place to protect workers and visitors entering the facility. There were no reported outbreaks of the COVID-19 virus at the RMC facility.

CNSC staff conducted 7 inspections which included compliance verification criteria related to Conventional Health and Safety over the current licence period. There were no non-compliances identified against this SCA. However, CNSC staff made 2 recommendations for improvement with safety inspections and housekeeping, which RMC acknowledged and promptly acted upon.

Practices

The RMC facility manages workplace safety hazards through programs applicable to all of RMC through Defence Administrative Orders and Directives. RMC has three health and safety sub-committees which report to the RMC Safety Council. The Academic Wing Workplace Health and Safety Committee performs periodic inspections of laboratories at the RMC facility.

Health and safety inspections are performed twice a year, and maintenance is performed periodically on safety equipment.

RMC controls all chemicals, corrosive agents, and cleaning agents to ensure proper storage, handling and use. It stores flammable samples and chemicals in

locked cabinets that comply with the [National Fire Protection Association](#) (NFPA).

CNSC staff have verified these practices and other elements of this SCA, including safety training, through every general inspection conducted at RMC during this licence period.

Awareness

New employees and contractors must attend training on Workplace Hazardous Materials Information System (WHMIS), safety, and introduction to radiation safety, and pass an exam on the content of the training. Recurrent safety awareness training is mandatory for all RMC staff.

3.8.3.2 Regulatory Focus

CNSC staff continue to assess RMC's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation and reports.

3.8.3.3 Proposed Improvements

REGDOC-2.8.1, *Conventional Health and Safety* is included in the proposed LCH as CVC. No other improvements related to this SCA are proposed.

3.8.4 Conclusion

Based on CNSC staff's assessment of RMC's application, supporting documents and past performance, CNSC staff conclude that RMC continues to implement and maintain an effective conventional health and safety program in accordance with regulatory requirements and CNSC expectations.

3.8.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 8.1 requires the licensee to implement and maintain a conventional health and safety program. CVC for this licence condition are included in the proposed LCH.

3.9 Environmental Protection

The environmental protection SCA covers programs that identify, control and monitor all releases of nuclear and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

The specific areas that comprise this SCA at RMC include:

- Effluent and Emissions Control (releases)
- Protection of People
- Environmental Management System (EMS)
- Assessment and Monitoring
- Environmental Risk Assessment (ERA)

3.9.1 Trends

The following table indicates the overall rating for the Environmental Protection SCA over the current licensing period:

ENVIRONMENTAL PROTECTION								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has developed, implemented and maintained an effective environmental protection program that protects the environment and the public in accordance with CNSC regulatory requirements. During the current licence period, releases to the environment were low. CNSC staff continue to monitor RMC's implementation of the environmental protection program through compliance verification activities.								

3.9.2 Discussion

A summary of the licensee's performance, regulatory focus and proposed improvements are presented in the following subsections.

Regulatory Requirements

The NSCA requires licensees to make adequate provisions for the protection of the environment. Licensees achieve this by developing and maintaining an environmental protection program to control releases of nuclear and hazardous substances and to assess the effects of these releases on the environment. The GNSCR, under paragraphs 12(1)(c) and (f), require that each licensee take all reasonable precautions to protect the environment and the health and safety of persons, and to control the release of radioactive nuclear substances and hazardous substances within the site of the licensed activity and into the environment.

The RPR prescribe dose limits for the general public, which under subsection 1(3) is 1 mSv per calendar year.

The CINFR require that an application for a licence contain:

- 3(e), the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on.
- 3(g), the proposed environmental protection policies and procedures.
- 3(h), the proposed effluent and environmental monitoring programs.
- 6(e), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.
- 6(h), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear

facility, and the measures that will be taken to prevent or mitigate those effects.

- 6(i), the proposed location of points of release, the proposed maximum quantities and concentrations, and the anticipated volume and flow rate of releases of nuclear substances and hazardous substances into the environment, including their physical, chemical and radiological characteristics.
- 6(j), the proposed measures to control releases of nuclear substances and hazardous substances into the environment.

The CNSC published version 1.2 of [REGDOC 2.9.1, *Environmental Principles, Assessments and Protection Measures*](#) in 2020. Licensees must meet the requirements of this REGDOC and implement measures to identify, control and monitor all releases of radioactive and hazardous substances, and their effects on the environment.

3.9.3 Summary

3.9.3.1 Past performance

During the current licence period, CNSC staff verified RMC's performance with respect to environmental protection through inspections and desktop reviews. CNSC staff performed 6 compliance inspections that included compliance verification criteria related to environmental protection. There were no non-compliances identified. However, one recommendation was made in 2013 related to periodic sampling and analysis of reactor water, which RMC addressed promptly.

From these compliance activities, CNSC staff concluded that RMC's implementation of the environmental protection program at the RMC facility meets CNSC's regulatory requirements and expectations.

A summary of the licensee's past performance, regulatory focus, regulatory focus and proposed improvements are presented in the following subsections.

Effluent and Emissions Control (releases)

RMC monitors and controls its airborne emissions and liquid effluent to the environment, by implementing an Environmental Protection Program. The effluent and emissions monitoring program includes monitoring of radiological substances in the gaseous releases through sampling before release. This is discussed further below. There are no releases of hazardous substances from RMC.

Atmospheric Emissions

RMC releases small quantities of radioactive noble gases, mainly Xe-133, resulting from the weekly purges of reactor head space, and Ar-41, due to irradiation activities. Each irradiation site and the reactor headspace purge are connected to HEPA filters that stop any particulate material from being released

to the environment. Before the gases are vented from the reactor container, any fission products are allowed to decay in the reactor headspace for a minimum of 48 hours, and the radionuclide activities are recorded. The releases take place through filters and a dedicated facility stack, after sampling and analysis of the head space cover gas. Once released from the stack, these quantities are below the threshold of detection capability, which is confirmed through periodic sampling.

CNSC staff review the atmospheric emissions during inspections and in annual compliance reports and confirm that releases during the licensing term have been low and consistent from year to year. Due to the negligible quantities that are released and the minimal impact to the environment and to people, CNSC staff determined that no formal release limits or action levels are required for RMC.

Liquid effluent

There are no releases of radioactive liquids to the environment from RMC. The reactor pool is filled with deionized water and surrounded by a stainless-steel liner that prevents any potential spill to the environment. If the deionized water from the reactor pool had to be disposed of, RMC would analyze it and confirm the absence of radionuclides prior to disposal into the sewer. Any other radioactive liquids are stored in appropriate containers for delay and radioactive decay until they can be disposed of into the appropriate waste stream.

Protection of People

There have been no spills or environmental occurrences at RMC during the licensing term, and the estimated dose to the public is several orders of magnitude below the regulatory public dose limit.

RMC developed an Environmental Risk Assessment (ERA) [8] and performed a dose assessment for a member of the public standing next to the exhaust stack located on the rooftop of the building and being exposed to emissions from the stack containing Ar-41, Kr-87, Kr-88 and Xe-133. To be conservative, it was assumed that there is no dilution of the vented gas through the stacks. The dose assessment shows that the maximum estimated dose to a person standing next to the exhaust on the roof for a full year is 62.5 μSv . This represents 6% of the regulatory limit of 1 mSv/year.

CNSC staff conclude that risks to the public or the environment are negligible and that the public and the environment continue to be protected.

Environmental Management System (EMS)

RMC's environmental management system is integrated in the facility's overall management system. CNSC staff reviewed the results of the EMS during compliance inspections and document reviews. There are no concerns on RMC's EMS. The EMS is satisfactory for the RMC facility.

Assessment and Monitoring

RMC is not required to implement an environment monitoring program because the estimated dose to public is several orders of magnitude below the regulatory public dose limit, and the dose rates to non-human ecological receptors are orders

of magnitude lower than conservative benchmarks. However, RMC does monitor and record every gaseous release to the environment through the reactor headspace purge and sampling procedure.

Environmental Risk Assessment

An Environmental Risk Assessment (ERA) of nuclear facilities is a systematic process used by licensees to identify, quantify, and characterize the risk posed by releases of radiological and hazardous substances and physical stressors on representative human and non-human biota receptors, including the magnitude and extent of the potential effects associated with a facility. The ERA serves as the basis for the development of site-specific environmental protection measures. The results of these measures, in turn, inform and refine future revisions of the ERA.

REGDOC 2.9.1, *Environmental Protection: Environmental Principles, Assessments, and Protection Measures* includes a requirement for a stand-alone ERA in accordance with CSA N288.6-12, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills* [9]. The stand-alone ERA document must detail the facility's interactions with the environment along with any potential impacts. Although REGDOC-2.9.1 and CSA N288.6-12 are not referenced in RMC's current LCH, CNSC staff determined that an ERA would be appropriate in the context of the licence renewal.

RMC submitted an ERA in September 2022 [8]. CNSC staff determined that RMC's ERA meets the requirements of REGDOC-2.9.1 and CSA N288.6-12, and effectively demonstrates that people and the environment are protected.

3.9.3.2 Regulatory Focus

CNSC staff will continue to monitor performance in this area through regulatory oversight activities, inspections, and desktop reviews of RMC's compliance reporting and revisions to relevant program documentation.

3.9.3.3 Proposed Improvements

The following references are included as CVC in the proposed LCH under the Environmental Protection SCA:

- Compliance with REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures*, Version 1.2 (2020).
- Compliance with CSA N288.6-12, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*.

CNSC staff expect that RMC will continue to identify and implement improvements to RMC's environmental protection program documents on a continuous basis.

3.9.4 Conclusion

RMC has implemented and maintained an environmental protection program that adequately protects the environment and the public in accordance with regulatory requirements.

3.9.5 Recommendation

Standardized Licence condition 9.1 has been included in the proposed licence for this SCA. This licence condition requires the licensee to implement and maintain an environmental protection program. CVC for this licence condition are included in the proposed LCH.

3.10 Emergency Management and Fire Protection

The Emergency Management and Fire Protection SCA covers emergency plans and emergency preparedness programs that exist for emergencies and for non-routine conditions. This area also includes any results of participation in exercises.

The specific areas that comprise this SCA at RMC include:

- Conventional Emergency Preparedness and Response
- Nuclear Emergency Preparedness and Response
- Fire Emergency Preparedness and Response

3.10.1 Trends

The following table indicates the overall rating trends for the Emergency Management and Fire Protection over the current licensing period:

EMERGENCY MANAGEMENT AND FIRE PROTECTION								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC's emergency preparedness and fire protection measures met applicable CNSC regulatory and performance objectives. CNSC staff monitor RMC's implementation of this program through regular compliance verification activities.								

3.10.2 Discussion

The SCA 'Emergency Management and Fire Protection' covers the provisions for a licensee to have in place an emergency preparedness plan and response capability, which can mitigate the effects of accidental releases of radiological and hazardous substances into the environment during emergency and non-routine conditions. This SCA also includes implementation of a fire protection program to prevent or minimize the risk that fire poses to the environment and the health and safety of persons.

Regulatory Requirements

Paragraph 24(4)(b) of the NSCA requires the applicant to make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. In addition:

- Paragraph 12(1)(c) of the GNSCR states that every licensee shall “take all reasonable precautions to protect the environment and the health and safety of persons and to maintain security”.
- Paragraph 12(1)(f) of the GNSCR states that every licensee shall “take all reasonable precautions to control the release of radioactive nuclear substances or hazardous substances within the site of the licensed activity and into the environment of the licensed activity”.

Paragraph 6(k) of the CINFR requires that an application for a licence shall contain information on the licensee’s proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to:

- Assist offsite authorities in planning and preparing to limit the effects of an accidental release;
- Notify offsite authorities of an accidental release or the imminence of an accidental release;
- Report information to offsite authorities during and after an accidental release;
- Assist offsite authorities in dealing with the effects of an accidental release;
- Test the implementation of the measures to prevent or mitigate the effects of an accidental release.

[REGDOC-2.10.1, Nuclear Emergency Preparedness and Response](#), sets out the emergency preparedness requirements and guidance of the CNSC related to the development of emergency measures for licensees and licence applicants of Class I nuclear facilities and uranium mines and mills. REGDOC-2.10.1 was published in 2016 and incorporated into RMC’s revised LCH in 2019.

3.10.3 Summary

A summary of the licensee’s past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.10.3.1 Past Performance

Conventional and Nuclear Emergency Preparedness and Response

The SLOWPOKE-2 facility at RMC complies with the requirements through the Emergency Procedures listed in the Reactor Manual and RMC’s College Standing

Orders (CSO) 2100-2 *Responding to Emergencies*, the Fire Protection Program and periodic emergency exercises.

RMC has an onsite emergency plan as part of its Emergency Standard Procedures, which address the requirement for the clear allocation of responsibilities, authorities, and arrangements for coordinating site activities and external response organizations throughout all phases of an emergency.

The RMC site emergency plan provides:

- Prompt recognition and classification of emergencies;
- Timely notification and alerting of response personnel;
- Safe emergency work practices that will be followed to support the safety of all persons and emergency workers;
- Monitoring radioactive releases;
- Information pertaining to the treatment and first aid of a limited number of contaminated and overexposed personnel/ persons on site; and
- Facility management and urgent mitigating repairs, control and other actions that are carried out at the Facility.

The Emergency Standard Procedures are referenced and explained in the Reactor Manual with the responses expected from the Commissionaires at RMC, the City of Kingston Fire Department, CFB Kingston Military Police, and SLOWPOKE-2 reactor operators under the two main headings of non-nuclear emergency and nuclear emergency.

CNSC staff performed 7 compliance inspections during this licence period which included verification criteria associated with Emergency Management and Fire Protection. One notice of non-compliance of low safety significance was issued during the 2013 inspection related to one fire extinguisher inspection date that was found past due. RMC developed and implemented corrective actions satisfactorily.

Additionally, CNSC staff conducted a security inspection in October 2019, which also included aspects of RMC's emergency response plan. In response to CNSC staff's recommendations, RMC initiated a comprehensive table-top exercise for security response to all non-routine conditions at the Facility. The persons and groups participating in the exercise involved the Facility staff, the Military Police (MP), Security Advisor to the Commandant, the MP training section, the City of Kingston firefighters training section, the J33 Operations Officer at RMC and J32 Security at RMC. An extensive communications exercise between the participating groups resulted in familiarization with the SLOWPOKE-2 Facility and in the alignment of interdepartmental procedures between the CFB Kingston MP, the City of Kingston Fire Department and the facility.

RMC conducted another multi-jurisdictional emergency services training exercise called "Exercise Watchdog Response" involving the SLOWPOKE-2 facility in October 2021. Organizations participating in this exercise included: the Military

Police Regiment Detachment Kingston in conjunction with the Base Auxiliary Security Force, HMCS Cataraqui, the Royal Canadian Mounted Police's Marine Unit, Kingston Police Force, and Kingston Fire and Rescue.

CNSC staff reviewed the results of these exercises and were satisfied with the outcome.

Fire Emergency Preparedness and Response

CNSC staff have assessed RMC's Fire Protection Program (FPP), including the procedures, plans and assessments that describe how protection from fire is achieved. The FPP explains the implementation and control of activities related to fire safety, which are conducted by various departments within RMC and the CFB Kingston Base Fire Prevention Chief, with the following objectives:

- Ensure that fires do not significantly increase the risk of radiological release to public.
- Protect SLOWPOKE-2 personnel from the hazards of fires in accordance with RMC Fire Orders.
- Minimize interruption of SLOWPOKE-2 operation due to fire.

The FPP implemented for the SLOWPOKE-2 reactor ensures that personnel and equipment are protected from fire through the following practices:

- Control of sources of ignition.
- Control of flammable and combustible material.
- Mitigation of the consequences of fire through detection, suppression and response.
- Conducting fire drills.
- Maintaining the safety basis of the reactor.

Practices are based on the [NBCC 2020](#), [NFCC 2015](#) and [NFPA 801 Annex B](#) standards for fire protection at facilities handling radioactive materials.

Based on their review of RMC's application, program documents and inspection results, CNSC staff conclude that RMC maintains an Emergency Management and Fire Protection Program in accordance with the current licence and applicable codes and standards, including REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*. CNSC staff conclude that RMC is performing satisfactorily with regard to this SCA.

3.10.3.2 Regulatory Focus

Specific compliance and verification activities performed during this past licensing period included reviews of RMC's emergency response plan and fire safety plan, annual compliance reports, and inspections.

CNSC staff will continue to monitor RMC's performance in this area through regulatory oversight activities including onsite inspections, exercises and desktop reviews of program documentation pertaining to this SCA.

3.10.3.3 Proposed Improvements

CSA N393-13: *Fire protection for facilities that process, handle, or store nuclear substances* [7] is included in the proposed LCH as CVC, with an implementation plan.

3.10.4 Conclusion

CNSC staff have assessed RMC's Emergency Management and Fire Protection programs and conclude that the programs adequately protect workers, the public and the environment from any credible emergency conditions.

CNSC staff conclude that RMC's performance for this SCA is satisfactory and that RMC is qualified to carry out the activities proposed in the licence.

3.10.5 Recommendation

Two standard licence conditions are included in the proposed licence for this SCA. Licence condition 10.1 requires RMC to implement and maintain an emergency preparedness program. Licence condition 10.2 requires RMC to implement and maintain a fire protection program. The CVC for these licence conditions are included in the proposed LCH.

3.11 Waste Management

The Waste Management SCA covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility for storage, treatment, or disposal at another licensed location. This area also covers the planning for decommissioning.

The specific areas that comprise this SCA at RMC include:

- Waste Characterization
- Waste Minimization
- Waste Management Practices
- Decommissioning Plans

3.11.1 Trends

The following table indicates the overall rating trends for the Waste Management over the current licensing period:

WASTE MANAGEMENT								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC's waste management program met applicable CNSC regulatory and performance objectives. CNSC staff continue to monitor RMC's implementation of this program through regular compliance verification activities.								

3.11.2 Discussion

A summary of the licensee's performance, regulatory focus and proposed improvements are presented in the following subsections.

Regulatory Requirements

The GNSCR require that an application for a licence include:

- 3(1)(j), the name, quantity, form and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed, or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste

Paragraph 3(k) of the CINFR also requires that an application contains:

- the proposed plan for the decommissioning of the nuclear facility or of the site.

The CNSC published [REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#) and [REGDOC-2.11.2, Decommissioning](#) in 2021. However, they are not referenced in the current LCH.

3.11.3 Summary

Based on CNSC staff's assessment of the licence renewal application, supporting documents and past compliance activities, CNSC staff determined that RMC maintains a waste management program in accordance with REGDOC-2.11.1 Volume I: *Management of Radioactive Waste*, CSA N292.0-19, *General principles for the management of radioactive waste* [10] and CSA N292.3-14 *Management of low- and intermediate-level radioactive waste* [11]. A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.11.3.1 Past Performance

Waste Characterization, Minimization, and Management Practices

CNSC staff conducted 6 compliance inspections which included compliance verification criteria related to waste management during the current licence period. One NNC was issued in 2015 related to storage practices in RMC's waste storage room and a recommendation was made in 2019 regarding waste container labelling. The findings were of low safety significance, and RMC implemented corrective actions satisfactorily in both cases.

RMC implements a waste management program that is compliant with the requirements of REGDOC-2.11.1, *Waste Management, Volume I: Management of Radioactive Waste*. The objectives of the program are to minimize the generation of waste at the facility, and handle and dispose of waste to minimize risk to staff, members of the public and the environment up to the point when the waste is removed from the facility.

Most of the waste generated at the facility is laboratory waste resulting from daily operations and includes gloves, bench coverings, liquid scintillation fluid, and samples irradiated by neutron activation analysis. Waste is characterized prior to being handed over to RMC's radiation safety officer who is responsible for managing the waste up to the point that it is removed from the facility.

RMC's waste management program states that 80% of samples irradiated by neutron activation is irradiated less than 15 minutes, resulting in the presence of radioisotopes with half-lives of 11 seconds to 35 hours. These irradiated samples are stored for a period of delay and decay until they can be disposed of as non-radioactive waste. Waste that contains isotopes with longer half-lives is kept at RMC in shielded containers until a suitable volume justifies disposal to a licensed waste management facility.

In August 2021, as part of RMC's refueling project, the original LEU spent reactor core was removed from the reactor container by CNL and transported to the Canadian Nuclear Laboratories in Chalk River for disposition and interim storage.

CNSC staff have regularly assessed RMC's waste management program to ensure that it remains adequate and effective. RMC's waste management program meets CSA N292.0-19 *General principles for the management of radioactive waste and irradiated fuel* [10] and CSA N292.3-14 *Management of low- and intermediate-level radioactive waste* [11]. RMC also meets the requirements for hazardous waste as defined by [Ontario Regulation 347 General – Waste Management](#).

Decommissioning plans

In February 2022, in accordance with paragraph 3(k) of the CINFR and as part of its application, RMC submitted a revised Preliminary Decommissioning Plan (PDP) and cost estimate for decommissioning of the SLOWPOKE-2 facility. The CNSC requires RMC to revise its PDP at a minimum of every 5 years or when requested by the Commission or a person authorized by the Commission.

The PDP outlines the strategy and preliminary plan by which the SLOWPOKE-2 facility will be decommissioned in the future. The estimated quantities and characteristics of wastes generated during decommissioning is provided and potential disposition routes for the waste streams are outlined. The PDP also describes hazards associated with the decommissioning and mitigation measures during decommissioning to ensure health, safety and protection of workers, the public and the environment.

RMC estimates the cost of decommissioning at \$13.6 million in 2022, and \$16.5 million in 2026. This estimate is significantly higher than the cost of \$6.6 million for decommissioning the Saskatchewan Research Council (SRC) SLOWPOKE-2 facility in 2020, due in part to the existence of a steel liner in the RMC reactor pool, and other equipment such as the neutron beam tube (NBT). These features did not exist at SRC. Therefore, based on the revised PDP and this cost estimate, RMC proposes a financial guarantee in the amount of \$16.5 million. Further information on the financial guarantee is found in section 5.2.

CNSC staff have reviewed the PDP and found that it meets the requirements of REGDOC-2.11.2 *Decommissioning* and CSA N294-19 *Decommissioning of Facilities Containing Nuclear Substances* [12] and provides an acceptable basis for a decommissioning cost estimate.

3.11.3.2 Regulatory Focus

CNSC staff will continue to monitor and evaluate RMC's waste management program through regulatory oversight activities, including onsite inspections and reviews of compliance reports and revisions to relevant program documentation.

3.11.3.3 Proposed Improvements

REGDOC-2.11.1, *Waste Management Volume I: Management of Radioactive Waste* and REGDOC-2.11.2, *Decommissioning*, were published in January 2021 and are included in the proposed LCH as CVC.

CSA N292.0-19, *General Principles for the Management of Radioactive Waste and Irradiated Fuel* [10], and CSA N292.3-14, *Management of low and intermediate-level radioactive waste* [11] apply to RMC and are also referenced in the proposed LCH as guidance until implementation plans are developed.

3.11.4 Conclusion

Based on CNSC staff's assessment of the licence renewal application, supporting documents, the PDP and RMC's past performance in this SCA, CNSC staff conclude that RMC continues to maintain and implement a documented waste management program in accordance with CNSC's regulatory requirements. RMC has demonstrated satisfactory performance for this SCA.

3.11.5 Recommendation

Two standardized licence conditions are included in the proposed licence for the Waste Management SCA. Standardized licence condition 11.1 requires RMC to

implement and maintain a waste management program. Standardized licence condition 11.2 requires RMC to maintain a decommissioning plan. CVC for these licence conditions are included in the proposed LCH.

3.12 Security

The Security SCA covers the programs required to implement and support the security requirements stipulated in the regulations, the licence, orders, or expectations for the facility or activity.

Specific performance evaluation for security is identified as sensitive information and has been designated as Prescribed Information. This information is not available for public release.

The specific areas that comprise this SCA at RMC include:

- Facilities and Equipment
- Response Arrangements
- Security Practices

3.12.1 Trends

The following table indicates the overall rating trends for the Security over the current licensing period:

SECURITY								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC has implemented and maintained a security program that meets regulatory requirements under the GNSCR and Part 2 of the Nuclear Security Regulations (NSR) to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment or information.								

3.12.2 Discussion

A summary of the licensee's performance, regulatory focus and proposed improvements are presented in the following subsections.

Regulatory Requirements

RMC is subject to the GNSCR, which provide obligations for licensees across all SCAs. Specific obligations that distinctly encompass the security SCA include:

- Paragraph 12(1)(c) of the GNSCR, Every licensee shall take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances;

- Paragraph 12(1)(g) of the GNSCR, Every licensee shall implement measures for alerting the licensee to the illegal use or removal of a nuclear substance, prescribed equipment or prescribed information, or the illegal use of a nuclear facility;
- Paragraph GNSCR p.12(1)(h) of the GNSCR, Every licensee shall implement measures for alerting the licensee to acts of sabotage or attempted sabotage anywhere at the site of the licensed activity; and
- Paragraph 12(1)(j) of the GNSCR, Every licensee shall instruct the workers on the physical security program at the site of the licensed activity and on their obligations under that program.

Furthermore, sections 21 to 23 of the GNSCR provide obligations for all licensees on the identification, storage, handling, and transfer requirements of information designated as “prescribed information”.

In addition to the regulatory requirements stipulated in the GNSCR, this facility is identified as a named entity within Schedule 2 of the *Nuclear Security Regulations* (NSR). As such, and as identified by paragraph 40(1)(b) of the NSR, RMC is subject to Part 2 of the NSR, specifically sections 39 to 48.

In 2020, the CNSC published [REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material](#) which provides regulatory expectations and guidance for licensees regarding the CNSC’s expectations under the GNSCR for security.

3.12.3 Summary

A summary of the licensee’s past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.12.3.1 Past Performance

RMC has implemented and maintained a security program that meets regulatory requirements under the GNSCR and Part 2 of the NSR to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment or information. The facility’s security program includes administrative and technical measures that meet current CNSC regulatory requirements for nuclear security.

During the licence period, CNSC staff performed 6 inspections that included compliance verification criteria related to security. In addition, CNSC staff performed 2 focused security inspections (2013, 2019) to verify that the licensee complies with regulations and to assess the effectiveness of the licensee’s security measures. All findings identified during these inspections were of low safety significance, and all corrective actions and recommendations have been implemented satisfactorily.

Facilities and Equipment

RMC has maintained a security program that provides appropriate security systems and devices for the facility and the areas that involve the processing, use,

or storage of nuclear substances. The security program includes a combination of intrusion detection systems, security cameras, physical barriers and the presence of on-site RMC security personnel. It also includes measures to prevent the unauthorized removal of nuclear substances from the facility. In addition, RMC has processes for effectively testing and maintaining the security measures and equipment.

Response Arrangements

Alarm detection and assessment systems are continuously monitored by on-site security staff. RMC has established a response protocol with the Military Police and the Kingston Police to ensure timely off-site armed response, should a security-related incident occur. In addition, RMC conducts emergency and security exercises regularly.

Security Practices

RMC maintain effective measures for controlling access to persons and vehicles to prevent unauthorized access to the nuclear facility and nuclear substances. The applicant has implemented a satisfactory Facility Access Security Clearance (FASC) process that includes a criminal record check for individuals. In addition, RMC has a security awareness program for all staff and a supervisory awareness program for managers and supervisors to enhance capabilities in identifying and responding to changes in employee behaviour.

3.12.3.2 Regulatory Focus

During the licence period, CNSC staff performed a variety of compliance activities, including inspections and document reviews to verify that the licensee complies with regulations and to assess the effectiveness of the licensee's security measures. CNSC staff will continue to monitor RMC's performance for the security SCA through regulatory oversight activities, including onsite inspections and technical assessments of relevant program documentation.

3.12.3.3 Proposed Improvements

In 2020, the CNSC revised REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material (version 2.1)*. Part A of REGDOC-2.12.3, sets out the minimum security measures that licensees must implement to prevent the loss, sabotage, illegal use, illegal possession or illegal removal of sealed sources during their entire lifecycle, including while the sources are in storage, transport or being stored during transportation. Part B of this document provides information and guidance on how to comply with the minimum security measures, including measures related to transport vehicles, containers and security plans for Categories I, II or III Nuclear Material.

REGDOC-2.12.3 is included in the proposed LCH as part of CVC for this SCA. Other specific improvements for the security SCA are deemed sensitive and are designated Prescribed Information. This information is not available for public release.

3.12.4 Conclusion

CNSC staff confirm that RMC meets regulatory requirements for the Security SCA and that the performance rating of “Satisfactory” is supported.

CNSC staff will continue to monitor and provide regulatory oversight of RMC’s implementation and operation of their security program. RMC’s compliance with the security SCA include ensuring adequate provisions for the security of nuclear substances, the implementation of measures to alert the licensee to the illegal use or removal of nuclear substances, and sabotage or attempted sabotage, anywhere at the site, and that all workers will be instructed on the facility’s security program and their obligations therein.

3.12.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 12.1 requires the licensee to implement and maintain a security program. CVC for this licence condition are included in the proposed LCH.

3.13 Safeguards and Non-Proliferation

The Safeguards and Non-Proliferation SCA covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as other measures arising from the [*Treaty on the Non-Proliferation of Nuclear Weapons*](#).

Licensees require a licence, separate from the licensing of their operations, for the import and export of controlled nuclear substances, equipment and information identified in the [*Nuclear Non-proliferation Import and Export Control Regulations*](#). The scope of the non-proliferation program for the RMC SLOWPOKE-2 reactor is limited to the tracking and reporting of foreign obligations and origins of nuclear material. This tracking and reporting assists the CNSC in the implementation of Canada’s bilateral Nuclear Cooperation Agreements (NCA) with other countries.

The specific areas that comprise this SCA with respect to this licensee are:

- Nuclear Material Accountancy and Control
- Access and Assistance to the IAEA
- Operational and Design Information
- Import and Export

3.13.1 Trends

The following table indicates the overall rating trends for the Safeguards and Non-Proliferation over the current licensing period:

SAFEGUARDS AND NON-PROLIFERATION								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC continues to perform satisfactorily in this SCA. CNSC staff conclude RMC's program for safeguards and non-proliferation meets regulatory requirements.								

3.13.2 Discussion

Regulatory Requirements

The [Canada-IAEA Comprehensive Safeguards Agreement](#) (Safeguards Agreement), which came into force on February 21, 1972 and the [Canada-IAEA Additional Protocol](#) (Additional Protocol), which came into force on September 8, 2000, are two legally binding treaty-level agreements Canada made with the IAEA. The Safeguards Agreement lays out the safeguards system that Canada shall adhere to, while the Additional Protocol contains further requirements for the provision of information and access and the obligation to provide information on and access to certain nuclear fuel cycle related manufacturers and researchers.

In addition, the following regulatory requirements apply:

- Subparagraph 9(a)(iii) of the NSCA establishes that one of the objects of the Commission is to “achieve conformity with measures of control and international obligations to which Canada has agreed”.
- Paragraph 24(4)(b) of the NSCA states that “no licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee... will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed”.
- Paragraph 27(b) of the NSCA states that “every licensee and every prescribed person shall make the prescribed reports and file them in the prescribed manner”.
- Paragraph 12(1)(i) of the [GNSCR](#) states that “every licensee shall... take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement”.

- Section 30 of the GNSCR identifies situations in which safeguards reports shall be provided by licensees to the Commission.

In February 2018, the CNSC published [REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*](#), which RMC implemented in 2019. This document sets out requirements and guidance for safeguards programs for applicants and licensees who possess nuclear material, operate a uranium and/or thorium mine, carry out specified types of nuclear fuel-cycle related research and development work, and/or carry out specified types of nuclear-related manufacturing activities. The requirements and guidance in this document are essential to Canadian compliance with the [Safeguards Agreement](#) entered into with the IAEA, and are consistent with modern national and international practices.

3.13.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.13.3.1 Past Performance

Through several compliance activities led by the CNSC and by the IAEA, CNSC staff determined that RMC has an effective safeguards program that conforms with measures required by the CNSC to meet Canada's international safeguards obligations as well as other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons*. Details of CNSC staff's assessment are presented in the following paragraphs.

Nuclear Material Accountancy and Control

During this licence period, RMC controlled and performed nuclear material accountancy and reporting for the RMC SLOWPOKE-2 reactor facility, and complied with CNSC's regulatory requirements in accordance with REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*.

Access and Assistance to the IAEA

During this licence period, the IAEA performed five inspections (physical inventory verification and design information verification) in 2015 and 2019 as well as one complementary access in 2017. The results of all IAEA inspections were satisfactory and no issues were identified. The CNSC also performed physical inventory taking evaluations (PITE) to ensure the licensee complied with regulatory requirements in 2013, 2014, 2016 and 2017. For the IAEA inspections and CNSC evaluations, RMC provided the access and assistance to perform these safeguards activities and complied with regulatory requirements. No inspections were performed between 2020 and 2022, however RMC was available to facilitate them if required.

The following table shows the number of compliance activities led by the IAEA and by the CNSC over the licence period at RMC.

Table 4: Compliance activities led by the IAEA and by the CNSC

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
IAEA Activity	0	0	2	0	1	0	2	0	0	0	5
CNSC Activity	1	1	0	1	1	0	0	0	0	0	4
Total	1	1	2	1	2	0	2	0	0	0	9

The CNSC also performed periodic evaluation of RMC's performance and reported its results in regulatory oversight reports [3, 4, 5]. There were no reportable events or action notices issued in the Safeguards and Non-Proliferation SCA during this licensing period.

Operational and Design Information

During this licensing period, the licensee provided the required operational and design information updates, including annual updates to its operational program and design information updates to the IAEA and the CNSC. The licensee's performance meets regulatory requirements in this area.

Import and Export

The scope of the non-proliferation program under this license is limited to the tracking and reporting of foreign obligations and origins of nuclear material. CNSC staff determined that the licensee complied with the CNSC's regulatory requirements in this respect.

3.13.3.2 Regulatory Focus

CNSC staff will continue to monitor and evaluate the licensee's performance through participation in IAEA inspections, CNSC evaluations, and ongoing assessments of compliance with licensing requirements.

3.13.3.3 Proposed Improvements

No changes are anticipated in the in near future for this SCA. CVC for this SCA are contained in REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy* which is included in the proposed LCH.

3.13.4 Conclusion

Based on the review of licensee's performance over the licence period, CNSC staff conclude that RMC has an acceptable safeguards program and the overall performance of this SCA is satisfactory. RMC is qualified to carry out the authorized activities in the proposed licence.

3.13.5 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition 13.1 requires that the licensee implement and maintain a safeguards program. CVC for this licence condition are included in the proposed LCH.

3.14 Packaging and Transport

The Packaging and Transport SCA covers the safe packaging and transport of nuclear substances to and from the licensed facility.

3.14.1 Trends

The following table indicates the overall rating trends for the Packaging and Transport over the current licensing period:

PACKAGING AND TRANSPORT								
OVERALL COMPLIANCE RATINGS								
2013	2014	2015	2016	2017	2018	2019	2020	2021
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
RMC continues to perform satisfactorily in this SCA. Overall, CNSC staff conclude that the RMC packaging and transport SCA meets regulatory requirements.								

3.14.2 Discussion

A summary of the licensee's performance, regulatory focus and proposed improvements are presented in the following subsections.

Regulatory Requirements

The [Packaging and Transport of Nuclear Substances Regulations, 2015](#) (PTNSR) and the [Transportation of Dangerous Goods Regulations](#) (TDGR) apply to the packaging and transport of nuclear substances at RMC, including the design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage and unloading of packages.

RMC is required to have appropriate training for personnel involved in the handling, offering for transport and transport of dangerous goods, and is required to issue a training certificate to those workers in accordance with these regulations.

3.14.3 Summary

A summary of the licensee's past performance, regulatory focus and proposed improvements are presented in the following subsections.

3.14.3.1 Past Performance

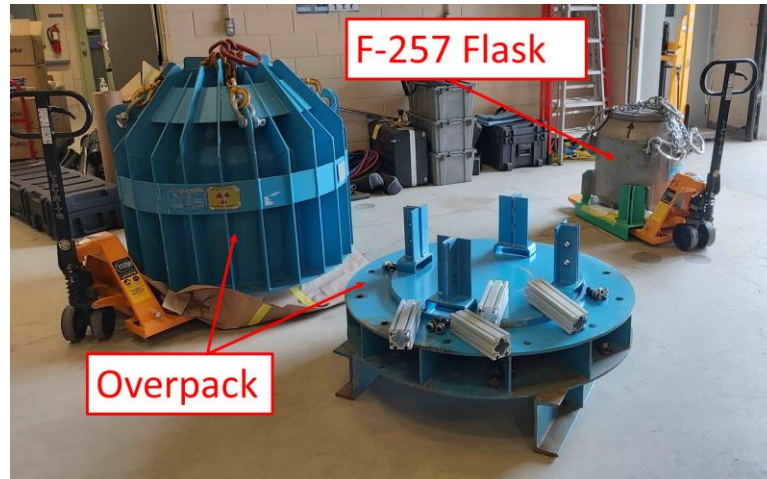
RMC has developed and implemented a packaging and transport program to ensure all shipments to and from its facility are in compliance with the PTNSR and the TDGR. RMC's packaging and transport program covers elements of package design and maintenance as required by the regulations.

RMC reported no events related to packaging and transport reported under the PTNSR during the current licence period. CNSC staff conducted 4 inspections which included compliance verification criteria associated with the Packaging and

Transport SCA over this licence period, including during the 2021 refueling project and verified compliance as part of other routine verification activities. CNSC staff identified no issues of non-compliance for this SCA.

The refueling project required to remove the irradiated fuel core from the RMC SLOWPOKE-2 reactor and place it into the existing F-257 transport flask, which is certified and registered by the CNSC for this application. Figure 6 below shows the flask and its overpack, designed to protect the flask from impacts.

Figure 6: F-257 flask with overpack



The spent fuel core was loaded into the F-257 flask and was transported safely to CNL with the appropriate transportation plan and permits.

3.14.3.2 Regulatory Focus

CNSC staff will continue to monitor RMC's compliance with regulatory requirements for the packaging and transport SCA through onsite inspections and reviews of annual compliance reporting and packaging and transportation program updates.

3.14.3.3 Proposed Improvements

Transport Canada have recently published several amendments to the TDGR. These are included *de facto* by reference to the TDGR in the LCH. CNSC staff will continue to verify RMC's compliance with the PTNSR and TDGR, including the recent amendments.

3.14.4 Conclusion

Based on CNSC staff assessments of RMC's licence application, supporting documents and past performance, CNSC staff conclude that RMC's implementation of the Packaging and Transport SCA has met and continues to meet all applicable regulatory requirements.

3.14.5 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition 14.1 requires that the licensee implements and maintains a packaging and transport program. CVC for this licence condition are included in the proposed LCH.

4. INDIGENOUS AND PUBLIC CONSULTATION AND ENGAGEMENT

4.1 Indigenous Consultation and Engagement

The common-law duty to consult with Indigenous Nations and communities applies when the Crown contemplates actions that may adversely affect potential or established Indigenous and/or treaty rights. The CNSC ensures that all of its licence decisions under the [NSCA](#) uphold the honour of the Crown and consider Indigenous peoples' potential or established Indigenous and/or treaty rights pursuant to section 35 of the [Constitution Act, 1982](#).

Throughout the current operating licence of the RMC facility, the CNSC has not been made aware of any direct interest or concern with regards to the SLOWPOKE facility and its operations by Indigenous Nations and/or communities. However, in order to ensure that Indigenous Nations and communities with a potential interest in the RMC SLOWPOKE facility were aware of the licence renewal application, CNSC staff initially identified two Indigenous Nations and communities based on the proximity of their communities to RMC. These Indigenous Nations and communities include the Mohawks of the Bay of Quinte and the Métis Nation of Ontario. These Indigenous Nations and communities were notified of the licence application and the opportunity for funding through the Participant Funding Program. Following these initial notifications, CNSC staff received information from Curve Lake First Nation indicating that they were interested in this licence renewal. Based on this information, Curve Lake First Nation was added to the identified Indigenous Nations and communities and CNSC staff followed up with them and discussed this licence renewal during meetings in October and December 2022.

The identified Indigenous Nations and communities have been encouraged to participate in the regulatory review process and in the public hearing to advise the Commission directly of any concerns they may have in relation to this licence renewal application. To date, CNSC staff have not been made aware of any specific concerns with regards to the RMC SLOWPOKE licence renewal application, however, CNSC staff remain open to meeting with Indigenous Nations and communities to discuss this licence renewal application, as well as ongoing operations at the RMC SLOWPOKE facility and to encourage and maintain productive and respectful relationships.

CNSC staff are committed to ongoing engagement and collaboration with interested Indigenous Nations and communities and will continue to provide

opportunities for meaningful long-term engagement over the proposed licensing term.

Licensee Engagement Activities

RMC has an Action Plan on Institutional Equity, Diversity, and Inclusion, available on the RMC website. RMC has stated that since the commissioning of SLOWPOKE-2 facility at RMC in 1985, the facility has not had any adverse effects on the land surrounding RMC and or on the surrounding environment. RMC indicated its commitment [1] to following the guidance in [REGDOC-3.2.2, *Indigenous Engagement*](#) to ensure meaningful Indigenous engagement and reporting to the CNSC.

The Director General Indigenous Affairs (DGIA) within is the DND/CAF lead on “Indigenous Engagement and the Duty to Consult”. The DGIA has posted guidelines for federal officials to fulfill the Duty to Consult, which was published by the Department of Aboriginal Affairs and Northern Development. A Guide to Acknowledge Indigenous People and Traditional Territory was further distributed to all units within the CFB Kingston. An Indigenous Policy Advisor from the Military Personnel Generation Group, National Defense is also available within RMC for consultation and communication.

CNSC staff have had several exchanges with RMC to discuss Indigenous engagement as part of the application for a licence renewal. RMC sent letters [13] to identified Indigenous nations and updated its public information [website](#) with information related to the licence renewal.

4.1.1 Conclusion

Based on the information received and reviewed, CNSC staff do not expect this licence renewal to cause any adverse impacts to potential or established Indigenous and/or Treaty rights.

CNSC staff determined that RMC has informed and engaged with the identified Indigenous Nations and communities of their application to renew the RMC operating licence.

CNSC remains committed to meaningful, ongoing engagement with Indigenous Nations and communities who have an interest in CNSC-regulated facilities and activities, including the RMC facility. The identified Indigenous Nations and communities have been notified and encouraged to participate in the process and in the Commission’s public hearing, by both RMC and the CNSC, thus providing Indigenous nations the opportunity to advise the Commission directly of any concerns they may have in relation to this request.

4.2 CNSC Public Consultation and Engagement

Part of CNSC’s mandate is to provide objective scientific and regulatory information to the public concerning nuclear activities. The availability and clarity of information pertaining to nuclear activities is essential to establishing an atmosphere of openness, transparency and trust between the licensee and the

public. Licensees have an important role to inform the public about their nuclear facility and activities. Since 2012, the CNSC requires major licensees to develop and implement a public information and disclosure program supported by a robust disclosure protocol that addresses local communities and stakeholders' needs, discussed fully in section 4.3.

4.2.1 Discussion

In accordance with section 17 of the [Canadian Nuclear Safety Commission Rules of Procedure](#), a Notice of Public Hearing was issued and posted on the CNSC website inviting written comments and requests for appearances before the Commission. CNSC staff also informed the public of RMC's application, the public Commission hearing, and participant funding availability, via the CNSC's website, email subscription list, and social media channels. CNSC staff also sent notifications to specific stakeholders, such as the Mayor of Kingston, the Kingston Chamber of Commerce and Environment and Climate Change Canada.

CNSC staff report to the Commission on a three-year cycle on the regulatory oversight of research reactors [3,4,5]. Funding through CNSC's Participant Funding Program (PFP) was made available for participation, and the public and Indigenous Nations and communities had the opportunity to review, question and comment on the regulatory oversight report. PFP was also made available for participation in this licence renewal CMD (see section 4.4).

CNSC staff have planned a webinar on the RMC licence renewal application for January 2023, which will provide an overview of the CNSC, the regulatory framework, the licensing process, key information in RMC's application, and guidance on how to participate in a licensing hearing. Awareness for this webinar will be ensured by posting notification to the CNSC website, emails to CNSC info list subscribers, direct emails to Indigenous Nations and communities, targeted emails and CNSC social media.

CNSC staff has verified that RMC has engaged with Indigenous Nations and the public with regard to its licence application.

4.2.2 Conclusion

The CNSC is committed to keeping interested communities informed of regulatory activities occurring in regard to the RMC facility and will continue to look for ways to enhance the involvement of interested groups.

4.3 Licensee Public Information Program

All licensees are required to maintain and implement a Public Information and Disclosure Program (PIDP), in accordance with regulatory document [REGDOC-3.2.1, Public Information and Disclosure](#). This program is supported by disclosure protocols that outline the type of facility information to be shared with the public as well as details on how that information is to be shared. This ensures that timely information about the health, safety and security of persons and the environment, and other issues associated with the lifecycle of nuclear facilities, is effectively communicated to the public.

4.3.1 Discussion

CNSC staff assessed RMC's implementation of its PIDP for its SLOWPOKE-2 reactor facility to verify that it communicates regularly with its audiences in a way that is meaningful to them. CNSC staff also review yearly program updates to verify RMC is taking audience feedback into consideration and taking steps to implement program adjustments to meet the evolving needs of its audiences.

RMC updated its PIDP in January 2022, which now reflects the requirements of REGDOC-3.2.1. CNSC staff reviewed RMC's PIDP for its SLOWPOKE-2 facility, and concluded that it meets CNSC requirements.

All licensees faced many challenges due to the COVID-19 pandemic, and had to adapt accordingly. This included moving away from traditional in-person meetings and events, and offering increased digital communications whenever possible.

CNSC staff verified that, in accordance with RMC's PIDP for its SLOWPOKE-2 reactor facility, RMC's communication activities included:

- Posting its PIDP and disclosure on RMC's [website](#);
- Updating RMC's external and internal website with the latest information on its SLOWPOKE-2 reactor;
- Publishing information and reports via various DND publications (print and online) and newsletters;
- Engaging with Indigenous Nations and the public;
- Engaging with local and national media upon request;
- Conducting special site tours and briefings for undergraduate students and military staff
- Providing site tours and handout brochures for the local community, educational groups and media to increase understanding of its SLOWPOKE-2 reactor facility; and
- Hosting on-site international conference meetings.

RMC states that it maintains the objective to build trust and confidence of local communities in the RMC SLOWPOKE-2 reactor and other facilities. In conjunction with communications planning and the public affairs office, RMC promotes education about radiation safety in the general Kingston community.

Information about routine operations as well as planned and unplanned events is disseminated via publications on the RMC SLOWPOKE-2 website, local and social media, and scientific publications.

RMC also participates in the annual scientific family-oriented festival Science Rendez-vous that popularizes science for the public, and the facility continues to explore opportunities to enhance the public information program for its target audiences.

4.3.2 Conclusion

CNSC staff reviewed RMC's PIDP for its SLOWPOKE-2 reactor facility and concluded that it meets CNSC requirements. RMC has demonstrated acceptable communications activities to the public and community members related to the facility.

Future improvements should include demonstrating mechanisms for audiences to give feedback on the PIDP as well as providing a summary of public or media inquiries and examples of communication products, including in-person and online communications.

4.3.3 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition G.4 requires that the licensee implement and maintain a public information and disclosure program. CVC for this licence condition are included in the proposed LCH.

4.4 Participant Funding Program

The CNSC made funding available through its PFP to assist Indigenous Nations and communities, members of the public, and stakeholders in participating in the regulatory process for licence renewal for the RMC facility and to provide value-added information to the Commission through informed and topic-specific interventions. This funding was offered to review RMC's licence application and associated documents and to prepare for, and participate in, the Commission's public hearing.

4.4.1 Discussion

The [Notice of Public hearing](#), posted on June 6, 2022, included notification of a PFP opportunity in the amount of \$15,000. The participant funding opportunity was also advertised on the CNSC website and was included in notification letters sent to Indigenous Nations and communities on July 13, 2022 [14, 15]. Those interested in obtaining participant funding were invited to submit a completed participant funding application before August 12, 2022.

One application was received from Mr. David Winfield.

The Funding Review Committee reviewed the application and made recommendations on the allocation of funding to the eligible recipient for the provision of new, distinctive and valuable information to the CNSC through informed and topic-specific interventions. Funding criteria are listed in the [PFP guide](#). Based on these criteria, the CNSC awarded \$900 in funding to the applicant.

Following the funding application deadline, representatives from Curve Lake First Nation expressed an interest in the renewal and funding to support their participation in the process. CNSC staff offered Curve Lake First Nation funding to meet with CNSC staff and discuss the licence renewal. As part of this offer, funding was also made available to support Curve Lake First Nations

participation in the hearing process, including the review of RMC's licence renewal application and related documentation.

4.4.2 Conclusion

CNSC staff encourage the public and Indigenous Nations and communities to participate in the Commission's public hearing. The PFP was offered to assist interested Indigenous Nations and communities, members of the public and other stakeholders to prepare for, and participate in, the Commission's public hearing process.

5. OTHER MATTERS OF REGULATORY INTEREST

5.1 Cost Recovery

Paragraph 24(2)(c) of the [NSCA](#) requires that a licence application is accompanied by the prescribed fee. The CNSC [Cost Recovery Fees Regulations](#) (CRFR) set out the specific requirements based on the activities to be licensed. An applicant for a Class I facility licence is subject to Part 2 of CRFR, Regulatory Activity Plan fees. However, in accordance with the CRFR, RMC is exempt from any fees associated with the planned regulatory efforts.

5.1.1 Discussion

As with other academic institutions, RMC has been and continues to be exempt under the CRFR. Paragraph 2 of the CRFR stipulates:

These Regulations do not apply to: (a) a secondary school or a specified educational institution as defined in subsection 2(1) of the *Canada Student Loans Act*; (b) a not-for-profit organization that carries out research and is wholly owned by an institution referred to in paragraph (a).

5.1.2 Conclusion

There is no concern over the payment of future cost recovery fees as RMC continues to be exempt under the CRFR.

5.2 Financial Guarantees

Subsection 24(5) of the NSCA stipulates that a licence may contain any term or condition that the Commission considers necessary for the purposes of this Act, including a condition that the applicant provide a financial guarantee in a form that is acceptable to the Commission.

RMC currently maintains a financial guarantee for decommissioning of the facility in the form of a letter of commitment from the Deputy Minister of National Defense.

5.2.1 Discussion

Requirements and guidance for establishing a financial guarantee for decommissioning are provided in [REGDOC-3.3.1, Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities](#),

published in January 2021. The value of the financial guarantees for nuclear facilities must be linked to the cost estimate set out in the most recent decommissioning plan for the nuclear facility.

The RMC SLOWPOKE-2 reactor facility, being an integral part of the DND, is owned by DND and is therefore the property of the Crown. The Facility is administered and funded by DND, through the Minister of National Defence under the authority of the Parliament of Canada. The Commandant of RMC is ultimately responsible for its daily operation and maintenance.

In February 2022, RMC submitted an updated PDP and cost estimate for the decommissioning of the SLOWPOKE-2 facility as part of its application. CNSC staff reviewed the PDP (see section 3.11) and found that it meets applicable regulatory requirements and provides an acceptable basis for a decommissioning cost estimate. RMC has proposed a revised financial guarantee in the amount of \$16.5 million in the form of a letter by the Deputy Minister of the Department of National Defense, which is an expressed commitment from DND and was included in RMC's application [1]. The document confirms that the SLOWPOKE-2 facility is owned by DND and therefore the property of the Crown and thus, the costs associated with the future decommissioning of this facility will be paid by DND.

A Letter of Commitment from the Department of National Defense is a valid financial instrument and satisfies the criteria of REGDOC-3.3.1.

5.2.2 Conclusion

CNSC staff conclude that RMC currently has in place a financial guarantee that is valid and enforceable and is sufficient to fund RMC's decommissioning obligations. Based on CNSC staff's assessment, the financial guarantee is compliant with REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities*.

5.2.3 Recommendation

CNSC staff recommend that the Commission accepts RMC's proposed financial guarantee. Standardized licence condition G.3 has been included in the proposed licence for RMC, which requires that the licensee maintain a financial guarantee for decommissioning that is acceptable to the Commission.

CVC are included in proposed LCH, which includes REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities*.

5.3 Improvement Plan and Significant Future Activities

RMC has not identified any significant future activities or improvements for the requested licence period.

5.4 Nuclear Liability Insurance

The [*Nuclear Liability and Compensation Act*](#) establishes civil liability and compensation provisions for damages resulting from a nuclear incident. The RMC facility is identified as a nuclear installation in Schedule 2 of the [*Nuclear Liability Compensation Regulations*](#) and is therefore required to maintain valid insurance for the liability amount defined in those regulations.

5.4.1 Discussion

The Department of Natural Resources oversees the enforcement of the *Nuclear Liability Compensation Regulations*, and the CNSC ensures that applicants have the required financial security in place to cover their respective liability amount prior to granting a licence, as established by the *Nuclear Liability and Compensation Act* and the *Nuclear Liability Compensation Regulations*.

The RMC is an integral unit of the Federal Department of National Defence, which is owned by the Federal Government of Canada. Government of Canada underwrites its own risks and does not purchase insurance in the commercial insurance market. Any liability issues are processed by the staff within the Office of the Judge Advocate General.

5.4.2 Conclusion

RMC satisfies the requirements under the *Nuclear Liability and Compensation Act* for its SLOWPOKE-2 reactor facility.

5.5 Delegation of Authority

The Commission may include in licences any conditions that it considers necessary for the purposes of the NSCA. The Commission may delegate authority to CNSC staff with respect to the administration of licence conditions, or portions thereof [16].

In the proposed licence, Licence Condition 3.2 requires that *The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission*. CNSC staff recommend that the Commission delegate its authority for the purposes described in this licence condition to the following staff:

- Director, Nuclear Processing Facilities Division
- Director General, Directorate of Nuclear Cycle and Facilities Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

5.6 Proposed Licence Period

There is no change in the proposed licence period. In its application, RMC has requested the renewal of its Class IA Non-Power Reactor Operating Licence for a period of 10 years, which is consistent with the current licence period of 10 years.

5.6.1 Discussion

In the early 2000's the typical licence period for Class I facilities was 2 years. In 2002, following the coming into force of the NSCA, and the evolution of CNSC's licensing process and regulatory framework, CNSC staff reviewed the feasibility of granting longer term licences. As an outcome of this review, CNSC staff developed an approach to recommending appropriate licence periods, which was based on benchmarking with international practices. This approach is outlined in CMD 02-M12 [17] and was presented to the Commission in March 2002. CMD 02-M12 provides a risk-informed process that has been used by CNSC staff to support recommendations regarding licence periods to the Commission in past. Since 2002, CNSC's regulatory framework has continued to evolve and the typical licence period for Class I facilities has gradually lengthened to a 10-year term or more.

CNSC staff have no concern with the 10-year term that RMC requested, given the performance of the licensee during the current licence term, low risk of the facility, CNSC's regulatory oversight and the periodic updates provided to the Commission through the RORs. CNSC staff recommend that the Commission accept RMC's request for a 10-year licence term.

6. OVERALL CONCLUSIONS AND RECOMMENDATIONS

CNSC staff's conclusions and recommendations are based on the assessment of RMC's compliance with the NSCA and its regulations during the current licence period (2013-2023), and the assessment of the licence application, including all program documents in support of the application. CNSC staff determined that RMC's performance during the current licensing term was satisfactory and met regulatory requirements. CNSC staff assessed RMC's application and determined that it complies with regulatory requirements.

CNSC staff conclude that RMC implements the programs, resources, and measures to ensure the health and safety of persons and the environment are protected, and to ensure appropriate measures related to security and Canada's international obligations are in place during the proposed licence period.

Based on above conclusions, CNSC staff recommend that the Commission take the following actions:

1. Conclude, pursuant to paragraph 24(4)(a) and (b) of the NSCA, that RMC:
 - i. is qualified to carry on the activities authorized by the licence;
 - ii. will make adequate provisions for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
2. Accept an increase to the maximum allowable excess reactivity of the reactor from 4.0 to 4.3 mk in RMC's OLCs.
3. Accept the financial guarantee as set out in section 5.2 of this CMD.

4. Delegate authority as set out in section 5.5 of this CMD.
5. Approve the issuance of the proposed 10-year licence NPROL-20.00/2033 for operation of the RMC facility, effective July 1, 2023 to June 30, 2033.

REFERENCES

1. Royal Military College of Canada, Non-Power Operating Licence Renewal [Application](#), 23 February 2022, (e-Doc 6743957).
2. [Record of Proceedings - Royal Military College of Canada](#) - Application to renew the Non-Power Reactor Operating Licence for the SLOWPOKE-2 reactor, (e-Doc 4160005).
3. CMD 16-M43, Regulatory Oversight Report for Nuclear Processing, Small Research Reactor and Class IB Accelerator Facilities: 2015, (e-Doc 5015366).
4. [CMD 18-M32](#), Regulatory Oversight Report for Research Reactors and Class IB Accelerators: 2016 – 2017, (e-Doc 5536665).
5. [CMD 21-M33](#), Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities and Research Reactors in Canada: 2020, (e-Doc 6612658).
6. CSA Group, CSA N286-12, Management System Requirements for Nuclear Facilities, June 2012.
7. CSA Group, CSA N393-13: Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances, January 2013.
8. FAC-2: RMC Environmental Risk Assessment Rev. 3.1, September 2022, (e-Doc 6881896).
9. CSA Group, CSA N288.6-12, Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills, June 2012.
10. CSA Group, CSA N292.0:19, General principles for the management of radioactive waste, June 2019.
11. CSA Group, CSA N292.3-14 Management of low- and intermediate-level radioactive waste, January 2014.
12. CSA Group, CSA N294-19 Decommissioning of Facilities Containing Nuclear Substances, November 2019.
13. RMC Letters to First Nations, August 31, 2022, (e-Doc 6866900).
14. Letter to Ms. Lisa Maracle, Director of Community Services, Mohawks of The Bay of Quinte, June 12, 2022, (e-Doc 6837577).
15. Letter to Mr. Jesse Fieldwebster, Climate Change & Regions 4, 6, 8, & 9 Manager, Métis Nation of Ontario, June 12, 2022, (e-Doc 6837578).
16. Briefing Note, Delegation of Authority, February 1, 2017, (e-Doc 5177736).
17. CNSC, CMD 02-M12 New Staff Approach to Recommending Licence Periods, March 2002 (e-Doc 3007783).

GLOSSARY

For definitions of terms used in this document, see [REGDOC-3.6, Glossary of CNSC Terminology](#), which includes terms and definitions used in the Nuclear Safety and Control Act and the Regulations made under it, and in CNSC regulatory documents and other publications.

AECL	Atomic Energy of Canada Ltd
ALARA	As low as reasonably achievable
CAF	Canadian Air Force
CFB	Canadian Forces Base
CINFR	Class I Nuclear Facilities Regulations
CMD	Commission Member's Document
CMR	Collège Militaire Royal
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CRC	Criminal Record Check
CRFR	Cost Recovery Fees Regulations
CSA	Canadian Standard Association
CSO	College Standing Orders
CVC	Compliance Verification Criteria
DGIA	Director General Indigenous Affairs
DND	Department of National Defense
EMP	Environmental Monitoring Program
EMS	Environmental Management System
EPR	Environmental protection review
ERA	Environmental Risk Assessment
FASC	Facility Access Security Clearance
FPP	Fire Protection Program
GNSCR	General Nuclear Safety and Control Regulations
IAA	Impact Assessment Act
IAEA	International Atomic Energy Agency
LCH	Licence Conditions Handbook
LEU	Low enriched Uranium

mk	mk, or milli-k is a unit to measure reactivity ρ , defined as follows: $\rho = (k-1)/k \cdot 10^{-3}$, where $k = (\text{neutrons produced in one generation})/(\text{neutrons produced in the previous generation})$
MP	Military Police
NBCC	National Building Code of Canada
NBT	Neutron Beam Tube
NCA	Nuclear Cooperation Agreements
NEW	Nuclear energy worker
NFCC	National Fire Code of Canada
NFPA	National Fire Protection Association
NNC	Notice of non-compliance
NPROL	Non-Power Reactor Operating Licence
NSCA	Nuclear Safety and Control Act
NSR	Nuclear Security Regulations
OLC	Operating Limits and Conditions
OPEX	Operating Experience
PAD	Personal Alarming Dosimeter
PDP	Preliminary Decommissioning Plan
PFP	Participant Funding Program
PIDP	Public Information and Disclosure Program
PITE	Physical Inventory Taking Evaluations
PTNSR	Packaging and Transport of Nuclear Substances Regulations
REGDOC	Regulatory Document
RMC	Royal Military College of Canada
RP	Radiation Protection
SAR	Safety Analysis Report
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SLOWPOKE	Safe LOW-POwer Kritical Experiment
SRC	Saskatchewan Research Council
SSC	Structures, systems and component
TDGR	Transportation of Dangerous Goods Regulations
WHMIS	Workplace Hazardous Materials Information System

A. SAFETY PERFORMANCE RATING LEVELS

Satisfactory (SA)

Licensee meets all of the following criteria:

- Performance meets CNSC staff expectations
- Licensee non-compliances or performance issues, if any, are not risk-significant
- Any non-compliances or performance issues have been, or are being, adequately corrected

Below Expectations (BE)

One or more of the following criteria apply:

- Performance does not meet CNSC staff expectations
- Licensee has risk-significant non-compliance(s) or performance issue(s)
- Non-compliances or performance issues are not being adequately corrected

Unacceptable (UA)

One or both of the following criteria apply:

- Risk associated with a non-compliance or performance issue is unreasonable
- At least one significant non-compliance or performance issue exists with no associated corrective action

Note: Starting in 2019, facility performance assessment ratings were simplified and the “Fully Satisfactory (FS)” was replaced by the “Satisfactory (SA)” rating. It is important to recognize that a facility that received an SCA performance rating of FS in previous Regulatory Oversight Report and now has a rating of SA, does not necessarily indicate a reduction in performance.

B. BASIS FOR THE RECOMMENDATION(S)

B.1 Regulatory Basis

The recommendations presented in this CMD are based on compliance objectives and expectations associated with the relevant SCAs and regulatory requirements.

CNSC's staff assessment of RMC's licence application included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements. The completeness check verified that the application included the prescribed information in accordance with the Nuclear Safety and Control Act and applicable regulations.

The sufficiency check verified that the application included sufficient and quality information in order for CNSC staff to conduct the technical assessment. The technical assessment verified that the application included adequate safety and control measures to address CNSC requirements. Documents originally submitted as part of the application may have been revised, updated, or replaced over the course of the assessment to address CNSC requirements.

The regulatory basis for the matters that are relevant to this CMD are as follows.

Management System

The regulatory foundation for the recommendation(s) associated with Management System includes the following:

- The [Class I Nuclear Facilities Regulations](#) require that an application for a licence shall contain, under paragraph:
 - 3(d), the proposed management system for the activity to be licensed, including measures to promote and support safety culture.
- The [GNSCR](#) require that an application for a licence shall contain, under paragraphs:
 - 3(1)(k), the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the NSCA and the regulations made under the NSCA, including the internal allocation of functions, responsibilities and authority.
 - 15(a), the persons who have the authority to act for them (the applicant/licensee) in their dealings with the Commission.
 - 15(b), the names and position titles of the persons who are responsible for the management and control of the licensed activity and the nuclear substance, nuclear facility, prescribed equipment or prescribed information encompassed by the licence.

Human Performance Management

The regulatory foundation for the recommendation(s) associated with Human Performance Management includes the following:

- The [CINFR](#) require that an application for a licence shall contain, under paragraphs:

- 3(d.1), the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty.
- 6(m), the proposed responsibilities of and the qualification requirements and training program for workers, including the procedures for the requalification of workers
- 6(n), the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.
- 9(2), The Commission or a designated officer authorized under paragraph 37(2)(b) of the [NSCA](#) may certify a person referred to in paragraph 44(1)(k) of the NSCA for a position referred to in a licence after receiving from the licensee an application stating that the person
 - (a) meets the applicable qualification requirements referred to in the licence;
 - (b) has successfully completed the applicable training program and examination referred to in the licence; and
 - (c) is capable, in the opinion of the licensee, of performing the duties of the position.
- 9(3), The Commission or a designated officer authorized under paragraph 37(2)(b) of the NSCA may renew a certification after receiving from a licensee an application stating that the certified person
 - (a) has safely and completely performed the duties of the position for which the person was certified;
 - (b) continues to receive the applicable training referred to in the licence;
 - (c) is capable, in the opinion of the licensee, of performing the duties of the position.
- 9(4), A certification expires five years after the date of its issuance or renewal
- 14(2)(e), every licensee who operates a Class I nuclear facility shall keep a record of the status of each worker's qualifications, requalification and training, including the results of all tests and examinations completed in accordance with the licence.
- The GNSCR require that licensees, under paragraphs:
 - 12(1)(a), ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence.
 - 12(1)(b), train the workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence.
 - 12(1)(e), require that every person at the site of the licensed activity to use equipment, devices, clothing and procedures in accordance with the Act, the regulations made under the Act and the licence.

Operating Performance

The regulatory foundation for the recommendation(s) associated with operating performance includes the following:

- The CINFR require that an application for a licence to operate a Class I nuclear facility shall contain, under paragraph:
 - 6(d), the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

Safety Analysis

The regulatory foundation for the recommendation(s) associated with safety analysis includes the following:

- The GNSCR require that an application for a licence shall contain, under paragraph:
 - 3(1)(i), a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.
- The CINFR require that an application for a licence shall contain, under paragraphs:
 - 6(a), a description of the structures at the nuclear facility, including their design and their design operating conditions;
 - 6(b), a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;
 - 6(c), a final safety analysis report demonstrating the adequacy of the design of the nuclear facility.
 - 6(h) the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects;

Physical Design

The regulatory foundation for the recommendation(s) associated with physical design includes the following:

- Paragraph 3(1)(d) of the GNSCR requires that an application for a licence shall contain a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.
- The CINFR require that an application for a licence shall contain, under paragraphs:
 - 3(a), a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;
 - 3(b), plans showing the location, perimeter, areas, structures and systems of the nuclear facility;
 - 6(a), a description of the structures at the nuclear facility, including their design and their design operating conditions;
 - 6(b), a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;

- 6(c), a final safety analysis report demonstrating the adequacy of the design of the facility; and
- 6(d), proposed measures, policies, methods and procedures for operating and maintaining the facility.

Fitness for Service

The regulatory foundation for the recommendation(s) associated with fitness for service includes the following:

- The CINFR require that an application for a licence shall contain, under paragraph:
 - 6(d), the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

Radiation Protection

The regulatory foundation for the recommendation(s) associated with radiation protection includes the following:

- The GNSCR require, under subsection 3(1), that a licence application contain the following information under paragraphs:
 - 3(1)(e), the proposed measures to ensure compliance with the [RPR](#).
 - 3(1)(f), any proposed action level for the purpose of section 6 of the RPR.
- The RPR
- The CINFR require that an application for a licence to operate a Class I nuclear facility shall contain, under paragraphs:
 - 6(e), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.
 - 6(h), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measure that will be taken to prevent or mitigate those effects.

Conventional Health and Safety

The regulatory foundation for the recommendation(s) associated with Conventional Health and Safety includes the following:

- The CINFR require that an application for a licence shall contain, under paragraph:
 - 3(f), the proposed worker health and safety policies and procedures.
- RMC's activities and operations must comply with the [Canada Labour Code, Part II: Occupational Health and Safety](#).

Environmental Protection

The regulatory foundation for the recommendation(s) associated with Environmental Protection includes the following:

- The GNSCR, under paragraphs 12(1)(c) and (f), require that each licensee take all reasonable precautions to protect the environment and the health and safety of persons, and to control the release of radioactive nuclear substances and hazardous substances within the site of the licensed activity and into the environment.
- The RPR prescribe dose limits for the general public, which under Subsection 1(3) is 1 mSv per calendar year.
- The CINFR require that an application for a licence shall contain, under paragraphs:
 - 3(e), the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on.
 - 3(g), the proposed environmental protection policies and procedures.
 - 3(h), the proposed effluent and environmental monitoring programs.
 - 6(e), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.
 - 6(h), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects.
 - 6(i), the proposed location of points of release, the proposed maximum quantities and concentrations, and the anticipated volume and flow rate of releases of nuclear substances and hazardous substances into the environment, including their physical, chemical and radiological characteristics.
 - 6(j), the proposed measures to control releases of nuclear substances and hazardous substances into the environment.

Emergency Management and Fire Protection

The regulatory foundation for the recommendation(s) associated with Emergency Management and Response includes the following:

- 12(1)(c) of the GNSCR states that every licensee shall “take all reasonable precautions to protect the environment and the health and safety of persons and to maintain security”.
- 12(1)(f) of the GNSCR states that every licensee shall “take all reasonable precautions to control the release of radioactive nuclear substances or hazardous substances within the site of the licensed activity and into the environment of the licensed activity”.
- The CINFR require that an application for a licence shall contain, under paragraph:
 - 6(k) information on the licensee’s proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to:
 - Assist offsite authorities in planning and preparing to limit the effects of an accidental release;

- Notify offsite authorities of an accidental release or the imminence of an accidental release;
- Report information to offsite authorities during and after an accidental release;
- Assist offsite authorities in dealing with the effects of an accidental release; and
- Test the implementation of the measures to prevent or mitigate the effects of an accidental release.

Waste Management

The regulatory foundation for the recommendation(s) associated with Waste Management includes the following:

- The GNSCR require that an application for a licence include, under paragraph:
 - 3(1)(j), the name, quantity, form and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed, or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste.

Security

The regulatory foundation for the recommendation(s) associated with Security includes the following:

- GNSCR p. 12(1)(c) Every licensee shall take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances;
- GNSCR p.12(1)(g) Every licensee shall implement measures for alerting the licensee to the illegal use or removal of a nuclear substance, prescribed equipment or prescribed information, or the illegal use of a nuclear facility;
- GNSCR p.12(1)(h) Every licensee shall implement measures for alerting the licensee to acts of sabotage or attempted sabotage anywhere at the site of the licensed activity; and
- GNSCR p.12(1)(j) Every licensee shall instruct the workers on the physical security program at the site of the licensed activity and on their obligations under that program.
- GNSCR sections 21 to 23 provide obligations for all licensees on the identification, storage, handling, and transfer requirements of information designated as “prescribed information”.
- All Class I licensees must comply with the [Nuclear Security Regulations](#).

Safeguards and Non-Proliferation

The regulatory basis for the recommendation is as follows:

- Subparagraph 9(a)(iii) of the NSCA establishes that one of the objects of the Commission is to "achieve conformity with measures of control and international obligations to which Canada has agreed".
- Paragraph 24(4)(b) of the NSCA states that "no licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee...will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed".
- Paragraph 27(b) of the NSCA states that "every licensee and every prescribed person shall (b) make the prescribed reports and file them in the prescribed manner".
- Paragraph 12(1)(i) of the GNSCR states that "every licensee shall...take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement".
- Section 30 of the GNSCR identifies situations in which safeguards reports shall be provided by licensees to the Commission. Regulatory document series 3.1, Reporting Requirements, sets out the CNSC's requirements for event and compliance monitoring reporting by licensees, and can be found on the CNSC's website.

Packaging and Transport

The regulatory foundation for the recommendation(s) associated with Packaging and Transport includes the following:

- The [Packaging and Transport of Nuclear Substances Regulations, 2015](#); and
- Transport Canada's [Transportation of Dangerous Goods Regulations](#).

Decommissioning Strategy and Financial Guarantees

The regulatory foundation for the recommendation(s) associated with RMC's Decommissioning Strategy and Financial Guarantees includes:

- The GNSCR require that an application for a licence shall contain, under paragraph:
 - 3(1)(l), a description of any proposed financial guarantee relating to the activity to be licensed.
- The CINFR require that an application for a licence shall contain, under paragraph:
 - 3(k), the proposed plan for the decommissioning of the nuclear facility or of the site.

Licensee's Public Information Program

- The CINFR require that an application for a licence shall contain, under paragraph:
 - 3(j), information on the licensee's public information program.

B.2 Technical Basis

The technical basis for recommendations, including guidance documents, national standards and regulatory documents is presented in this CMD under each SCA and addressed in detail in the LCH.

C. SAFETY AND CONTROL AREA FRAMEWORK

C.1 Safety and Control Areas Defined

The safety and control areas discussed in sections 3.1 through 3.14 are comprised of specific areas of regulatory interest which vary between facility types.

The following table provides a high-level definition of each SCA. The specific areas within each SCA are to be identified by the CMD preparation team in the respective areas within section 3 of this CMD

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	Safety and Control Area	Definition
Management	Management System	Covers the framework which establishes the processes and programs required to ensure an organization achieves its safety objectives and continuously monitors its performance against these objectives and fostering a healthy safety culture.
	Human Performance Management	Covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee personnel are in relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.
	Operating Performance	This includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.
Facility and Equipment	Safety Analysis	Maintenance of the safety analysis that supports that overall safety case for the facility. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.
	Physical Design	Relates to activities that impact on the ability of systems, components and structures to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.
	Fitness for Service	Covers activities that impact on the physical condition of systems, components and structures to ensure that they remain effective over time. This includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.
Core Control Processes	Radiation Protection	Covers the implementation of a radiation protection program in accordance with the Radiation Protection Regulations. This program must ensure that contamination and radiation doses received are monitored and controlled and maintained ALARA.
	Conventional Health	Covers the implementation of a program to manage

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	Safety and Control Area	Definition
	and Safety	workplace safety hazards and to protect workers.
	Environmental Protection	Covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.
	Emergency Management and Fire Protection	Covers emergency plans and emergency preparedness programs which exist for emergencies and for non-routine conditions. This also includes any results of exercise participation.
	Waste Management	Covers internal waste-related programs which form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. Also covers the planning for decommissioning.
	Security	Covers the programs required to implement and support the security requirements stipulated in the regulations, in their licence, in orders, or in expectations for their facility or activity.
	Safeguards and Non-Proliferation	Covers the programs and activities required for the successful implementation of the obligations arising from the Canada/IAEA safeguards agreements as well as all other measures arising from the <i>Treaty on the Non-Proliferation of Nuclear Weapons</i> .
	Packaging and Transport	Programs that cover the safe packaging and transport of nuclear substances and radiation devices to and from the licensed facility.

C.2 Specific Areas for this Facility Type

The following table identifies the specific areas that comprise each SCA for the RMC SLOWPOKE-2 facility:

SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
Management	Management System	<ul style="list-style-type: none"> ▪ Management System ▪ Organization ▪ Performance Assessment, Improvement and Management Review ▪ Operating Experience (OPEX) ▪ Change Management ▪ Safety Culture ▪ Configuration Management ▪ Records Management ▪ Management of Contractors ▪ Business Continuity
	Human Performance Management	<ul style="list-style-type: none"> ▪ Human Performance Programs ▪ Personnel Training ▪ Personnel Certification ▪ Work Organization and Job Design ▪ Fitness for Duty
	Operating Performance	<ul style="list-style-type: none"> ▪ Conduct of Licensed Activity ▪ Procedures ▪ Reporting and Trending ▪ Outage Management Performance ▪ Safe Operating Envelope ▪ Accident Management and Recovery
Facility and Equipment	Safety Analysis	<ul style="list-style-type: none"> ▪ Deterministic Safety Analysis ▪ Hazard Analysis ▪ Criticality Safety
	Physical Design	<ul style="list-style-type: none"> ▪ Design Governance ▪ Site Characterization ▪ Facility Design ▪ Structure Design ▪ System Design ▪ Components Design
	Fitness for Service	<ul style="list-style-type: none"> ▪ Equipment Fitness for Service/Equipment Performance ▪ Maintenance ▪ Aging Management ▪ Periodic Inspection and Testing

SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
Core Control Processes	Radiation Protection	<ul style="list-style-type: none"> ▪ Application of ALARA ▪ Worker Dose Control ▪ Radiation Protection Program Performance ▪ Radiological Hazard Control
	Conventional Health and Safety	<ul style="list-style-type: none"> ▪ Performance ▪ Practices ▪ Awareness
	Environmental Protection	<ul style="list-style-type: none"> ▪ Effluent and Emissions Control (releases) ▪ Protection of People ▪ Environmental Management System (EMS) ▪ Assessment and Monitoring ▪ Environmental Risk Assessment
	Emergency Management and Fire Protection	<ul style="list-style-type: none"> ▪ Conventional Emergency Preparedness and Response ▪ Nuclear Emergency Preparedness and Response ▪ Fire Emergency Preparedness and Response
	Waste Management	<ul style="list-style-type: none"> ▪ Waste Characterization ▪ Waste Minimization ▪ Waste Management Practices ▪ Decommissioning Plans
	Security	<ul style="list-style-type: none"> ▪ Facilities and Equipment ▪ Response Arrangements ▪ Security Practices ▪ Drills and Exercises ▪ Cyber Security
	Safeguards and Non-Proliferation	<ul style="list-style-type: none"> ▪ Nuclear Material Accountancy and Control ▪ Access and Assistance to the IAEA ▪ Operational and Design Information ▪ Import and Export
	Packaging and Transport	<ul style="list-style-type: none"> ▪ Packaging and Transport

D. SUPPORTING DETAILS

D.1 Inspections (2013 – 2023)

The following table includes inspections conducted at RMC during the 2013 – 2023 licence period and the SCAs included for each inspection.

Year	Reference	Management system	Human performance	Safety Analysis	Operating performance	Physical Design	Fitness for service	Radiation protection	Conventional H&S	Environmental protection	Emergency & fire protection	Waste management	Security	Safeguards and non-prolifer.	Packaging and transport	Public Information and Disclosure
2013	NLRRD-RMC-13-T2	X	X		X			X	X	X	X	X			X	
2014	NLRRD-RMC-14-T2	X	X		X		X	X	X	X	X	X	X		X	
2015	NLRRD-RMC-15-T2	X	X		X			X	X	X	X	X	X		X	
2016	RMC-SLWPK-2016-01	X	X		X		X	X	X	X	X	X	X			
2017	RMC-SLWPK-2017-01	X	X		X		X	X	X	X	X	X	X			X
2019	RMC-SLWPK-2019-01	X	X		X		X	X	X	X	X	X	X			X
2019	2019-NSD-RMC-01										X		X			
2021	RMC-SLWPK-2021-01	X	X	X	X		X	X	X		X		X		X	X
2022	RMC-SLWPK-2022-01		X													
	Total for each SCA	7	8	1	7	0*	5	7	7	6	8	6	7	0**	4	3

* Physical design is typically assessed during document and licensing reviews, unless a change is implemented. It is also assessed as part of Fitness for Service.

** Safeguards inspections are conducted and accounted separately. These are discussed under section 3.13, Safeguards and Non-Proliferation.

PART 2

Part 2 of this CMD provides all relevant information pertaining directly to the licence, including:

- The current licence;
- Any proposed changes to the conditions, licensing period, or formatting of an existing licence;
- The proposed licence; and
- The proposed licence conditions handbook.

CURRENT LICENCE

Word eDoc 3910552
PDF eDoc 4097347



e-Doc 3910552 (Word)

e-Doc 4097347 (PDF)

File: 2.03

NON-POWER REACTOR OPERATING LICENCE SLOWPOKE-2 REACTOR

ROYAL MILITARY COLLEGE OF CANADA

- I) **LICENCE NUMBER:** **NPROL-20.00/2023**
- II) **LICENSEE:** Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to
- The Royal Military College of Canada –
Collège militaire royal du Canada
P.O. Box 17000, Stn. Forces
Kingston, Ontario
K7K 7B4**
- III) **LICENCE PERIOD:** This licence is valid from **July 1, 2013**, to **June 30, 2023**, unless otherwise suspended, amended, revoked or replaced.
- IV) **LICENSED ACTIVITIÉS:**
- This licence authorizes the licensee to:
- (a) operate the Royal Military College of Canada - Collège militaire royal du Canada SLOWPOKE-2 reactor and associated facilities (hereinafter “the facility”), located in the Sawyer Science and Engineering Building at the Royal Military College of Canada - Collège militaire royal du Canada, in Kingston, Ontario;
 - (b) produce, possess, transfer, use, package, manage, and store the nuclear substances that are required for, associated with or arise from the activities described in (a); and
 - (c) possess and use prescribed equipment and prescribed information required for, associated with or arise from the activities described in (a).

V) EXPLANATORY NOTES:

- (a) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- (b) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* (hereinafter “NSCA”) and associated regulations.
- (c) The Royal Military College of Canada - Collège militaire royal du Canada Licence Conditions Handbook (hereinafter “RMCC-LCH”) provides
 - (i) compliance verification criteria in order to meet the conditions set out in this licence;
 - (ii) information regarding delegation of authority to CNSC staff; and
 - (iii) applicable versions of documents and a process for version control of codes, standards or other documents that are used as compliance verification criteria.

VI) CONDITIONS:

1. GENERAL

- 1.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis for the facility, unless otherwise approved in writing by the Commission.
- 1.2 The licensee shall give written notification of changes made to the licensee documents submitted to support the licence application.
- 1.3 The licensee shall maintain a preliminary decommissioning plan for the facility, and shall review and revise the plan at such times as the Commission may require and in any event, no later than ten years from previous revision.
- 1.4 The licensee shall maintain in effect a financial guarantee for decommissioning of facility that is acceptable to the Commission. The licensee shall report annually that the financial guarantee is valid and in effect.
- 1.5 The licensee shall implement and maintain a public information program including a public disclosure protocol.
- 1.6 The licensee shall, in the event of any conflict or inconsistency between licence conditions, codes or standards or regulatory documents used as compliance verification criteria in the RMCC-LCH, refer the matter to the Commission for resolution.

2. MANAGEMENT SYSTEM

- 2.1 The licensee shall implement and maintain a management system for activities carried out under this licence.

3. HUMAN PERFORMANCE MANAGEMENT

- 3.1 The licensee shall ensure that persons appointed to the positions of reactor engineer, reactor technician, or reactor operator hold certifications in accordance with the requirements of the NSCA.
- 3.2 The licensee shall establish and maintain a training program for certified persons.

4. OPERATING PERFORMANCE

- 4.1 The licensee shall operate the facility subject to the terms and conditions of this licence and within the limits specified in Appendix A to this licence.
- 4.2 The licensee shall maintain an accurate inventory of their sealed sources, both in use and in storage, and provide details of this inventory when requested.
- 4.3 The licensee shall report to the Commission unplanned situations or events at the facility.
- 4.4 The licensee shall submit annual compliance monitoring and operational performance reports to the Commission.

5. SAFETY ANALYSIS

- 5.1 The licensee shall conduct and maintain safety analyses that are representative for the current hazards of the facility or process analyzed.

6. PHYSICAL DESIGN

- 6.1 The licensee shall ensure that the defence-in-depth principle is applied and maintained in the design of the nuclear facility in order to prevent, or if prevention fails, to mitigate the consequences resulting from radioactive releases.

7. FITNESS FOR SERVICE

- 7.1 The licensee shall develop, implement and maintain documented programs of maintenance, testing, surveillance, and inspection of structures, systems and components important to safety to ensure that their availability, reliability and functionality remain in accordance with the design over the lifetime of the facility.
- 7.2 The licensee shall develop, implement and maintain an aging management program for the facility to identify all aging mechanisms relevant to structures, systems and components important to safety; to evaluate their possible consequences; and to provide direction for the activities required to maintain the operability and reliability of these structures, systems and components.

8. RADIATION PROTECTION

- 8.1 The licensee shall implement and maintain a radiation protection program which includes action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

9. CONVENTIONAL HEALTH AND SAFETY

- 9.1 The licensee shall implement and maintain an occupational health and safety program at the facility.

10. ENVIRONMENTAL PROTECTION

- 10.1 The licensee shall control, monitor and record releases of radioactive nuclear substances and hazardous substances from the facility.

11. EMERGENCY MANAGEMENT AND FIRE RESPONSE

- 11.1 The licensee shall implement and maintain an emergency management program to prepare for and respond to emergency events, including fires, initiating at or impacting the facility, and for dealing with the effects of such emergencies both in the facility and outside the facility.

12. WASTE MANAGEMENT

- 12.1 The licensee shall implement and maintain a waste management program documenting handling, processing, transportation, storage and disposal of nuclear wastes, including nuclear wastes mixed with other hazardous substance.

13. SECURITY

- 13.1 The licensee shall implement and maintain a nuclear security program to prevent persons from carrying out malevolent actions capable of affecting the safe operation of the facility.

14. SAFEGUARDS AND NON-PROLIFERATION

- 14.1 The licensee shall implement and maintain safeguards measures required to ensure safeguards implementation at the facility.

15. PACKAGING AND TRANSPORT

- 15.1 The licensee shall implement and maintain a program for the packaging and transport of nuclear substances.

16. NUCLEAR FACILITY SPECIFIC

- 16.1 The licensee shall, by June 30, 2018 develop and submit to the Commission a plan for end of operation or continued operation of the SLOWPOKE-2 reactor beyond the exhaust of the original uranium core.

SIGNED at OTTAWA, this 26th day of June, 2013.



Michael Binder, President
on behalf of the Canadian Nuclear Safety Commission

APPENDIX A

Operating Limits

1. The licensee shall ensure that the total thermal power from the reactor fuel does not exceed 20 kilowatts under steady-state operating conditions.
2. The licensee shall ensure that the maximum excess reactivity of the reactor does not exceed 4.0 mk.
3. The licensee shall not operate the reactor at neutron flux levels exceeding $1.05 \times 10^{12} \text{ n cm}^{-2} \text{ s}^{-1}$, except that while increasing power under automatic control a peak power of no more than $1.4 \times 10^{12} \text{ n cm}^{-2} \text{ s}^{-1}$ may be permitted for a time of no more than one minute.
4. The licensee shall not allow the reactor to contain more than 200 finished SLOWPOKE-2 fuel elements except otherwise approved in writing by the Commission. The total amount of uranium-235 in the reactor shall not exceed 1.3 kg. The fuel elements shall consist of only uranium oxide pellets and the uranium being enriched to no more than 20% by weight uranium-235.
5. The facility may contain sealed sources of uranium-235 for use as testing or calibration devices. The licensee shall ensure that no sealed source contains more than 1.0 grams of uranium-235.

PROPOSED LICENCE CHANGES

Overview

RMC currently operates the RMC SLOWPOKE-2 reactor facility under a Non-Power Reactor Operating Licence, NPROL-20.00/2023. The proposed licence incorporates standardized licence conditions in a standard format. The licensed activities remain the same.

Licence Conditions

The proposed licence incorporates the standardized licence conditions that are applicable to RMC as a Non-Power Operating Reactor, as developed by CNSC staff.

Licence Format

The current licence was drafted in 2013 and reflects the format and conditions that were used in CNSC licences at that time. CNSC has since modified the generic licence format and have introduced a set of standardized conditions for each SCA. The RMC licence proposed for 2023 has been prepared using the current standardized licence condition format.

Operating Limits and Conditions (OLC) were shown as Appendix A in the current licence. These have been removed from the proposed licence as the OLC are usually part of a licensee's document. RMC's OLCs are part of the larger document *Reactor Operating Manual*, and for ease of reference, the OLCs are extracted and incorporated into the LCH under Operating Performance.

Licence Period

In its application, RMC has requested the renewal of its Class IA Non-Power Reactor Operating Licence for a period of 10 years, which is consistent with the current licence issued on July 1, 2013. As discussed in section 5.6 of this CMD, CNSC staff have no concern with the 10-year term that RMC requested.

PROPOSED LICENCE

Word eDoc 6792968
PDF eDoc 6950505



NON-POWER REACTOR OPERATING LICENCE SLOWPOKE-2 REACTOR

ROYAL MILITARY COLLEGE OF CANADA

- I) LICENCE NUMBER:** **NPROL-20.00/2033**
- II) LICENSEE:** Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to
- The Royal Military College of Canada/
Collège militaire royal du Canada
P.O. Box 17000, Stn. Forces
Kingston, Ontario
K7K 7B4**
- III) LICENCE PERIOD:** This licence is valid from **July 1, 2023**, to **June 30, 2033**, unless otherwise suspended, amended, revoked or replaced.
- IV) LICENSED ACTIVITIES:**
- This licence authorizes the licensee to:
- (i) operate the Royal Military College of Canada/Collège militaire royal du Canada SLOWPOKE-2 reactor and associated facilities (hereinafter “the facility”), located in the Sawyer Science and Engineering Building at the Royal Military College of Canada /Collège militaire royal du Canada, in Kingston, Ontario;
 - (ii) produce, possess, transfer, use, package, manage, and store the nuclear substances that are required for, associated with or arise from the activities described in (i); and
 - (iii) possess, transfer and use prescribed equipment and information that are required for, associated with or arise from the activities described in (i).
- V) EXPLANATORY NOTES:**
- (i) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.

- (ii) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the [*Nuclear Safety and Control Act*](#) and associated regulations.
- (iii) The Royal Military College of Canada - Collège militaire royal du Canada Licence Conditions Handbook (LCH) provides compliance verification criteria used to verify compliance with the conditions set out in this licence, information regarding version control of licensing basis documents, including codes, standards or other documents that are used as compliance verification criteria.

VI) CONDITIONS:

The licensee shall comply with the following conditions, established pursuant to subsection 24(5) of the Nuclear Safety and Control Act.

G. GENERAL

G.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis for the facility, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence; and
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission").

G.2 The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 The licensee shall implement and maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.4 The licensee shall implement and maintain a public information and disclosure program.

1. MANAGEMENT SYSTEM

1.1 The licensee shall implement and maintain a management system.

2. HUMAN PERFORMANCE MANAGEMENT

2.1 The licensee shall implement and maintain a training program.

- 2.2 The licensee shall ensure that persons appointed to the positions of reactor engineer, reactor technician, and reactor operator hold certifications in accordance with the requirements of the [*Nuclear Safety and Control Act*](#).

3. OPERATING PERFORMANCE

- 3.1 The licensee shall implement and maintain an operating program, which includes a set of operating limits.
- 3.2 The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

4. SAFETY ANALYSIS

- 4.1 The licensee shall implement and maintain a safety analysis program.

5. PHYSICAL DESIGN

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

6. FITNESS FOR SERVICE

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

7. RADIATION PROTECTION

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

8. CONVENTIONAL HEALTH AND SAFETY

- 8.1 The licensee shall implement and maintain an occupational health and safety program.

9. ENVIRONMENTAL PROTECTION

- 9.1 The licensee shall implement and maintain an environmental protection program.

10. EMERGENCY MANAGEMENT AND FIRE RESPONSE

- 10.1 The licensee shall implement and maintain an emergency management program.
- 10.2 The licensee shall implement and maintain a fire protection program.

11. WASTE MANAGEMENT

- 11.1 The licensee shall implement and maintain a waste management program.

11.2 The licensee shall maintain a decommissioning plan.

12. SECURITY

12.1 The licensee shall implement and maintain a security program.

13. SAFEGUARDS AND NON-PROLIFERATION

13.1 The licensee shall implement and a maintain safeguards program.

14. PACKAGING AND TRANSPORT

14.1 The licensee shall implement and maintain a packaging and transport program.

SIGNED at OTTAWA, this _____ day of _____ 2023.

Rumina Velshi, President
on behalf of the Canadian Nuclear Safety Commission

DRAFT LICENCE CONDITIONS HANDBOOK

Word eDoc 6796416

PDF eDoc 6950511



e-Doc 6796416 (Word)
e-Doc 6950511 (PDF)

DRAFT

LICENCE CONDITIONS HANDBOOK

LCH-NPROL-20.00/2033

**ROYAL MILITARY COLLEGE OF CANADA
SLOWPOKE-2 NON-POWER REACTOR
NPROL-20.00/2033**

Revision 0



Licence Conditions Handbook
LCH-NPROL-20.00/2033
Royal Military College
Non-Power Reactor Licence (NPROL)
NPROL-20.00/2033

Effective: July 1, 2023

SIGNED at OTTAWA this Xth day of month 2023

Andrew McAllister, Director
Nuclear Processing Facilities Division
Directorate of Nuclear Cycle and Facilities Regulation
Canadian Nuclear Safety Commission

Revision History:

Effective Date	Rev. #	LCH e-Doc #	Section(s) changed	Description of the Changes	Document Change Record
Month day, 2023	0			Original document	N/A

DRAFT

Table of Contents

INTRODUCTION	v
GENERAL	7
1. SCA – MANAGEMENT SYSTEM	15
2. SCA – HUMAN PERFORMANCE MANAGEMENT	17
3. SCA – OPERATING PERFORMANCE	20
4. SCA – SAFETY ANALYSIS	35
5. SCA – PHYSICAL DESIGN	38
6. SCA – FITNESS FOR SERVICE	41
7. SCA – RADIATION PROTECTION	43
8. SCA – CONVENTIONAL HEALTH AND SAFETY	45
9. SCA – ENVIRONMENTAL PROTECTION	46
10. SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION	49
11. SCA – WASTE MANAGEMENT	52
12. SCA – SECURITY	55
13. SCA – SAFEGUARDS AND NON-PROLIFERATION	57
14. SCA – PACKAGING AND TRANSPORT	59
APPENDIX A: Definitions and Acronyms.....	60
APPENDIX B – Version Controlled Documents.....	63
APPENDIX C – Certification Requirements for Reactor Operators, Reactor Engineer and Reactor Technician.....	68

INTRODUCTION

The purpose of the licence conditions handbook (LCH) is to identify the regulatory requirements and other relevant parts of the licensing basis to help ensure that the licensee maintains facility operation in accordance with the licensing basis for the Royal Military College SLOWPOKE-2 reactor facility and the Non-Power Reactor Operating Licence, NPROL-20.00/2033. The LCH provides compliance verification criteria for conditions set out in the licence. The LCH should be read in conjunction with the licence.

The LCH typically has three parts under each LC: the Preamble, Compliance Verification Criteria (CVC), and Guidance. The Preamble explains, as needed, the regulatory context, background, and/or history related to the LC. CVC are criteria used by Canadian Nuclear Safety Commission (CNSC) staff to verify and oversee compliance with the LC. Guidance is non-mandatory information, including direction on how to comply with the LC.

The statement “a person authorized by the Commission” in the LCs or the LCH indicates that the Commission may delegate certain authority to CNSC staff. Unless specified otherwise, the delegation of authority by the Commission to act as a person authorized by the Commission is applied to the incumbents in the following positions:

- Director, Nuclear Processing Facilities Division
- Director, Personnel Certification Division
- Director General, Directorate of Nuclear Cycle and Facilities Regulations
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

The links provided in the LCH by e-Access numbers are references to the internal CNSC electronic filing system, and those documents cannot be opened from outside of the CNSC network.

Current versions of the licensing basis publications, licensee documents that require notification of change and guidance documents referenced in the LCH are tracked in the document *RMC Written Notification Document Tracking Sheet* (e-Doc [6894203](#)), which is controlled by the Nuclear Processing Facilities Division (NPF) and is available to the licensee upon request.

Most CNSC documents referenced in the LCH are available through the [CNSC website](#). Documents listed on CNSC website may contain prescribed information as defined by the [General Nuclear Safety and Control Regulations](#) (GNSCR). Information in these documents will be made available only to stakeholders with appropriate security clearance on a valid need to know.

Domestic and international standards (in particular consensus standards produced by the CSA Group) are an important component of the CNSC's regulatory framework. Standards support the regulatory requirements established through the [Nuclear Safety and Control Act](#) (NSCA), its regulations and licences by setting out the necessary elements for acceptable design and performance at a regulated facility or a regulated activity. Standards are one of the tools used by the CNSC to evaluate whether licensees are qualified to carry out licensed activities.

The CNSC offers complimentary access to the CSA Group [suite of nuclear standards](#) through the CNSC website. This access platform allows interested stakeholders to view these standards online through any device that can access the Internet. Standards applicable to the licensees are documented in the CVC or guidance as appropriate.

Several appendices are attached to the LCH. They provide detailed criteria and clarifications where needed, and are integral and mandatory parts of the LCH.

- Appendix A: provides glossary of terms and acronyms used throughout the LCH.
- Appendix B: provides a list of Version Controlled Documents, including codes, standards, regulatory documents and licensee documents referenced in the LCH
- Appendix C: provides certification requirements for Reactor Operators, Reactor Engineers and Reactor Technicians

This licence authorizes the licensee to:

- i) operate the Royal Military College of Canada/Collège militaire royal du Canada SLOWPOKE-2 reactor and associated facilities, (hereinafter “the facility”), located in the Sawyer Science and Engineering Building at the Royal Military College of Canada/Collège militaire royal du Canada, in Kingston, Ontario;
- ii) produce, possess, transfer, use, package, manage and store, the nuclear substances that are required for, associated with, or arise from the activity described in (i); and
- iii) possess, transfer, use, prescribed equipment and information that are required for, associated with, or arise from the activity described in (i).

The licensee is:

Royal Military College of Canada/
Collège militaire royal du Canada
P.O. Box 17000, Stn. Forces
Kingston Ontario
K7K 7B4

GENERAL

Licence Condition G.1: Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;**
- (ii) the conditions and safety and control measures described in the facility’s or activity’s licence and the documents directly referenced in that licence;**
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;**

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter “the Commission”).

Preamble

The licensing basis sets the boundary conditions for acceptable performance at a regulated facility or activity, and thus establishes the basis for the CNSC’s compliance program with respect of that regulated facility or activity. The degree to which the regulatory requirements are applied to the RMC facility should reflect their importance to the health and safety of persons, environment, national security, international obligations to which Canada has agreed, licensee’s quality and economic expectations, the complexity of facility or activity, and the possible consequences if accidents occur or the activity is carried out incorrectly.

Where the LC requires the licensee to implement and maintain a particular program, the documents submitted by the licensee to support their application that describe and implement the program are part of the licensing basis.

Compliance Verification Criteria

Regulatory Role of the Licensing Basis

The licensing basis is established when the Commission renders its decision regarding the licence application. LC G.1 requires the licensee to conduct the licensed activities in accordance with the licensing basis. For activities that are not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation.

The licensing basis is not intended to unduly inhibit the ongoing management and operation of the facility or the licensee’s ability to adapt to changing circumstances and continuously improve, in accordance with its management system.

Part (i) of the licensing basis refers to applicable laws and regulations. There are many federal and provincial acts and regulations, and international laws, agreements, guidelines, etc., applicable to activities performed at the RMC facility.

The laws, regulations and international agreements for which CNSC has a regulatory role are:

- [Nuclear Safety and Control Act](#) (NSCA) and its Regulations
- [Impact Assessment Act](#) and its Regulations
- [Canadian Environmental Protection Act, 1999](#)
- [Nuclear Liability and Compensation Act](#)
- [Transportation of Dangerous Goods Act](#) and its Regulations
- [Radiation Emitting Devices Act](#)
- [Canada/IAEA Safeguards Agreements](#)
- [Canada Labour Code, Part II](#)

Part (ii) of the Licensing Basis

Part (ii) of the licensing basis refers to the conditions and the safety and control measures included in the licence and in the documents directly referenced in the licence.

Under the standardized format and content, the licence requires the licensee to implement and maintain certain programs. There are no documents directly referenced in the standardized RMC licence. For the purpose of a licence requirement, a program may be a series of documented, coordinated activities, not necessarily a single document.

Part (iii) of the Licensing Basis

Part (iii) of the licensing basis consists of the safety and control measures described in the licence application and in the documents in support of that licence application. The safety and control measures include important aspects of that documentation, as well as important aspects of analysis, design, operation, etc. They may be found in high-level, programmatic licensee documents but might also be found in lower-level, supporting licensee documentation. LC G.1 requires the licensee to conform to, and/or implement, all these safety and control measures.

Part (iii) of the licensing basis also includes the safety and control measures in the standards, codes and CNSC regulatory documents referenced in the application or in the licensee's supporting documentation. Note, however, this does not mean that all details in these referenced documents are part of the licensing basis; some of these documents may contain administrative, informative or guidance sections that are not considered to be part of the licensing basis.

Applicable licensee documents are listed in the LCH under the heading "Licensee Documents that Require Notification of Change". Applicable CNSC regulatory documents, CSA standards and other documents are listed in the LCH under the heading "Licensing Basis Publications". The documents listed in the LCH could cite other documents that also contain safety and control

measures. Applicable licensing basis publications are listed in tables in this LCH under the most relevant LC. All “shall” or normative statements in licensing basis publications are considered CVC unless stated otherwise. If any “should” or informative statements in licensing basis publications are also considered CVC, this is also explained under the most relevant LC.

Details that are not directly relevant to safety and control measures for facilities or activities authorized by the licence are excluded from the licensing basis. Details that are relevant to a different safety and control area (i.e., not the one associated with the main document), are only part of the licensing basis to the extent they are consistent with the main requirements for both safety and control areas.

In the event of any perceived or real conflict or inconsistency between two elements of the licensing basis, the licensee shall consult CNSC staff to determine the approach to resolve the issue.

CNSC Staff’s Approach to Assessing the Licensing Basis for RMC

In accordance with LC G.2, RMC will submit relevant documentation for CNSC staff review regarding proposed changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis. This includes, but is not limited to changes to equipment, processes, supporting activities, specific licensee documentation or any other item considered a safety or control measure under the licensing basis. There are specific licensee documents listed in the LCH, which require written notification every time a new version of the document is approved by RMC. CNSC staff will review the information submitted by RMC to confirm that the proposed change remains within the licensing basis. CNSC staff assess whether a proposed change is within the licensing basis based on changes or impact on the overall safety at the RMC facility. RMC may proceed with the proposed initiatives if they are found to be within the licensing basis.

Any proposed activity, facility or other change, which CNSC staff consider to be outside the licensing basis, will be discussed with RMC and should RMC choose to proceed with the change, CNSC staff will submit the matter to the Commission for consideration. If the Commission grants approval to the change, it will become part of the licensing basis for RMC and will be reflected in updates to LCH as appropriate.

Licence Application

Date	Document Title	e-Doc #
February 23, 2022	Royal Military College of Canada Slowpoke-2 Facility Non-Power Operating Licence Renewal Application	6743957

Guidance

Guidance Documents

Document Number	Document Title	Version
REGDOC-3.5.3	Regulatory Fundamentals	2018

When the licensee becomes aware that a proposed change or activity might be outside the licensing basis, it should first seek direction from CNSC staff regarding the potential acceptability of this change or activity. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them.

Licence Condition G.2: Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

Preamble

CNSC staff track the version history of licensee documents that require notification of change in document *RMC Written Notification Document Tracking Sheet* (e-Doc 6894203) (with the exception of security-related documents).

The objective of the licensing basis, as defined in the LCH under LC G.1, is to set the boundary conditions for acceptable performance at the facility. The licensee is encouraged to make continuous improvements to their programs and documents throughout the licensing period as long as they remain within the licensing basis authorized by the Commission.

Compliance Verification Criteria

Written notification is a physical or electronic communication from a person authorized to act on behalf of the licensee to the CNSC.

Under the licensee's management system, a change control process requires justifying changes and the review of changes by relevant stakeholders. Proposed changes with the potential to negatively impact designs, operating conditions, policies, programs, methods, or other elements that are integral to the licensing basis, are documented and written notification of the change shall be provided to the CNSC. Written notifications shall include a summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis (e.g., an evaluation of the impact on health, safety, security, the environment and Canada's international obligations). A copy of the revised document shall accompany the notification. All written notifications shall be transmitted to CNSC per established communications protocols.

Many changes for which the licensee shall notify the CNSC are captured as changes to licensee documents under part (iii) of the licensing basis. The LCH identifies specific documents that require written notification under the most relevant LC. However, other documents identified in the application or in the licensee's supporting documentation may require notification of change if they describe safety and control measures applicable to the licensing basis. For example, if a licensee document in the CVC refers to another document, including a third-party document, without citing the revision number of that document, if that document changes and the licensee uses the revised version, the licensee shall determine if it is necessary to notify the CNSC of the change.

The documents needed to support the licence application may include documents produced by third parties (e.g., reports prepared by third party contractors). Changes to these documents require written notification to the CNSC only if the new version continues to form part of the licensing basis. That is, if the licensee implements a new version of a document prepared by a third party, it shall inform the CNSC of the change(s), per LC G.2. On the other hand, if a third party has updated a certain document, but the licensee has not adopted the new version as part of its safety and control measures, the licensee is not required to inform the CNSC that the third party has changed the document.

Licensee documents listed in the CVC of the LCH are subdivided into groups having different requirements for notification of change

Category	Definition
PN	Prior notification - The licensee shall submit the notice to the CNSC prior to implementing the change; typically, the requirement is to submit the proposed changes 30 days prior to planned implementation; however the licensee shall allow sufficient time for the CNSC to review the change proportionate to its complexity and the importance of the safety and control measures being affected
NT	Notification - The licensee shall submit the notice at time of making the change

Notification of some proposed changes (i.e., engineered physical changes, new processes/activities for the facility) may not be best captured through an update to a licensee document. In these cases, a standalone submission may be made that includes the summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis.

Changes that are not clearly in the safe direction require further assessment of impact to determine if Commission approval is required in accordance with LC G.1.

Guidance

For proposed changes that would not be in accordance with the licensing basis, the guidance for LC G.1 applies.

Licence Condition G.3: Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

Preamble

The [General Nuclear Safety and Control Regulations](#) requires under paragraph 3(1)(l) that a licence application contain a description of any proposed financial guarantee relating to the activity to be licensed.

LC G.3 requires the licensee to maintain a financial guarantee (FG) for decommissioning that is acceptable to the Commission. The FG shall remain valid and in effect and adequate to fund the activities described in the preliminary decommissioning plan or decommissioning strategy. If the preliminary decommissioning plan is revised and significantly impacts the cost estimate for the FG, the expectation is that the FG is revised and submitted to the Commission for acceptance. In addition, the financial guarantee for decommissioning is to be reviewed and revised by Royal Military College every five years, and when the Commission requires.

Royal Military College has provided a *Preliminary Decommissioning Plan* and an associated cost estimate. CNSC staff deemed these to be satisfactory and the Commission accepted the financial guarantee with the associated cost estimate. Royal Military College uses a letter by the Deputy Minister of the Department of National Defense as a guaranteed commitment to cover the cost for placing the facility in a safe state of storage (i.e., transfer of nuclear substances to a licensee authorized to possess them and removal of hazardous material) and to decommission the facility. The document confirms that the SLOWPOKE-2 facility is owned by DND and therefore the property of the Crown and thus, the costs associated with the future decommissioning of this facility will be paid by DND.

Compliance Verification Criteria

1. The licensee shall maintain in effect a financial guarantee for decommissioning acceptable to the Commission which shall remain valid, in effect and adequate to fund the activities described in the preliminary decommissioning plan.
2. The financial guarantee for decommissioning is to be reviewed and revised by Royal Military College every five years, when the Commission requires, or following a revision of the preliminary decommissioning plan.
3. The licensee shall report annually to the CNSC on the status of the financial guarantee to confirm that the financial guarantee remains valid, in effect and adequate to fund decommissioning of the facility.
4. The licensee shall develop its financial guarantee based on the guidance in the following regulatory guidance document.

Licensing Basis Publications

Document Title	Document #	Version
Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities	REGDOC-3.3.1	2021

Licensee Document that Requires Notification of Change

Document Title	Document #	Prior Notification
Deputy Minister of the Department of National Defense, Letter of Financial Guarantee	e-Doc 6743957	Yes
Preliminary Decommissioning Plan	ADM-5	No

Guidance

Guidance Publications

Document #	Document Title	Version
REGDOC-2.11.2	Decommissioning	2021
N294	Decommissioning of Facilities Containing Nuclear Substances	2019

Licence Condition G.4: Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

Preamble

The [Class I Nuclear Facilities Regulations](#) requires that an application for a licence contain the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed.

The primary goal of a public information and disclosure program is to ensure that information related to the health, safety and security of persons and the environment, and other issues associated with the lifecycle of the nuclear facilities are effectively communicated to the public. In addition, the program shall include a commitment to a disclosure protocol for ongoing, timely communication of information related to the licensed facility during the course of the licence period.

This LC requires the licensee to implement and maintain a public information and disclosure program to improve the public's level of understanding about RMC's activities.

Compliance Verification Criteria

Licensing Basis Publications

Document Number	Document Title	Version
REGDOC- 3.2.1	Public Information and Disclosure	2018

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Public Information Program and Disclosure Protocol	ADM-4	NT

Guidance

None provided.

1. SCA – MANAGEMENT SYSTEM

Licence Condition 1.1: Management System

The licensee shall implement and maintain a management system.

Preamble

The [Class I Nuclear Facilities Regulations](#) require that a licence application contain information on the proposed management system for the activity to be licensed, including the measures to promote and support safety culture.

The [General Nuclear Safety and Control Regulations](#) requires that a licence application contain the applicant's organizational management structure, including the internal allocation of functions, responsibilities and authority.

CSA N286 *Management System Requirements for Nuclear Facilities* contains the requirements for a management system throughout the lifecycle of a nuclear facility and extends to all safety and control areas.

CSA N286.0.1 *Commentary on N286-12, Management System Requirements for Nuclear Facilities* provides background information concerning certain clauses and requirements in CSA N286. This background information can help the user clarify the context of the CSA N286 requirements.

Compliance Verification Criteria

Licensing Basis Publication

Document Number	Document Title	Version
CSA N286	Management System Requirements for Nuclear Facilities*	2012 (R2017)
REGDOC-2.1.1	Management System	2019
REGDOC-2.1.2	Safety Culture	2018

*This document is applicable to all LCs.

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Management System for the SLOWPOKE-2 Facility at RMC	ADM-3	PN
Change Control Procedure	QAP-5	PN

Guidance Publications

Document #	Document Title	Version
CSA N286.0.1	Commentary on N286-12, Management system requirements for nuclear facilities	2020

2. SCA – HUMAN PERFORMANCE MANAGEMENT

Licence Condition 2.1: Training Program

The licensee shall establish and maintain a training program.

Preamble

This LC requires the licensee to develop and implement training programs for workers. It also provides the requirements regarding the program and processes necessary to support responsibilities of, qualifications and requalification training of persons at the nuclear facility.

As defined by the [General Nuclear Safety and Control Regulations](#), a worker is a person who performs work that is referred to in a licence. This includes contractors and temporary employees. Training requirements apply equally to these types of workers as to the licensee’s own employees. The GNSCR require that licensees ensure that there are a sufficient number of properly trained and qualified workers to conduct the licensed activities safely.

The [Class I Nuclear Facilities Regulations](#) require that licence applications include the proposed responsibilities of and qualification requirements and training program for workers, including the procedures for the requalification of workers; and the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.

The [Class I Nuclear Facilities Regulations](#) contain provisions for the certification of persons, and require every licensee to keep a record of the status of each worker’s qualifications, requalification and training, including the results of all tests and examinations completed in accordance with the licence.

Licensing Basis Publications

Document Number	Document Title	Version
REGDOC-2.2.2	Personnel Training, Version 2	2016

Licencee Documents that Require Notification of Change

Document Title	Document #	Notification
Training Program for Reactor Operators – Automatic Mode	N/A	PN
Training Manual Part II Training in the SAT Format & Operation in Manual Mode of the SLOWPOKE-2 Reactor at RMC	N/A	PN

Licence Condition 2.2: Personnel Certification

The licensee shall ensure that persons appointed to the positions of reactor engineer, reactor technician, or reactor operator hold certifications in accordance with the requirements of the NSCA.

Preamble

This condition requires that any person that the licensee appoints to the positions of reactor engineer, reactor technician, or reactor operator must hold a certification issued pursuant to the NSCA, and that the authority or responsibility of these certified persons can only be delegated to another person who holds the same certification. In addition, the certified persons must maintain their competency through continuing training and experience carrying out the duties of the position for which they are certified.

Paragraphs 12(1)(a) and 12(1)(b) of the [General Nuclear Safety and Control Regulations](#) require that a licensee shall ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the Regulations made under the Act and the licence, and train the workers to carry on the licensed activity in accordance with the Act, the Regulations made under the Act and the licence.

Paragraphs 6(m) and 6(n) of the [Class I Nuclear Facilities Regulations](#) require that licence applications include the proposed responsibilities, qualification requirements, training program, including the procedures for the requalification of workers, and the results that have been achieved in implementing the program for recruiting, training and qualifying workers.

Subsection 14(2) of the [Class I Nuclear Facilities Regulations](#) require every licensee to keep a record of the status of each worker's qualifications, requalification and training, including the results of all tests and examinations completed in accordance with the licence.

Compliance Verification Criteria

1. When applying for certification of a reactor operator (RO), reactor engineer (RE) or reactor technician (RT), the licensee shall confirm that the person
 - (a) meets the qualification requirements specified in Appendix C of the RMC-LCH;
 - (b) has successfully completed the applicable training program and examination specified in Appendix C of the RMC-LCH; and
 - (c) is capable, in the opinion of the licensee, of performing the duties of a RO, RE or RT for the RMC SLOWPOKE-2 reactor.
2. When applying for renewal of a certification of a person as a RO, RE and RT, the licensee shall confirm that the person
 - (a) has safely and competently performed the duties of a RO, RE or RT at the SLOWPOKE-2 reactor;
 - (b) continues to receive the applicable continuing training specified in Appendix C of the RMC-LCH; and

- (c) is capable, in the opinion of the licensee, of performing the duties of a RO, RE or RT for the SLOWPOKE-2 reactor.
3. The licensee shall ensure that certified RO, RE or RT complete the continuing training requirements and perform the operations specified in section 3 of Appendix C of the RMC-LCH.
 4. Any person appointed to the position of RO, RE and RT shall not delegate the authorities or responsibilities of their position to any other person that does not hold a certification pursuant to the NSCA for the same position.
 5. The licensee shall document and maintain the required initial and continuing training programs to address the training requirements referred to in Appendix C of the RMC-LCH. These programs shall be in accordance with the principles of a systematic approach to training.

3. SCA – OPERATING PERFORMANCE

Licence Condition 3.1: Operating Program

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

Preamble

The [Class I Nuclear Facilities Regulations](#) require that a licence application contain the following information: the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. The [Nuclear Substances and Radiation Devices Regulations](#) have requirements for records to be kept and retained for nuclear substances.

An operating program includes an up-to-date set of operating limits for the facility and activities authorized under the licence, including: production limits and limits for the possession, use, management, transfer, storage of nuclear substances, and an inventory of nuclear substances possessed under the licensees' operating licence.

In addition, the operations program is to ensure that any building modifications are made in accordance with the *National Building Code*, the *National Fire Code*, and *CSA N393 Fire Protection for Facilities that Process, Handle or Store Nuclear Substances*. CSA N393 includes specific reporting requirements for reporting and follow-up of fire incidents and fire protection program audits.

Compliance Verification Criteria

Licensing Basis Publications

Document #	Document Title	Version
IRC-10NFC	National Fire Code of Canada	2020
IRC-10NBC	National Building Code of Canada	2020
CSA N393*	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	2013 (R2018)

* To be implemented by January 2024

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Reactor Manual for the SLOWPOKE-2 Facility at RMC	FAC-1	PN
Operator Manual	SIRCIS-10-4008	PN
Safety Assessment for the SLOWPOKE-2 Reactor at RMC	SEP-5	PN
Description and Safety Analysis for the SLOWPOKE-2 Reactor with LEU Oxide Fuel	CPR-77	PN

Criteria for Facility Operation:

1. The licensee shall operate its facility using up-to-date procedures that have been through a formal development process which includes validation before the procedure is approved for use. In addition, such procedures shall be reviewed (and revised, as appropriate) on a regular basis.
2. As part of the operating program, the licensee shall implement and maintain a sealed source tracking program.
3. The licensee shall maintain a record of the nuclear substances and radiation devices in its possession, and provide details to show:
 - a. the name, quantity, form and location of the nuclear substance;
 - b. where the nuclear substance is a sealed source, the model and serial number of the sources;
 - c. where the nuclear substance is contained in a radiation device, the model and serial number of the device, the quantity of the nuclear substance used, and the manner in which the nuclear substance is used; and
 - d. any transfer, receipt including acquisition, and disposal of a nuclear substance including:
 - the date of transfer, receipt, disposal
 - the name and address of the supplier or the recipient
 - the number of the licence of the recipient
 - the name, quantity and form of the nuclear substance transferred, received, disposed of
 - where the nuclear substance is a sealed source, the model and serial number of the source

- where the nuclear substance is contained in a radiation device, the model and serial number of the device.
4. Any operation, test and routine maintenance described in the document CPSR-362 SLOWPOKE-2 Nuclear Reactor Operation and Routine Maintenance and supported by the Procedures' Manual for the SLOWPOKE-2 Facility at RMC shall be performed by, or under the direct supervision of, a person holding a certification as reactor operator issued by the Commission or a person authorized by the Commission.
 5. The licensee shall operate the facility using up-to-date procedures that have been developed through a formal process, including validation before the procedure is approved for use. In addition, such procedures shall be reviewed (and revised, as appropriate) on a regular basis.
 6. The licensee shall not operate the facility without appropriate remedial action and approval by the Commission or a person authorized by the Commission when:
 - (a) any problem or potential problem is discovered through research findings (including internal and external operating experience) or new or revised safety analyses that represents
 - (i) a new hazard or potential hazard to the health and safety of persons, security or the environment; or
 - (ii) a known hazard or potential hazard to the health and safety of persons, security or the environment that is different in nature, greater in probability, or greater in magnitude than was previously presented to the Commission in licensing documents;
 - (b) the facility operates in a state that was not considered in the safety analysis report;
 - (c) an event of a type that was not considered in the safety analysis report occurs;
 - (d) an unexplained or unexpected behaviour of the reactor core or of a safety system occurs; or
 - (e) a nuclear substance or a hazardous substance is released in a quantity or at a rate that is greater than that predicted in the bounding case analysed in the safety analysis report.
 7. The licensee shall not return the facility to normal operation following unplanned shutdowns until it has been shown to be safe to do so.

Criteria for Nuclear Maintenance

- (1) The following activities shall be conducted by, or under the direct supervision of, a person holding a certification issued by the Commission or a person authorized by the Commission, as reactor engineer or reactor technician:

- (a) breaking the seal and resealing of the reactor container
- (b) opening/closing of the reactor container
- (c) providing nuclear maintenance services to the reactor
- (d) removing or replacing the fuel; or
- (e) modifying the reactor as required or authorized by the Commission or a person authorized by the commission

Discussion

A team consisting of a certified reactor engineer and a certified reactor technician generally leads/performs nuclear maintenance tasks.

The reactor engineer leads the performance of the nuclear maintenance tasks, and has the authority to break the seal, access the reactor container, and supervise maintenance of the core and control system. The engineer establishes reactor excess reactivity and calculates the desired reactivity changes.

The reactor technician performs any required changes in the reactor vessel or modifications to the core and reflectors under the direction and supervision of the reactor engineer. The reactor technician may repair and replace components that are outside the reactor seal, or inside the seal but above the reactor pool.

The nuclear maintenance jobs under normal operations consist of the tasks listed in Table 3-1. Table 3-2 lists the maintenance tasks and the common skill elements. The training recommendations for persons performing nuclear maintenance tasks are included in Table 3-3.

Table 3-1: SLOWPOKE-2 Reactor Nuclear Maintenance Tasks

#	Nuclear Maintenance Task	Nuclear Maintainers Required	Reactor State during Task
1	Addition of beryllium top reflector shim plates	2	Low power critical
2	Removal/replacement of beryllium top plates, control rod, and shim tray	2	Shut down
3	Removal/replacement of the control rod	2	Shut down
4	Removal/replacement of the reactor core	2	Shut down
5	Removal/replacement/installation of an irradiation tube	2	Low power critical
6	Connection of a capsule transfer system	1	Low power critical
7	Replacement of a flux detector	2	Low power critical
8	Replacement of a thermocouple	2	Low power critical

Table 3-2: SLOWPOKE-2 Reactor Nuclear Maintenance Tasks and Common Skill Elements

#	Common Skill Elements			Additional Task-Specific Elements
	Remove/replace reactor inspection plate (RT)	Confirm that irradiation sites are empty (RE & Operations Staff)	Determine reactor period and Keff (RE)	
1	X	X	X	Manipulate beryllium shim plates (RT)
2	X	X	X	Manipulates beryllium shim plates and shim tray (RT) Remove/replace control rod and drive assembly (RT)
3	X		X	Establish guaranteed shutdown state (RE)
4	X		X	Removal/replacement of the reactor core (RT)
5	X		X	Remove/replace irradiation tube (RT)
6		X		Connect capsule transfer system (RT)
7	X	X	X	Remove/replace flux detector (RT)
8	X	X	X	Remove/replace thermocouple (RT)

Notes:

1. The nuclear maintenance tasks numbers are from Table 3-1.
2. Lead responsibility is indicated as (RE) for reactor engineer, and (RT) for reactor technician.

Table 3-3: Training Recommendations for Nuclear Maintenance Tasks

#	Nuclear Maintenance Task	Training Recommendations
1	Addition of beryllium top reflector shim plates	Initial and continuing
2	Removal/replacement of beryllium top plates, control rod and shim tray	Specialized (as need arises)
3	Removal/replacement of the control rod	Specialized (as need arises)
4	Removal/replacement of the reactor core	Specialized (as need arises)
5	Removal/replacement/installations of an irradiation tube	Specialized (as need arises)
6	Connection of a capsule transfer system	Specialized (as need arises)
7	Replacement of a flux detector	Specialized (as need arises)
8	Replacement of a thermocouple	Specialized (as need arises)

Criteria for Modifications to the Facility and Processes

Consistent with CNSC’s principle of graded approach to regulating nuclear facilities and activities, the licensee is allowed to make any changes to the facility that do not have a detrimental effect on nuclear safety.

The licensee may make a change that will not result in an adverse impact on health and safety of persons, environment, national security, or to measures of control and international obligations to which Canada has agreed, without the approval of the Commission or a person authorized by the Commission.

Changes to the safety and control measures that are within the boundary conditions set by the licensing basis are permitted provided that the objective of the licensing basis is met. Changes that would have a detrimental effect on nuclear safety by reducing the safety margins within an acceptable safety case can only be made with prior approval of the Commission or a person authorized by the Commission.

The licensee may make any changes in accordance with the licensee’s change control process. The licensee shall inform CNSC staff in annual performance reports of such changes implemented during the previous calendar year for the facility.

This condition also establishes the requirements that must be met when performing modifications to the facility or processes. This may include modifications to prescribed equipment.

Modifications to the facility may consist of:

- Modifications to structures, systems and components
 - Modifications to the operating limits and conditions
 - Modifications to instructions and procedures resulting from permanent and temporary modifications to systems, structures, equipment, components and software;
 - Modifications to software used for safety purposes; or
 - A combination of the above
- (1) The licensee shall not make any change that would result in an impact on health and safety of persons, environment, national security, or to measures of control and international obligations to which Canada has agreed that is different in nature or greater in magnitude or probability than that described in the licensing basis documents without prior approval of the Commission or a person authorized by the Commission.
- The documents submitted to get CNSC approval for the change, shall demonstrate that the change has been thoroughly developed, designed, analyzed, reviewed and approved by the licensee, and is in compliance with all regulatory requirements.
- (2) Changes to the safety and control measures that are outside of the boundary conditions set by the licensing basis require prior approval of the Commission or a person authorized by the Commission.
- (3) The licensee shall ensure that any modification to the facility, irrespective of the reason for the modification, does not degrade the facility's ability to be operated safely.
- (4) The licensee shall not make modifications to, or deviate from the design, operating conditions, purposes, methods, procedures or limits described in the safety analysis report that would result in an impact on health, safety or the environment that is different in nature or greater in magnitude or probability than that described in those documents without prior approval of the Commission or a person authorized by the Commission.
- (5) For a modification of the facility, a determination of the applicability of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) must be made by the CNSC. An environmental assessment under the CEAA 2012 may be required.
- (6) The licensee shall use the safety analysis as the basis for assessing the safety implications of changes to the facility, or structures, components or equipment, or to operating procedures.
- (7) For modifications to structures, systems and components important to safety, the process to ensure that all permanent and temporary modifications are properly designed, reviewed, controlled and implemented, and that all relevant safety requirements are met, shall include:
- (a) reason and justification for the modification;
 - (b) safety assessment;
 - (c) updating facility documentation and training
 - (d) fabrication, installation and testing; and

- (e) commissioning of the modification.
- (8) In regard to modifications to structures, systems and components important to safety, the licensee shall ensure that:
- (a) all temporary modifications are clearly identified at the point of application and at any relevant control positions;
 - (b) operating personnel is clearly informed of these modifications and of their consequences for facility operations;
 - (c) the temporary modifications are reviewed and approved before installation; the review shall be documented to demonstrate the scope and conclusion of the review;
 - (d) the number of simultaneous temporary modifications is kept to a minimum and this determination is justified;
 - (e) the duration of temporary modifications is limited and specified prior to implementation;
 - (f) testing is performed after installation and removal of the temporary modification;
 - (g) temporary modifications are shown on affected documents; and
 - (h) the facility is returned to the original state when the temporary modification is no longer needed.
- (9) The licensee shall periodically review outstanding temporary modifications to determine whether they are still needed.
- (10) Any changes to the defined specifications of a system, structure or component shall be treated as design changes.
- (11) The licensee shall review the site description, operating manual and safety analysis report and revise the documents as necessary to reflect changes to structures, systems, equipment, components and procedures and the revisions shall be submitted to the Commission for information.

Criteria for Operating Limits and Conditions

- (1) The licensee shall base each operating limit and condition on facility design, safety analysis and commissioning tests.
- (2) The permanent or temporary modifications to operating limits and conditions shall be adequately justified by safety analyses and an independent safety review.
- (3) The operating personnel shall be knowledgeable of the operating limits and conditions and their technical basis.
- (4) The operating limits and conditions shall cover all operational states, any intermediate conditions between these states, and temporary situations arising from maintenance and testing.
- (5) Adequate margins shall be established between operating limits and the established safety system settings to avoid undesirably frequent actuation of safety systems.
- (6) Safety limits shall be established using a conservative approach to take uncertainties in the safety analyses into account.
- (7) If the actions taken to correct a deviation from operating limits and conditions are not as prescribed, or have not been completed successfully in the allowable time, the facility shall be deemed to have operated in noncompliance with operating limits and conditions.
- (8) If operating personnel cannot ascertain that the facility is operating within operating limits, or the facility behaves in an unexpected way, measures shall be taken without delay to bring the facility to a safe and stable state.
- (9) The licensee shall investigate breaches of compliance with the operating limits and conditions, and shall implement corrective actions to prevent repeat events in the future.
- (10) The operating limits and conditions define the conditions that must be met to prevent situations or events that might lead to accidents, or to mitigate the consequences of accidents should they occur. The operating limits and conditions for the facility are documented in RMC's licensing basis documents, and are reproduced in Table 3-4.

Table 3-4: Operating Limits and Conditions

The licensee shall ensure that the total thermal power from the reactor fuel does not exceed 20 kilowatts under steady-state operating conditions.
The licensee shall ensure that the maximum excess reactivity of the reactor does not exceed 4.3 mk.
The licensee shall not operate the reactor at neutron flux levels exceeding $1.05 \times 10^{12} \text{ n cm}^{-2} \text{ s}^{-1}$, except that while increasing power under automatic control a peak power of no more than $1.4 \times 10^{12} \text{ n cm}^{-2} \text{ s}^{-1}$ may be permitted for a time of no more than one minute.
The licensee shall not allow the reactor to contain more than 200 finished SLOWPOKE-2 fuel elements except otherwise approved in writing by the Commission. The total amount of uranium-235 in the reactor shall not exceed 1.3 kg. The fuel elements shall consist of only uranium oxide pellets and the uranium being enriched to no more than 20% by weight uranium-235.
The facility may contain sealed sources of uranium-235 for use as testing or calibration devices. The licensee shall ensure that no sealed source contains more than 1.0 grams of uranium-235.

Licence Condition 3.2: Reports to the Commission

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

Preamble

This condition requires the licensee to implement and maintain a program for reporting information to the Commission. This includes compliance monitoring and operational performance, responses to unusual events, and sealed-source tracking reports, and notifications of various types.

The NSCA and applicable regulations describe reporting to the Commission or a person authorized by the Commission. Some reporting requirements are found in sections 29 - 32 of the *General Nuclear Safety and Control Regulations* and section 27 of the NSCA. Information regarding notification of action level exceedances is found in this LCH under LCs 7 and 9. A licensee is required to have a program that includes all reporting.

The CNSC has strengthened its regulatory controls on sealed sources, principally through establishment of a sealed source tracking system within an upgraded national sealed source registry and enhanced export and import controls for high-risk sealed sources. High-risk sealed sources are recorded in the CNSC database (the Sealed Source Tracking System) that tracks the location of each significantly hazardous radioactive source (IAEA Category 1 and 2 sources) in Canada.

Compliance Verification Criteria

Licensing Basis Publications

Document	Document Title	Version
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	2022

1. The licensee shall, in respect of a radioactive nuclear substance set out in column 1 of the table below, report in writing, according to the reporting schedule as set out in column 2 of the table, any transfer, receipt, export or import of a sealed source whose corresponding activity is equal to or greater than the value set out in column 3 of Table 3-5:

Table 3-5: Activity Limits for Sealed Source Tracking

Column 1	Column 2	Column 3
Nuclear Substance	Reporting Schedule	(TBq)
Americium 241	(a) at least 7 days before any transfer or export, and (b) within 48 hours of any receipt of a transfer or import.	0.6
Americium 241/Beryllium		0.6
Californium 252		0.2
Curium 244		0.5
Cobalt 60		0.3
Cesium 137		1
Gadolinium 153		10
Promethium 147		400
Plutonium 238		0.6
Plutonium 239/ Beryllium		0.6
Radium 226		0.4
Selenium 75		2
Strontium 90 (Yttrium 90)		10
Thulium 170		200
Ytterbium 169		3
Iridium 192	(a) prior to any transfer or export, and (b) within 48 hours of any receipt of a transfer or import.	0.8

The written report shall be in a form that includes:

- (a) on transfer or export of a sealed source(s),
 - (i) the date of transfer, or for export, the date the sealed source(s) leaves the facility,
 - (ii) the export licence number (where applicable),
 - (iii) the name of the recipient and licence number,
 - (iv) the name of the importer,
 - (v) the address of the recipient's or importer's authorized location,
 - (vi) the nuclear substance (radionuclide),
 - (vii) activity (radioactivity) (Bq) per sealed source on the reference date,
 - (viii) the reference date,
 - (ix) the sealed source unique identifiers, and
 - (x) where the sealed source is incorporated in a prescribed equipment:
 - (1) the name and model number of the equipment, and
 - (2) the equipment serial number
 - (b) on receipt or import of a sealed source(s),
 - (i) the date of receipt of a transfer or import,
 - (ii) the name of the shipper and licence number,
 - (iii) the name of the exporter,
 - (iv) the address of the shipper's or exporter's authorized location,
 - (v) the nuclear substance (radionuclide),
 - (vi) activity (radioactivity) (Bq) per sealed source on the reference date,
 - (vii) the reference date,
 - (viii) sealed source unique identifiers, and
 - (ix) where the sealed source is incorporated in a prescribed equipment:
 - (1) the name and model number of the equipment; and
 - (2) the equipment serial number
2. As part of reporting, the licensee shall provide an annual compliance report by March 31 of each year, covering the operation for the 12-month period from January 1 to December 31 of the previous year.

Guidance

Guidance Publications

Document #	Document Title	Version
REGDOC-3.1.3	Reporting Requirements for Waste Nuclear Substance Licensees, Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices	2020

The above guidance is applicable with respect to Sealed Source Tracking System (SSTS) reporting requirements.

4. SCA – SAFETY ANALYSIS

Licence Condition 4.1: Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

Preamble

The [General Nuclear Safety and Control Regulations](#) requires that a licence application contains information that includes a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.

The [Class I Nuclear Facilities Regulations](#) requires that a licence application contains information that includes a final safety analysis report demonstrating the adequacy of the design of the nuclear facility, and the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

The implementation and maintenance of a safety analysis program includes a process to identify and assess hazards and risks on an ongoing basis. This includes identifying and evaluating new or unforeseen risks that were not considered at the planning and design stages and updating previous risk assessments by replacing important assumptions with performance data. The results of this process will be used to set objectives and targets and to develop preventative and protective measures.

Compliance Verification Criteria

Licensing Basis Publications

Document #	Document Title	Version
REGDOC-2.4.1	Deterministic Safety Analysis	2014
REGDOC-2.4.3	Nuclear Criticality Safety	2020

Licencee Documents that Require Notification of Change

Document Title	Document #	Notification
Safety Assessment for the SLOWPOKE-2 Reactor at RMC	SEP-5	PN
Description and Safety Analysis for the SLOWPOKE-2 Reactor with LEU Oxide Fuel	CPR-77	PN

- (1) The safety analysis shall identify:

- (a) radiological hazards related to production, possessing or processing licensed nuclear substances at the facility;
 - (b) chemical hazards of licensed nuclear substances and hazardous chemicals produced from licensed material;
 - (c) facility hazards that could affect the safety of licensed nuclear substances and thus present an increased radiological risk;
 - (d) potential accident sequences caused by process deviations or other events internal to the facility and credible external events, including natural phenomena;
 - (e) the consequence and the likelihood of occurrence of each potential accident sequence, and the methods used to determine the consequences and likelihoods;
 - (f) each item relied on for safety, the characteristics of its preventive, mitigative, or other safety function, and the assumptions and conditions under which the item is relied upon to support compliance with the performance requirements; and
 - (g) common-cause failures initiated by internal and/or external events.
- (2) The objectives of the safety analysis shall be to:
- (a) confirm that the design of the nuclear facility meets its design and safety requirements;
 - (b) derive or confirm operating limits and conditions which should be consistent with the design and safety requirements;
 - (c) demonstrate that the management of the anticipated operational occurrences (AOO) and design basis accidents (DBA) is possible by automatic response of either the control systems or safety systems in combination with prescribed operator actions;
 - (d) accident management program is capable of providing mitigation for beyond design basis accidents (BDBA), to the extent practicable; and
 - (e) assist in demonstrating that safety goals, that may be established to limit the safety risks posed by the nuclear facility, are met.
- (3) The licensee shall review, revise and update as required the safety analysis report periodically, and when required to reflect modifications, new regulatory requirements and standards, or operational information.

Guidance

Guidance Publications

Document #	Document Title	Version
IAEA SSR-3	Safety of Research Reactors	2016
Argonne National Laboratory	JM-1 SLOWPOKE-II Research Reactor Supporting Analysis Report for the Conversion from HEU to LEU	N/A

5. SCA – PHYSICAL DESIGN

Licence Condition 5.1: Design Program

The licensee shall implement and maintain a design program.

Preamble

The [*Class I Nuclear Facilities Regulations*](#) require that a licence application contain the proposed measures, policies, methods and procedures to maintain the nuclear facility. The [*Class I Nuclear Facilities Regulations*](#) require that a licence application contain a description of the structures, systems and equipment, including the relevant design information for the facility.

A design program ensures that the design of the facility is managed using a well-defined systematic approach. This LC requires that the licensee implement and maintain a design program to confirm that safety-related systems, structures and components (SSC) and any modifications to them continue to meet their design basis given new information arising over time and taking changes in the external environment into account. It also confirms that SSCs continue to be able to perform their safety functions.

This LC requires that the licensee implement and maintain a design control process to ensure that design outputs (both interim and final) are reviewed, verified and validated against the design inputs and performance requirements, and to ensure that the design inputs are selected such that safety, performance and dependability of the design item are achieved.

CSA N393, *Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances* provides the minimum fire protection requirements for the design, construction, commissioning, operation, and decommissioning of facilities which process, handle, or store nuclear substances, and other hazardous substances that directly relate to the nuclear substances being regulated.

The *National Fire Code of Canada 2020* sets out technical provisions regulating:

- (a) activities related to the construction, use or demolition of buildings and facilities;
- (b) the condition of specific elements of buildings and facilities;
- (c) the design or construction of specific elements of facilities related to certain hazards; and
- (d) protection measures for the current or intended use of buildings.

The *National Building Code of Canada 2020* sets out technical provisions for the design and construction of new buildings. It also applies to the alteration, change of use and demolition of existing buildings.

Compliance Verification Criteria

Licensing Basis Publications

Document Number	Document Title	Version
NRCC 56190	National Building Code of Canada 2020	2020
NFCC 56192	National Fire Code of Canada 2020	2020
CSA N393*	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	2013 (R2018)

* To be implemented by January 2024

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Management System for the SLOWPOKE-2 Facility at RMC	ADM-3	PN
Description and Safety Analysis for the SLOWPOKE-2 Reactor with LEU Oxide Fuel	CPR-77	PN
Safety Assessment for the SLOWPOKE-2 Reactor at RMC	SEP-5	PN

- (1) The licensee shall make design provisions to ensure that potential radiation doses to the public and site personnel do not exceed prescribed limits and are as low as reasonably achievable.
- (2) The licensee shall ensure that all designs, including changes to the designs, meet all relevant safety, code, standard and regulatory requirements.
- (3) The design shall have as an objective the prevention and mitigation of consequences resulting from anticipated operational occurrences and design basis accident conditions.
- (4) The licensee shall apply the defence-in-depth principle to prevent and mitigate harmful effects of radioactive releases.
- (5) The design shall provide multiple physical barriers to the uncontrolled release of radioactive substances to the environment, and an adequate protection of the barriers.
- (6) The design shall prevent as far as practicable:
 - (a) Challenges to the integrity of the barriers;
 - (b) Failure of a barrier when challenged; and
 - (c) Failure of a barrier as consequence of failure of another barrier.

(7) The facility shall be able to fulfill the following fundamental safety functions (during normal operation, anticipated operational occurrences, and design basis accident conditions):

- (a) control of reactivity (where applicable);
- (b) removal of heat from the core (where applicable);
- (c) confinement of radioactive materials;
- (d) control of operational discharges of radioactive and hazardous substances, as well as limitation of accidental releases; and
- (e) monitoring of safety critical parameters to guide operator actions.

(8) The design basis shall be systematically defined and documented to reflect the actual facility.

Guidance Publications

Document #	Document Title	Version
REGDOC-2.5.1	General Design Considerations: Human Factors	2019

6. SCA – FITNESS FOR SERVICE

Licence Condition 6.1: Fitness for Service Program

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

Preamble

The [Class I Nuclear Facilities Regulations](#) requires that a licence application contain information including the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. It is expected that the licensee will conduct routine maintenance, inspection and testing to ensure that the availability, reliability and effectiveness of facilities and equipment that may impact the health, safety and protection of the environment.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Version
CSA N393*	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	2013 (R2018)
REGDOC-2.6.3	Aging Management	2014

* To be implemented by January 2024

Licence Documents that Require Notification of Change

Document Title	Document #	Notification
Management System for the SLOWPOKE-2 Facility at RMC	ADM-3	PN
SLOWPOKE-2 Nuclear Reactor Operation and Routine Maintenance	CPSR-362	NT

1. The licensee shall carry out testing and maintenance sufficient to ensure the reliability and effectiveness of all structures, systems and components, and safety-related equipment.
2. The licensee shall determine the extent and frequency of preventive maintenance, testing, surveillance, and inspection of structures, systems and components through a systematic approach, following operating experience and best industry practices, taking into account:
 - a) their importance to safety;
 - b) their inherent reliability;

- c) their potential for degradation (based on operational and other relevant experience, research and vendor recommendations);
 - d) the consequences of failure;
 - e) results of condition monitoring; and
 - f) the safety analysis.
3. The licensee shall establish, review and validate procedures for maintenance, testing, surveillance, and inspections.
 4. Before any structure, system, equipment or component is removed from or returned to service, the licensee shall ensure full consideration and approval of the proposed reconfiguration, followed by a documented confirmation of its correct configuration and, where appropriate, functional testing.
 5. Following any abnormal event due to which the safety functions and functional integrity of any structure, system or component may have been challenged, the licensee shall identify and revalidate the safety functions and carry out any necessary remedial actions, including inspection, testing, maintenance, and repair, as appropriate.
 6. The licensee shall ensure that all items of equipment used for examinations and tests, together with their accessories, are qualified and calibrated before they are used.
 7. The licensee shall properly identify all equipment in the calibration records, and shall establish a calibration program to ensure all equipment remains in calibrated state.

Guidance

Document #	Document Title	Version
IAEA NS-G-4.2	Maintenance, Periodic Testing and Inspection of Research Reactors	2006

7. SCA – RADIATION PROTECTION

Licence Condition 7.1: Radiation Protection Program

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

Preamble

The [Radiation Protection Regulations](#) requires that the licensee implement a radiation protection program and also ascertain and record doses for each person who performs any duties in connection with any activity that is authorized pursuant to the [Nuclear Safety and Control Act](#) or is present at a place where that activity is carried on. This program must ensure that doses to workers do not exceed prescribed dose limits and are kept as low as reasonably achievable (ALARA), social and economic factors being taken into account.

The regulatory dose limits are explicitly provided in the [Radiation Protection Regulations](#).

Action levels (ALs) are designed to alert licensees before regulatory dose limits are reached. By definition, if an action level is reached, a loss of control of some part of the associated radiation protection program may have occurred, and specific action is required, as defined in the [Radiation Protection Regulations](#). ALs are not intended to be static and are to reflect operating conditions in the facility.

Compliance Verification Criteria

Licensing Basis Publication

Document Number	Document Title	Version
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills	2022
REGDOC-2.7.1	Radiation Protection	2021

Licence Documents that Require Notification of Change

Document #	Document Title	Notification
N/A	RMC Radiation Safety Manual	PN
SEP-1	Radiation Safety for the SLOWPOKE-2 Facility	PN

1. When the licensee becomes aware that an action level has been reached, it shall notify the CNSC within seven days.
2. If an action level has been reached, the licensee shall file a final report with the CNSC within 21 days of becoming aware of the matter.
3. The licensee shall review and if necessary, revise the action levels at a frequency of once per five years to validate their effectiveness.

Radiation Protection Action Levels

Parameter	Action Level
Effective Dose (non-NEWs)	0.5 mSv/year
Effective Dose (NEWs)	10 mSv/year
Equivalent Dose (skin)	25 mSv/year

Guidance

Guidance Publications

Document #	Document Title	Version
REGDOC-2.7.2	Dosimetry, Volume I: Ascertaining Occupational Dose	2021

8. SCA – CONVENTIONAL HEALTH AND SAFETY

Licence Condition 8.1 Conventional Health and Safety Program

The licensee shall implement and maintain a conventional health and safety program.

Preamble

The [Class I Nuclear Facilities Regulations](#) requires that a licence application contain information including the proposed worker health and safety policies and procedures. As a federally regulated site, RMC is also subject to the requirements of Part II of the [Canada Labour Code](#) and [Canada Occupational Health and Safety Regulations](#).

Compliance Verification Criteria

Licensing Basis Publications

Document #	Document Title	Version
REGDOC-2.8.1	Conventional Health and Safety	2019

Licencee Documents that Require Notification of Change

Document Title	Document #	Notification
Management System for the SLOWPOKE-2 Facility at RMC	ADM-3	PN
General Safety Program, Defence Administrative Orders and Directives	DAOD 2007-1	NT
Safety, Defence Administrative Orders and Directives	DAOD 2007-0	NT
Hazardous Materials Management, Defence Administrative Orders and Directives	DAOD 4003-1	NT

Guidance

None provided.

9. SCA – ENVIRONMENTAL PROTECTION

Licence Condition 9.1 : Environmental Protection Program

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

Preamble

The [Class I Nuclear Facilities Regulations](#) require that a licence application contain the proposed environmental protection policies, procedures, effluent and environmental monitoring programs. The [General Nuclear Safety and Control Regulations](#) require that every licensee take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances. The [Radiation Protection Regulations](#) prescribe the radiation dose limits for the general public of 1 mSv per calendar year.

The release of hazardous substances is regulated by the CNSC as well as both the Ontario Ministry of the Environment, Conservation, and Parks and Environment and Climate Change Canada through various acts and regulations.

CSA N288.6, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*, provides requirements for the performance and maintenance of an environmental risk assessment at nuclear facilities.

The Environmental Management System (EMS) captures the environmental protection policies, programs, and procedures of the licensed activity, and ensures that environmental protection is managed via an integrated set of documented activities that have the support and commitment of all levels of management within the licensee's organization. It shall be designed in a way that is appropriate to the nature, scale and environmental impacts of its activities with a commitment to pollution prevention and continuous improvement, such that environmental issues are identified, monitored, interpreted and acted upon in a manner that demonstrates "adequate precaution" to protect the environment and the health and safety of persons. Components of an EMS include Environmental Policy, Planning, Implementation and Operation, Checking, and Management Review.

Compliance Verification Criteria

Licensing Basis Publications

Document #	Document Title	Version
REGDOC-2.9.1	Environmental Principles, Assessments and Protection Measures	2020
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills	2022
CSA N288.6	Environmental Risk Assessments at Class 1 Nuclear Facilities and Uranium Mines and Mills	2012

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
An Environmental Risk Assessment, SLOWPOKE-2 Facility at RMC	FAC-2	PN
Environmental Effects Review	SLWPK4-509200- ENA	NT

1. The licensee shall:

- (a) only discharge radioactive substances to the environment by means of the release paths identified in Table 9-1;
- (b) use best practicable means to exclude all entrained solids, gases and non-aqueous liquids from radioactive liquid effluents prior to discharge to the environment;
- (c) use the best practicable means to minimize the activity of gaseous and liquid radioactive substances that are released to the environment; and
- (d) keep records that describe fully and accurately the amount and type of nuclear substances released from the facility into the environment.

2. The licensee shall control hazardous emissions during normal operations.

3. The licensee shall keep records that describe fully and accurately the amount and type of hazardous substances released from the facility into the environment.

4. The licensee shall inform CNSC staff when gross radioactivity of reactor container water as measured by liquid scintillation counting exceeds ten times the yearly average concentration (after at least 48 hours of reactor shutdown).

Table 9-1: Radionuclides and Hazardous Substances Discharged from the Facility

Discharge Path	Typical Radionuclides
Headspace Purge to roof of Sawyer Building Module 5	Xe-133, Xe-135, Ar-41, Kr-87, Kr-88

Guidance

Document #	Document Title	Version
DAOD 4003-0	Environmental Protection and Stewardship	2004
N/A	Commandant's Environmental Policy Statement	2021

10. SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION

Licence Condition 10.1 Emergency Management Program

The licensee shall implement and maintain an emergency management program.

Preamble

The [Class I Nuclear Facilities Regulations](#) requires that an application for a licence to operate a Class I nuclear facility include the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to assist, notify, report to off-site authorities including the testing of the implementation of these measures.

This LC requires the licensee to establish an emergency preparedness program to prepare for, to respond to, and to recover from the effects of accidental radiological/nuclear and/or hazardous substance release. As part of the emergency preparedness program, the licensee shall prepare an onsite emergency plan and establish the necessary organizational structure for clear allocation of responsibilities, authorities, and arrangements for coordinating onsite activities and cooperating with external response organizations throughout all phases of an emergency.

Compliance Verification Criteria

Licensing Basis Publication

Document Number	Document Title	Version
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response, Version 2	2017

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Reactor Manual for the SLOWPOKE-2 Facility at RMC	FAC-1	PN
Fire Protection Program for the RMC SLOWPOKE-2 Facility	SEP-4	PN
Royal Military College Your guide to Responding to Emergencies	CSO2100-2	NT

Guidance

None provided.

Licence Condition 10.2: Fire Protection Program

The licensee shall implement and maintain a fire protection program.

Preamble

Licenseses shall prepare and implement a fire protection program (a set of planned, coordinated, controlled and documented activities) to ensure that the licensed activities do not result in an unreasonable risk to the health and safety of persons and to the environment due to fire and to ensure that the licensee is able to efficiently and effectively respond to emergency fire situations.

Compliance Verification Criteria

Licensing Basis Publications

Document Number	Document Title	Version
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response	2017
NFCC 56192	National Fire Code of Canada 2020	2020
NRCC 56190	National Building Code of Canada 2020	2020
CSA N393*	Fire Protection for Facilities That Process, Handle, or Store Nuclear Substances	2013 (R2018)

* To be implemented by January 2024

Licencee Documents that Require Notification of Change

Document Title	Document #	Notification
Fire Protection Program for the SLOWPOKE-2 Facility at RMC	SEP-4	PN

Guidance

None provided.

11. SCA – WASTE MANAGEMENT

Licence Condition 11.1: Waste Management Program

The licensee shall implement and maintain a waste management program.

Preamble

The Waste Management safety and control area covers internal waste-related programs that form part of the facility’s operations up to the point where the waste is removed from the facility to a separate waste management facility. This area also covers the planning for decommissioning.

CNSC Regulatory Document REGDOC-2.11, [Framework for Radioactive Waste Management and Decommissioning in Canada](#), describes the national framework and philosophy underlying the CNSC’s approach to regulating the management of radioactive waste.

CNSC Regulatory Document REGDOC-2.11.1, [Waste Management, Volume I: Management of Radioactive Waste](#) defines radioactive waste as any material (liquid, gaseous, or solid) that contains a radioactive nuclear substance, as defined in section 2 of the NSCA, for which no further use is foreseen. In addition to containing nuclear substances, radioactive waste may also contain hazardous substances that are not radioactive, as defined in section 1 of the [General Nuclear Safety and Control Regulations](#).

Compliance Verification Criteria

Licensing Basis Publications

Document Number	Document Title	Version
REGDOC-2.11.1	Waste Management, Volume I: Management of Radioactive Waste	2021

Licence Documents that Require Notification of Change

Document Title	Document #	Notification
RMC Radiation Safety Manual	N/A	PN

Guidance

Guidance Publications

Document #	Document Title	Version
CSA N292.0*	General Principles for the Management of Radioactive Waste and Irradiated Fuel	2019
CSA N292.3*	Management of Low- and Intermediate-Level Radioactive Waste	2014

* These documents are marked as guidance until RMC provides gap analyses, with implementation dates accepted by CNSC staff.

Licence Condition 11.2: Decommissioning Plan

The licensee shall implement and maintain a decommissioning plan.

Preamble

CNSC Regulatory Document REGDOC-2.11, [Framework for Radioactive Waste Management and Decommissioning in Canada](#), describes the national framework and philosophy underlying the CNSC’s approach to regulating decommissioning.

CNSC Regulatory Document REGDOC-2.11.2, [Decommissioning](#) defines decommissioning as the administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility, location or site where nuclear substances are managed, used, possessed or stored. Decommissioning actions are the procedures, processes and work activities (e.g., storage with surveillance, decontamination, dismantling or cleanup) that are taken to retire a facility, location or site from service with due regard for the health and safety of people and the environment.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Licensing Basis Publication

Document Number	Document Title	Version
CSA N294	Decommissioning of Facilities Containing Nuclear Substances	2019
REGDOC-2.11.2	Decommissioning	2021

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Preliminary Decommissioning Plan for the SLOWPOKE-2 Facility at RMC	ADM-5	PN

Guidance

None provided.

12. SCA – SECURITY

Licence Condition 12.1: Security Program

The licensee shall implement and maintain a security program.

Preamble

The [General Nuclear Safety and Control Regulations](#) requires that a licence application contain information including the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information.

The [Class I Nuclear Facilities Regulations](#) requires that a licence application to operate a Class I nuclear facility contain information including the proposed measures to prevent acts of sabotage or attempted sabotage at the nuclear facility, including measures to alert the licensee to such acts.

Part 2 of the [Nuclear Security Regulations](#) also applies to this licensee, as it is listed in Schedule 2 of these regulations. Part 2 of the *Nuclear Security Regulations* requires that an application in respect of a nuclear facility listed in Schedule 2 contain a description of the physical protection measures to be undertaken to ensure compliance with Part 2.

CNSC Regulatory Document 2.12.3, *Security of Nuclear Substances: Sealed Sources* sets out the minimum security measures that licensees must implement to prevent the loss, sabotage, illegal use, illegal possession, or illegal removal of sealed sources during their entire lifecycle, including while the sources are in storage, transport or being stored during transportation.

Compliance Verification Criteria

Licensing Basis Publications

Document #	Document Title	Version
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources	2.1 (2020)

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
RMC Security Plan (Prescribed Information)	SEP-3	PN
Security Directives for the SLOWPOKE-2 Facility (Prescribed Information)	SEP-2	PN

1. The licensee shall maintain the operation, design and analysis provisions specified in the security plan, including that they ensure adequate engineered safety barriers are in place for protection against malevolent acts.
2. Technical and administrative security measures shall be documented by the licensee in a site security plan.
3. The licensee shall implement and maintain a facility security plan, and ensure it is designated as prescribed information. The site security plan must be reviewed by the licensee when changes occur within the licensed facility and/or to address an increased threat level and updated if required.
4. The licensee shall implement satisfactory security measures to prevent the loss, sabotage, illegal use, illegal possession, or illegal removal of sealed sources while under licensee's control, including while the sources are in storage, transport or being stored during transportation.

Guidance**Guidance Publications**

Document #	Document Title	Version
IAEA Nuclear Security Series # 9	Security in Transport of Radioactive Material	2008
IAEA Nuclear Security Series # 11	Security of Radioactive Material and Associated Facilities	2009
IAEA Nuclear Security Series # 14	Nuclear Security Recommendation on Radioactive Material and Associated Facilities	2011
IAEA Nuclear Security Series # 15	Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control	2011

13. SCA – SAFEGUARDS AND NON-PROLIFERATION

Licence Condition 13.1: Safeguards and Non-Proliferation

The licensee shall implement and maintain a safeguards program.

Preamble

The GNSCR require the licensee to take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement, and defines reporting requirements for safeguards events.

The [Class I Nuclear Facilities Regulations](#) require that a licence application contain information on the licensee's proposed measures to facilitate Canada's compliance with any applicable safeguards agreement.

This LC requires that the licensee implement and maintain a safeguards program. Safeguards is a system of inspection and other verification activities undertaken by the IAEA in order to evaluate a Member State's compliance with its obligations pursuant to its safeguards agreements with the IAEA.

Canada has entered into a Safeguards Agreement and an Additional Protocol (hereinafter referred to as "safeguards agreements") with the IAEA pursuant to its obligations under the [Treaty on the Non-Proliferation of Nuclear Weapons](#) (INFCIRC/140). The objective of the Canada-IAEA safeguards agreements is for the IAEA to provide assurance on an annual basis to Canada and to the international community that all declared nuclear materials are in peaceful, non-explosive uses and that there is no indication of undeclared nuclear materials or activities. This conclusion confirms that Canada is in compliance with its obligations under the following Canada-IAEA safeguards agreements:

- (i) *Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*; and
- (ii) *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*.

These are reproduced in information circulars [INFCIRC/164](#) and [INFCIRC/164/Add.1](#).

In addition, the import and export of controlled nuclear substances, equipment and information identified in the [Nuclear Non-proliferation Import and Export Control Regulations](#) require separate authorization from the CNSC, consistent with subsection 3(2) of the GNSCR.

Compliance Verification Criteria

Licensing Basis Publications

Document #	Document Title	Version
REGDOC-2.13.1	Safeguards and Nuclear Material Accountancy	2018

Licensee Documents that Require Notification of Change

Document Title	Document #	Notification
Design Information Questionnaire, SLOWPOKE-2 Facility at RMC (Prescribed Information)	N/A	PN

Guidance

None provided.

14. SCA – PACKAGING AND TRANSPORT

Licence Condition 14.1: Packaging and Transport Program

The licensee shall implement and maintain a packaging and transport program.

Preamble

The [Class I Nuclear Facilities Regulations](#) require that a licence application contain information on the proposed procedures for handling, storing, loading and transporting nuclear substances.

The transport of nuclear substances or hazardous substances shall be done in accordance with the requirements of the [Packaging and Transport of Nuclear Substances Regulations, 2015](#), (PTNSR) and [Transportation of Dangerous Goods Regulations](#) (TDGR) set out by Transport Canada.

Compliance Verification Criteria

Licence Documents that Require Notification of Change

Document Title	Document #	Notification
Transportation of radioactive materials from RMC	OPN-7	PN
RMC Radiation Safety Manual	N/A	PN

Guidance

Guidance Documents

Document Number	Document Title	Version
REGDOC-2.14.1	REGDOC-2.14.1, Volume I, Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015, Version 2	2021

APPENDIX A: Definitions and Acronyms

A.1. Definitions

The following is a list of definitions of words or expressions used in the LCH that may need clarification; they are defined for the purpose of the LCH only. All other terms and expressions used in the LCH are consistent with the definitions provided in the NSCA, the regulations made pursuant to the NSCA, or in the CNSC regulatory document [REGDOC-3.6, Glossary of CNSC Terminology](#).

Accept/ed/able/ance – meets regulatory requirements, which mean it is in compliance with the documents referenced in the LCH.

Approval – Commission’s permission to proceed, for situations or changes where the licensee would be:

- not compliant with regulatory requirements set out in applicable laws and regulations;
- not compliant with a licence condition; and
- not in the safe direction but the objective of the licensing basis is met.

Boundary Conditions – procedural, administrative rules and operating limits for ensuring safe operation of the facility based on safety analyses and any applicable regulatory requirements.

Compliance Verification Criteria – regulatory criteria used by CNSC staff to verify compliance with the licence conditions.

Design Basis – the entire range of conditions for which the nuclear facility is designed, in accordance with established design criteria, and for which damage to the fuel and/or the release of radioactive material is kept within authorized limits.

Guidance – guidance in the LCH is non-mandatory information, including direction, on how to comply with the licence condition.

Notification Document – a document which is submitted to the CNSC at the time of implementing the change.

Prior Notification Document – a document which is submitted to the CNSC prior to implementing the change.

Program(s) – a documented group of planned activities, procedures, processes, standards and instructions coordinated to meet a specific purpose.

Qualified Staff – trained licensee staff, deemed competent and qualified to carry out tasks associated with their respective positions.

Safe Direction – changes in facility safety levels that would not result in:

- (a) a reduction in safety margins;
- (b) a breakdown of barrier;
- (c) an increase (in certain parameters) above accepted limits;
- (d) an increase in risk;
- (e) impairment(s) of safety systems;
- (f) an increase in the risk of radioactive releases or spills of hazardous substances;
- (g) injuries to workers or members of the public;
- (h) introduction of a new hazard;
- (i) reduction of the defence-in-depth provisions;
- (j) causing hazards or risks different in nature or greater in probability or magnitude than those stated in the safety analysis of the nuclear facility.

Safety and Control Measures – measures or provisions which demonstrate that the applicant:

- (i) is qualified to carry on the licensed activities; and
- (ii) has made adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and any measures required to implement international obligations to which Canada has agreed.

Written Notification – a physical or electronic communication between CNSC staff and a person authorized to act on behalf of the licensee.

A.2. Acronyms List

The following is the list of acronyms used in this document:

AL	Action Level
ALARA	As Low As Reasonably Achievable, social and economic factors taken into consideration
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
CVC	Compliance Verification Criteria
DNCFR	Directorate of Nuclear Cycle and Facilities Regulation
DRL	Derived Release Limits
EP	Environmental Protection
EMS	Environmental Management System
FG	Financial Guarantee
GNSCR	<i>General Nuclear Safety and Control Regulations</i>
IAEA	International Atomic Energy Agency
LC	Licence Condition
LCH	Licence Conditions Handbook
NPFD	Nuclear Processing and Facilities Division
NSCA	<i>Nuclear Safety and Control Act</i>
REGDOC	Regulatory Document
RMC	Royal Military College
RP	Radiation Protection
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SSC	Structures, systems and components
WN	Written Notification

APPENDIX B – Version Controlled Documents

B.1 Codes, Standards and Regulatory Documents

Document #	Document Title	Version	Licence Conditions
CSA N286	Management systems requirements for nuclear facilities	2012 (2017)	1.1, 4.1, 5.1
CSA N288.6	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	2012	9.1
CSA N292.0	General principles for the management of radioactive waste and irradiated fuel	2019	11.1
CSA N292.3	Management of Low and Intermediate-Level Radioactive Waste	2014	11.1
CSA N294	Decommissioning of Facilities Containing Nuclear Substances	2019	G.3, 11.2
CSA N393	Fire protection for Facilities that Process, Handle or Store Nuclear Substances	2013 (R2018)	3.1, 6.1, 10.2, 15.1
IAEA Nuclear Security Series # 11	Security of Radioactive Material and Associated Facilities	2009	12.1
IAEA Nuclear Security Series # 14	Nuclear Security Recommendation on Radioactive Material and Associated Facilities	2011	12.1
IAEA Nuclear Security Series # 15	Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control	2011	12.1
IAEA Nuclear Security Series # 9	Security in Transport of Radioactive Material	2008	12.1
IAEA SSR-4	Safety of Nuclear Fuel Cycle Facilities		4.1
IRC-10NBC	National Building Code of Canada	2020	3.1, 5.1
IRC-10NFC	National Fire Code of Canada	2020	3.1, 5.1
REGDOC-2.1.1	Management System	2019	1.1

Document #	Document Title	Version	Licence Conditions
REGDOC-2.1.2	Safety Culture	2018	1.1
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response	2017	10.1
REGDOC-2.11.1	Waste Management, Volume II: Assessing the Long-Term Safety of Radioactive Waste Management	2021	11.1
REGDOC-2.11.2	Decommissioning	2021	G.3, 11.2
REGDOC-2.12.3	Security of Nuclear Substances Sealed Sources	2020	12.1
REGDOC-2.13.1	Safeguards and Nuclear Material Accountancy	2018	13.1
REGDOC-2.14.1	Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015	2016	14.1
REGDOC-2.2.2	Personnel Training	2016	2.1
REGDOC-2.4.1	Deterministic Safety Analysis	2014	4.1
REGDOC-2.4.3	Nuclear Criticality Safety	2020	1.1
REGDOC-2.5.1	General Design Considerations: Human Factors	2019	5.1
REGDOC-2.6.3	Aging Management	2014	6.1
REGDOC-2.7.1	Radiation Protection	2021	7.1
REGDOC-2.7.2	Dosimetry, Volume I: Ascertaining Occupational Dose	2021	7.1
REGDOC-2.8.1	Conventional Health and Safety	2019	8.1
REGDOC-2.9.1	Environmental Protection Policies, Programs and Procedures	2020	9.1
REGDOC-3.1.2	Reporting Requirements for Non-Power Reactor: Class I Facilities and Uranium Mines and Mills	2022	3.2
REGDOC-3.1.3	Reporting Requirements for Waste Nuclear Substance Licensees, Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices	2020	3.2

Document #	Document Title	Version	Licence Conditions
REGDOC-3.2.1	Public Information and Disclosure	2018	G.4
REGDOC-3.3.1	Financial Guarantees for Decommissioning of nuclear facilities and termination of licensed activities	2021	G.3, 11.2
REGDOC-3.5.3	Regulatory Fundamentals	2018	Appendix A
REGDOC-3.6	Glossary of CNSC Terminology	2022	Appendix A

B.2 Licensee Documents

Documents referenced by the licensee in support of the licence application and ongoing licensing requirements that are referenced within the LCH. Current versions of the licensing basis publications, licensee documents that require notification of change and guidance documents referenced in the LCH are tracked in the document *RMC Written Notification Document Tracking Sheet* (e-Doc 6894203), which is controlled by the Nuclear Processing Facilities Division (NPF) and is available to the licensee upon request.

Document Title	Document #	Notification	Licence Conditions
Royal Military College of Canada Slowpoke-2 Facility Non-Power Operating Licence Renewal Application	e-Doc 6743957	PN	G.1
Reactor Manual for the SLOWPOKE-2 Facility at RMC	FAC-1	PN	G.2, 3.1, 10.1
Operator Manual	SIRCIS-10-4008	PN	G.2, 3.1
Safety Assessment for the SLOWPOKE-2 Reactor at RMC	SEP-5	PN	G.2, 3.1, 4.1, 5.1
Description and Safety Analysis for the SLOWPOKE-2 Reactor with LEU Oxide Fuel	CPR-77	PN	G.2, 3.1, 4.1, 5.1
Deputy Minister of the Department of National Defense, Letter of Financial Guarantee	e-Doc 6743957	PN	G.3
Preliminary Decommissioning Plan	ADM-5	PN	G.3, 11.2
Public Information Program and Disclosure Protocol	ADM-4	NT	G.4
Management System for the SLOWPOKE-2 Facility at RMC	ADM-3	PN	1.1, 5.1, 6.1
Change Control Procedure	QAP-5	PN	1.1
Training Program for Reactor Operators – Automatic Mode	N/A	PN	2.1
Training Manual Part II Training in the SAT Format & Operation in Manual Mode of the SLOWPOKE-2 Reactor at RMC	N/A	PN	2.1

Document Title	Document #	Notification	Licence Conditions
SLOWPOKE-2 Nuclear Reactor Operation and Routine Maintenance	CPSR-362	NT	6.1
RMC Radiation Safety Manual	N/A	PN	7.1, 11.1, 14.1
Radiation Safety for the SLOWPOKE-2 Facility	SEP-1	PN	7.1
Management System for the SLOWPOKE-2 Facility at RMC	ADM-3	PN	8.1
General Safety Program, Defence Administrative Orders and Directives	DAOD 2007-1	NT	8.1
Safety, Defence Administrative Orders and Directives	DAOD 2007-0	NT	8.1
Hazardous Materials Management, Defence Administrative Orders and Directives	DAOD 4003-1	NT	8.1
An Environmental Risk Assessment, SLOWPOKE-2 Facility at RMC	FAC-2	PN	9.1
Environmental Effects Review	SLWPK4-509200- ENA	NT	9.1
Fire Protection Program for the RMC SLOWPOKE-2 Facility	SEP-4	PN	10.1, 10.2
Royal Military College Your guide to Responding to Emergencies	CSO2100-2	NT	10.1
RMC Security Plan (Prescribed Information)	SEP-3	PN	12.1
Security Directives for the SLOWPOKE-2 Facility (Prescribed Information)	SEP-2	PN	12.1
Design Information Questionnaire, SLOWPOKE-2 Facility at RMC (Prescribed Information)	N/A	PN	13.1
Transportation of radioactive materials from RMC	OPN-7	PN	14.1

APPENDIX C – Certification Requirements for Reactor Operators, Reactor Engineer and Reactor Technician

1. QUALIFICATION REQUIREMENTS

Reactor Operator - Operation in Automatic Mode

1.1 A person seeking certification by the CNSC as reactor operator for operation in automatic mode at a SLOWPOKE-2 reactor facility shall, at the time of certification, meet the requirements specified in paragraphs 1.1.1 to 1.1.3 below:

- 1.1.1 **Education:** High school diploma which includes credits in science and mathematics.
- 1.1.2 **Experience:** Minimum of 3 months of apprenticeship as operator trainee at the SLOWPOKE-2 reactor facility where certification is sought.
- 1.1.3 **Training:** As specified in section 2.1

Reactor Operator - Operation in Manual Mode

1.2 A person seeking certification by the CNSC as reactor operator for operation in manual mode at a SLOWPOKE-2 reactor facility shall, at the time of certification, meet the requirements specified in paragraphs 1.2.1 to 1.2.3 below:

- 1.2.1 **Education:** High school diploma which includes credits in science and mathematics.
- 1.2.2 **Experience:** Minimum of 1 year of experience operating the reactor in automatic mode at the SLOWPOKE-2 reactor facility where certification is sought.
- 1.2.3 **Training:** As specified in section 2.2

Reactor Engineer

1.3 A person seeking certification by the CNSC as reactor engineer at SLOWPOKE-2 reactor facility shall, at the time of certification, meet the requirements specified in paragraphs 1.3.1 to 1.3.3 below:

- 1.3.1 **Education:**
 - (a) Baccalaureate in engineering or science from a recognized university; or
 - (b) Academic qualifications that meet the requirements for registration as a professional engineer in Canada; or
 - (c) A current or expired certification as reactor engineer at a SLOWPOKE-2 reactor.
- 1.3.2 **Experience:**
 - (a) One year relevant engineering experience; or

- (b) Two years of work experience as a professional in an operation, maintenance, research or laboratory environment; or
- (c) Five years experience working in a nuclear facility or related field.

1.3.3 **Training:** As specified in subsection 2.3.

Reactor Technician

1.4 A person seeking certification by the CNSC as reactor technician at SLOWPOKE-2 reactor facility shall, at the time of certification, meet the requirements specified in paragraphs 1.4.1 to 1.4.3 below:

1.4.1 Education:

- (a) An instrument technician, an electrical technician or an electro-mechanical technician diploma from a recognized educational institute; or
- (b) A two-year technician or technologist diploma from a recognized educational institution in a discipline relevant to nuclear engineering, with three years of experience in that discipline; or
- (c) A three-year technologist diploma from a recognized educational institution in a discipline relevant to nuclear engineering, with two years of experience in that discipline.

1.4.2 Experience:

- (a) One year work experience in control and process instrumentation maintenance, diagnostics and repair and two years work experience as a technician in an operation, maintenance, research or laboratory environment.

1.4.3 **Training:** As specified in subsection 2.3 below.

2. INITIAL TRAINING REQUIREMENTS

Reactor Operator - Operation in Automatic Mode

2.1 A person seeking certification as reactor operator for operation of the SLOWPOKE-2 reactor in automatic mode shall comply with the requirements specified in paragraphs 2.1.1 to 2.1.3 below:

2.1.1 Has successfully completed training, appropriate to the knowledge requirements of the position, covering:

- (a) principles of facility operation, including:
 - reactor theory;
 - heat transfer; and
 - principles of nuclear safety.
- (b) radiation protection fundamentals, including:
 - radiation hazards from operation of the reactor;
 - radiation protection theory and practices; and
 - radiation detection and measurement.
- (c) facility design and operating characteristics, including facility design features.
- (d) facility instrumentation and control, including:
 - nuclear instrumentation; and
 - reactor control system.
- (e) facility procedures, including:
 - procedures for normal, abnormal and emergency operation;
 - radiation protection procedures used during normal, abnormal and emergency operation;
 - administrative procedures related to facility operation and maintenance; and
 - procedures for radioactive material handling and disposal.
- (f) facility operating licence, RMC-LCH and documents referenced in the RMC-LCH.

This training shall be followed by a comprehensive written examination set by the licensee that confirms and documents that, at the completion of the training, the person has the required knowledge skills to perform the duties of a reactor operator.

2.1.2 Has successfully completed a facility specific on-the-job training, under the supervision of a certified reactor operator, appropriate to the knowledge and skill requirements of the position covering:

- operating practices;
- procedure for operation in automatic mode;
- operation of the facility equipment and systems under normal, abnormal and emergency conditions; and
- facility maintenance procedures.

This training shall include formal performance evaluations that confirms and documents that, at the completion of the training, the person has the required knowledge and skills to perform the duties of a reactor operator.

2.1.3 Have successfully operated the reactor in automatic mode for a minimum of 10 start-up and shut-down cycles under the supervision of a reactor operator certified for operation in automatic mode.

Reactor operator - Operation in manual mode

2.2 A reactor operator certified for operation of the SLOWPOKE-2 reactor in automatic mode, seeking certification as reactor operator for operation in manual mode, shall comply with the requirements specified in paragraphs 2.2.1 and 2.2.2 below:

2.2.1 Has successfully completed training covering:

- theory of control rod operation;
- response of the reactor to positive or negative reactivity insertions; and
- procedure for operation in manual mode.

This training shall be followed by a comprehensive written examination set by the licensee that confirms and documents that, at the completion of the training, the person has the required knowledge to perform the duties of a reactor operator.

2.2.2 Has successfully operated the reactor in manual mode for a minimum of 10 start-up operations and shut-down cycles, including switching between manual and automatic modes of operation, under the supervision of a reactor operator certified for operation in manual mode.

Reactor Engineer and Reactor Technician

2.3 A person seeking certification as reactor engineer or reactor technician for a SLOWPOKE-2 reactor shall comply with the requirements specified in paragraphs 2.3.1 to 2.3.2 below:

2.3.1 Has successfully completed training appropriate to the knowledge requirements of the position covering:

- a) Principles of facility operation, including:
 - Nuclear theory;

- Reactor physics; and
 - Principles of nuclear safety.
- b) Radiation protection principles, including:
- radiation fundamentals;
 - radiation hazards; and
 - radiation protection theory and practices.
- (c) facility design, function, operation and maintenance;
- (d) facility instrumentation and control;
- (e) facility procedures, including:
- procedures for normal, abnormal and emergency operation;
 - radiation protection procedures used during normal, abnormal and emergency operation;
 - administrative procedures related to facility operation and maintenance; and
 - procedures for radioactive material handling and disposal.
- (f) facility operating licence, RMC-LCH and documents referenced in the RMC-LCH.

This training shall include formal written evaluations that confirm and document that, at the completion of the training, the candidate has the required knowledge to perform the duties of a reactor engineer or technician

- 2.3.2 Has successfully completed a facility specific on-the-job training, under supervision of a certified incumbent of the position appropriate to the knowledge and skill requirements of the position covering the SLOWPOKE-2 Facility maintenance procedures.

This training shall include formal performance evaluations that confirm and document that, at the completion of the training, the candidate has the required knowledge and skills to perform the duties of a reactor engineer or technician.

3. CONTINUING TRAINING REQUIREMENTS

- 3.1 Reactor operators shall comply, during the period of their certification, with the requirements specified in paragraphs 3.1.1 to 3.1.3. Reactor engineers and reactor technicians shall comply, during the period of their certification, with the requirements specified in paragraphs 3.1.1 and 3.1.2.
- 3.1.1 Reactor operators, reactor engineers, and reactor technicians shall successfully complete continuing training appropriate to the knowledge requirements of the position covering the topics of their initial training that are required to work competently in the position.
- 3.1.2 Reactor operators, reactor engineers, and reactor technicians shall successfully complete training appropriate to the knowledge and skills requirements of the position covering topics identified as a result of:
- changes to facility systems and equipment;
 - changes to licensee's and facility's policies and procedures;
 - changes to regulatory requirements;
 - changes to the facility's operating licence or to documents referenced in the licence; and
 - experience and operating events at SLOWPOKE-2 reactor facilities.
- 3.1.3 The reactor operators shall successfully complete, as part of their continuing training, the operations listed below:
- start up and shut down the reactor, and perform the weekly maintenance routine, at least twice in each calendar year. If only the minimum of two start-ups, shut-downs and weekly maintenance routines are performed in calendar year, the time interval between identical operations shall be not less than two months; and
 - operate the auxiliary shutdown system at least once in each calendar year.