



Record of Decision

DEC 24-H100

In the Matter of

Applicant McMaster University

Subject Application to Renew the Class IA Non-Power Reactor Operating Licence for the McMaster Nuclear Reactor

Date of Decision June 4, 2024

RECORD OF DECISION – DEC 24-H100

Applicant: McMaster University

Address/Location: 1280 Main Street West, Hamilton, ON L8S 4K1

Purpose: Application to Renew the Class IA Non-Power Reactor
Operating Licence for the McMaster Nuclear Reactor

Application received: April 19, 2023

Date of decision: June 4, 2024

Panel of the Commission: M. Lacroix

Licence: Renewed

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1.0 INTRODUCTION

1. McMaster University has applied to the Canadian Nuclear Safety Commission¹ (CNSC or the Commission), under subsection 24(2) of the [Nuclear Safety and Control Act](#)² (NSCA), for a 20-year renewal of the Class IA Non-Power Reactor Operating Licence for its [McMaster Nuclear Reactor](#). McMaster University's current licence, NPROL-01.00/2024, is valid until June 30, 2024, and authorizes McMaster University to operate the reactor and associated facilities. The McMaster Nuclear Reactor facility is located at the McMaster University Campus, in Hamilton, Ontario, and on the traditional lands of the Haudenosaunee, Anishinaabe Nations.
2. The McMaster Nuclear Reactor has been in operation since 1959. The research reactor is a 5-megawatt (MW) open-pool reactor using low enriched uranium³ (LEU) fuel. The McMaster Nuclear Reactor produces Iodine-125 (I-125) and other isotopes for medical use, is used for neutron radiography, and irradiation of samples for biomedical research, material science and geological surveys.

Issues

3. The Commission is required to determine whether and what requirements the [Impact Assessment Act](#)⁴ (IAA) imposes in relation to the activities sought to be authorized in McMaster University's application to renew the licence for its McMaster Nuclear Reactor. Satisfying any such requirements can be a prerequisite to licensing.
4. Pursuant to paragraphs 24(4)(a) and (b) of the NSCA, in considering whether to renew the licence, the Commission must be satisfied that:
 - a) McMaster University is qualified to carry on the activity that the licence would authorize; and
 - b) in carrying on that activity, McMaster University 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.
5. As an agent of the Crown, the Commission recognizes its role in fulfilling the Crown's constitutional obligations, along with advancing reconciliation with Canada's Indigenous peoples. The Commission's responsibilities include the duty to consult and, where appropriate, accommodate Indigenous interests where the Crown contemplates conduct which may adversely impact potential or established Aboriginal⁵ or treaty

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

² S.C. 1997, c. 9.

³ Low enriched uranium is defined as enriched uranium containing less than 20 percent by weight of isotope uranium-235, uranium-233, or combined uranium-233 and uranium-235.

⁴ S.C. 2019, c. 28, s. 1.

⁵ "Aboriginal" is the term used in this document when referring to the Crown's duty to consult as that is the term used in s. 35 of the Constitution Act, 1982. In all other cases, "Indigenous" is the preferred terminology and used accordingly.

rights⁶. As such, the Commission must determine what engagement and consultation steps and accommodation measures are called for respecting Indigenous interests.

Panel

6. On August 14, 2023, the Commission published a [Notice of Public Hearing and Participant Funding](#) for this matter.
7. Pursuant to section 22 of the NSCA, the President of the Commission established a Panel of the Commission, composed of Commission Member Dr. M. Lacroix, to decide on the application. The Commission, in conducting a public hearing based on written materials, considered written submissions from McMaster University ([CMD 24-H100.1](#)) and CNSC staff ([CMD 24-H100.A](#)). The Commission also considered written submissions from 17 intervenors (see Appendix A for a list of interventions).
8. In making its decision, the Commission sent questions to CNSC staff through [CMD 24-H100-Q](#). The Commission is satisfied with the completeness of the responses provided by CNSC staff ([CMD 24-H100.B](#)).

Participant Funding Program

9. Pursuant to paragraph 21(1)(b.1) of the NSCA, the Commission has established a [Participant Funding Program \(PFP\)](#) to facilitate the participation of Indigenous Nations and communities, members of the public and stakeholders in Commission proceedings. In [August 2023](#), up to \$15,000 in funding was made available through the CNSC's PFP to review McMaster University's licence renewal application and associated documents, and to provide the Commission with value-added information through topic-specific interventions. A Funding Review Committee, independent of the CNSC, reviewed the funding application received and [made recommendations on the allocation of funds](#). Based on the recommendations from the Committee, the CNSC awarded up to \$3,000 to 2 applicants, D. Winfield and P. Sedran.

2.0 DECISION

10. Based on its consideration of the matter, as described in more detail in the following sections of this *Record of Decision*, the Commission concludes the following:
 - the [Impact Assessment Act](#) (IAA) does not impose any obligation upon the Commission in this matter
 - the contemplated licence renewal does not present any novel adverse impact on any potential or established Aboriginal claim or right

⁶ *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73; *Taku River Tlingit First Nation v. British Columbia (Project Assessment Director)*, 2004 SCC 74.

- the Commission's responsibility to uphold the honour of the Crown and its constitutional obligations with regard to engagement and consultation respecting Indigenous interests has been satisfied
- McMaster University remains qualified to carry on the activity that the licence will authorize
- McMaster University, in carrying on these activities, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed

Therefore,

the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews the Non-Power Reactor Operating Licence issued to McMaster University for its McMaster Nuclear Reactor located in Hamilton, Ontario. The renewed licence, NPROL-01.00/2044, is valid from July 1, 2024, to June 30, 2044, unless suspended, amended, revoked or replaced.

11. The Commission includes in the licence the conditions as recommended by CNSC staff in [CMD 24-H100.A](#). The Commission also delegates authority for the purposes of licence condition 3.2, as recommended by CNSC staff. Licence conditions and the delegation of authority are further discussed in section 4.6 of this Record of Decision.
12. The Commission accepts McMaster University's financial guarantee for its McMaster Nuclear Reactor in the amount of \$19.25 million, in the form of a combination of a *Deed of Trust* and a *Financial Security and Access Agreement with the CNSC*.
13. With this decision, the Commission directs CNSC staff to report on the performance of McMaster University, as part of its regulatory oversight report addressing nuclear research reactors. CNSC staff shall present that report at a public proceeding of the Commission, where members of the public will be able to participate. The Commission directs CNSC staff to notify it of any changes made to the Licence Conditions Handbook (LCH) through the regulatory oversight report. CNSC staff may bring any matter to the Commission's attention, as required.
14. The Commission directs that, at the midpoint of the 20-year licence period and no later than June 2034, McMaster University shall provide to the Commission a comprehensive midterm update on the conduct of its licensed activities and compliance with requirements. The midterm update shall include an overview of the aging management and fitness-for-service of the McMaster Nuclear Reactor, as well as the McMaster Nuclear Reactor Indigenous Engagement Program. The public and Indigenous Nations and communities shall be given the opportunity to participate to the midterm update. The Commission will plan to offer participant funding for this proceeding.

3.0 APPLICABILITY OF THE *IMPACT ASSESSMENT ACT*

15. In coming to its decision, the Commission is first required to determine whether any requirement under the IAA applied to the licence renewal application and whether an impact assessment is required.
16. Pursuant to the IAA and the [*Physical Activities Regulations*](#)⁷ made under it, impact assessments are to be conducted in respect of projects identified as having the greatest potential for adverse environmental effects in areas of federal jurisdiction. A licence renewal is not an activity listed in the *Physical Activities Regulations* that requires an impact assessment, or that meet the definition of a project on federal lands.
17. The Commission is satisfied that there is no requirement under the IAA for an impact assessment to be completed for this application for licence renewal. The Commission is also satisfied that there are no other applicable requirements of the IAA to be addressed in this matter⁸.

4.0 ISSUES AND COMMISSION FINDINGS

18. In making its licensing decision, the Commission considered specific relevant issues and submissions relating to McMaster University's qualification to carry on the licensed activities. The Commission also considered the adequacy of the proposed measures for protecting the environment, the health and safety of persons, national security and international obligations to which Canada has agreed.
19. The Commission's decision focuses on the issues relevant for this application, specifically:
 - Assessment of the licence application
 - Views of Hearing Participants
 - McMaster University's performance and safety and control measures in relevant [safety and control areas](#) (SCAs)
 - Indigenous engagement and consultation
 - Other matters of regulatory importance
 - Licence length and conditions, including the delegation of authority

4.1 Assessment of Licence Application

20. McMaster University submitted a licence renewal [application](#) for its McMaster Nuclear Reactor on April 19, 2023. In its consideration of this matter, the Commission assessed the application submitted by McMaster University, as required by the NSCA, the [General Nuclear Safety and Control Regulations](#)⁹ (GNSCR), and the [Class I Nuclear](#)

⁷ SOR/2019-285.

⁸ The IAA can impose other requirements on federal authorities in respect of authorizing projects that are not designated as requiring an impact assessment, including projects that are to be carried out on federal lands, or projects outside of Canada. This licence renewal does not engage any such applicable IAA requirements.

⁹ SOR/2000-202.

Facilities Regulations¹⁰, and other applicable regulations made under the NSCA, including the Radiation Protection Regulations¹¹, the Nuclear Security Regulations¹², and the Packaging and Transport of Nuclear Substances Regulations, 2015¹³.

21. Section 5 of the GNSCR provides:

An application for the renewal of a licence shall contain

- (a) the information required to be contained in an application for that licence by the applicable regulations made under the Act; and
- (b) a statement identifying the changes in the information that was previously submitted

Section 7 of the GNSCR also provides that:

An application for a licence or for the renewal, suspension in whole or in part, amendment, revocation or replacement of a licence may incorporate by reference any information that is included in a valid, expired or revoked licence.

22. In its application, McMaster University provided information to satisfy the requirements set out in each applicable clause of the NSCA and applicable regulations. In Appendix A of its application, McMaster University mapped each clause to the relevant section of its application.
23. In section 1.4 of CMD 24-H100.A, CNSC staff submitted that it assessed McMaster University's application and determined that it complied with all requirements for a Class IA licence application. In Appendix B.1 of CMD 24-H100.A, CNSC staff reported that its assessment of McMaster University's licence application included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements.
24. The Commission concludes that McMaster University's licence renewal application is complete and complies with the regulatory requirements respecting an application for licence renewal. The Commission notes that McMaster University's application is comprehensive and that CNSC staff's assessment confirms that McMaster University's application complies with the regulatory requirements respecting an application for licence renewal, as set in the NSCA and applicable regulations.

4.2 Views of Hearing Participants

25. The Commission received 17 interventions for this hearing. All 17 interventions were in support of the renewal of McMaster University's licence for a period of 20 years. Intervenors expressed support for the McMaster Nuclear Reactor for different reasons, including its safe operations, its use as a reliable source of neutrons, its isotope production and its support to research.

¹⁰ SOR/2000-204.

¹¹ SOR/2000-203.

¹² SOR/2000-209.

¹³ SOR/2015-145.

26. Two intervenors, D. Winfield ([CMD 24-H100.9](#)) and P. Sedran ([CMD 24-H100.15](#)), provided the Commission with detailed analyses regarding the fitness-for-service of the McMaster Nuclear Reactor. Both interventions submitted that the McMaster Nuclear Reactor would remain safe to operate for the proposed licence period of 20 years.

4.3 McMaster University's Performance and Safety and Control Measures at the McMaster Nuclear Reactor Facility

27. The Commission examined CNSC staff's assessment of McMaster University's performance with respect to the CNSC's SCA framework for the purpose of evaluating McMaster University's licence renewal application. CNSC staff submitted information on McMaster University's performance in all 14 SCAs. CNSC staff reported that McMaster University had implemented and maintained programs as required by its licence, and that McMaster University's performance in all SCAs had remained "satisfactory" during the current licence period. CNSC staff based its conclusions on oversight activities which included compliance inspections, document reviews, and technical assessments.

4.3.1 Management System

28. The management system SCA covers the framework that establishes the processes and programs required to ensure that McMaster University achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.
29. Paragraph 3(d) of the *Class I Nuclear Facilities Regulations* 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, including measures to promote and support safety culture." Section 3 of the GNSCR contains requirements that form the basis of a management system.
30. CNSC regulatory document¹⁴ [REGDOC-2.1.1, Management System](#)¹⁵ addresses the development and implementation of sound management practices and controls, while [REGDOC-2.1.2, Safety Culture](#)¹⁶ sets out requirements and guidance for fostering a healthy safety culture and conducting safety culture assessments. CSA N286-12, *Management System Requirements for Nuclear Facilities*¹⁷ provides an overall management framework and direction to develop and implement sound management practices and controls for the licensing basis.
31. In section 2.1 of its application, McMaster University reported that it has implemented a management system for its McMaster Nuclear Reactor facility in accordance with CSA N286-12. McMaster University described its management system, including its:

¹⁴ CNSC [regulatory documents](#) are typically referred to as REGDOCs

¹⁵ REGDOC-2.1.1, *Management System*, CNSC, May 2019.

¹⁶ REGDOC-2.1.2, *Safety Culture*, CNSC, April 2018.

¹⁷ N286-12, *Management System Requirements for Nuclear Facilities*, CSA Group, 2012 (R2022).

- organizational structure
 - safety culture
 - change management and quality assurance processes
 - record management
 - operating experience
 - business continuity
32. In section 3.1 of CMD 24-H100.A, CNSC staff confirmed that McMaster University has implemented a management system which satisfies all regulatory requirements, including those set out in REGDOC-2.1.1, REGDOC-2.1.2 and CSA N286-12. CNSC staff submitted that it conducted 5 inspections related to the management system SCA over the current licence period. These inspections resulted in 2 notices of non-compliance¹⁸, in the areas of work and change control package information completeness, and internal audits. CNSC reported that all non-compliances were of low safety significance and that McMaster University implemented appropriate corrective actions in response to each non-compliance.
33. The Commission concludes that McMaster University has acceptable programs in place to ensure that the McMaster Nuclear Reactor facility achieves its safety objectives and fosters a healthy safety culture. The Commission comes to this conclusion on the following basis:
- McMaster University has implemented and maintained a management system that meets regulatory requirements, including REGDOC-2.1.1, REGDOC-2.1.2, and CSA N286-12
 - McMaster University has appropriate organization and management structures in place to carry on the licensed activities
 - McMaster University has an acceptable safety culture and a process in place to monitor safety culture in accordance with REGDOC-2.1.2
 - McMaster University has implemented adequate corrective actions in response to inspection findings over the current licence term

4.3.2 *Human Performance Management*

34. The human performance management SCA encompasses activities that ensure that McMaster University staff are sufficient in number in all relevant job areas and have the necessary knowledge, skills, procedures, and tools in place to safely carry out their duties.
35. Paragraph 12(1)(a) of the GNSCR requires the licensee to ensure that there are sufficient qualified workers to carry on the licensed activity safely and in accordance with the NSCA, its regulations and the licence, whereas paragraph 12(1)(b) indicates that the licensee must train workers to carry on the licensed activity in accordance with the Act, its regulations and the licence.

¹⁸ A non-compliance is a regulatory requirement that has not been met. When a non-compliance is identified, CNSC staff assess the significance of the non-compliance, and determine the appropriate enforcement action, based on the CNSC's graduated approach to enforcement.

36. Paragraph 3(d.1) of the *Class I Nuclear Facilities Regulations* provides that the licence application must include information about the proposed human performance program for the activity to be licensed, including the measures to ensure workers' fitness for duty, whereas paragraphs 6(m) and 6(n) indicate that an application for a licence to operate a Class I nuclear facility must include information on the proposed responsibilities, qualification requirements, training program, and measures for the requalification of workers, as well as on the results obtained through the application of the program for the recruitment, training and qualification of workers related to the operation and maintenance of the nuclear facility.
37. [REGDOC-2.2.2, *Personnel Training, Version 2*](#)¹⁹ sets out requirements and guidance for the analysis, design, development, implementation, evaluation, documentation and management of training at nuclear facilities within Canada, including the essential principles and elements of an effective training system. [REGDOC-2.2.4, *Fitness for Duty*](#)²⁰ sets out requirements and guidance of the CNSC with respect to managing worker fatigue at high-security sites. [REGDOC-2.2.5, *Minimum Staff Complement*](#)²¹ provides guidance to assist Class I nuclear facility licensees and licence applicants in demonstrating to the CNSC that they will ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the NSCA, and [REGDOC-2.5.1, *General Design Considerations: Human Factors*](#)²² sets out guidance for licensees and licence applicants in developing human factors engineering program planning documentation that demonstrates how human factors considerations are incorporated into CNSC-licensed activities.
38. In section 2.2 of its application, McMaster University submitted information on its human performance program including details on its training and fitness for duty programs. McMaster University reported that its human performance program meets the requirements outlined in REGDOC-2.2.2. McMaster University also reported that its human performance program is also in compliance with REGDOC-2.2.4, REGDOC-2.2.5, and REGDOC-2.5.1.
39. Regarding training, McMaster University reported that it has implemented a systematic approach to training (SAT) based training program to ensure that workers are qualified to safely carry out their job duties. McMaster University reported that it maintains a documented training record for each worker and that it ensures that an appropriate number of trained and certified staff are working at its reactor facility. McMaster University noted that, to become a certified reactor operator, the personnel in question must pass the CNSC-approved exam.
40. Regarding fitness for duty, McMaster University submitted that supervisors and managers ensure that employees are fit for duty at all times. McMaster University added that it has an extensive employee and family assistance program.

¹⁹ REGDOC-2.2.2, *Performance Training, Version 2*, CNSC, December 2016.

²⁰ REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*, CNSC, March 2017.

²¹ REGDOC-2.2.5, *Minimum Staff Complement*, CNSC, April 2019.

²² REGDOC-2.5.1, *General Design Considerations: Human Factors*, CNSC, March 2019.

41. In section 3.2 of CMD 24-H100.A, CNSC staff confirmed that McMaster University has maintained a SAT-based training program that satisfies regulatory requirements, including the requirements set out in REGDOC-2.2.2. CNSC staff noted that, throughout the current licence term, McMaster University maintained a sufficient number of certified workers, ensured continued worker competence through ongoing training, and updated and improved its training program. CNSC staff noted that it also inspected McMaster University's fitness for duty program and identified 3 non-compliances. CNSC staff reported that all non-compliances were of low safety significance and that McMaster University implemented appropriate corrective actions in response to each non-compliance.
42. The Commission concludes that McMaster University has an appropriate human performance management program in place for the conduct of licensed activities. The Commission is satisfied that workers at McMaster University's reactor facility are appropriately trained and qualified in accordance with CNSC requirements. The Commission comes to this conclusion on the following basis:
- McMaster University has a SAT-based training program in place that meets regulatory requirements, including REGDOC-2.2.2
 - McMaster University has a fitness for duty program in place to ensure that workers are fit to safely conduct their job duties
 - McMaster University has maintained an appropriate number of certified staff throughout the current licence term
 - McMaster University provides students with adequate safety training prior to performing work at the reactor facility
 - McMaster University has addressed all inspection findings related to the human performance management SCA

4.3.3 *Operating Performance*

43. The operating performance SCA includes an overall review of the conduct of the licensed activities and the activities that enable effective performance, as well as improvement plans and significant future activities, at McMaster University's reactor facility.
44. Paragraph 6(d) of the *Class I Nuclear Facilities Regulations* provides that an application for a licence to operate a Class I nuclear facility must include information on the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills, Version 1.1](#)²³ sets out requirements and guidance for reports and notifications that licensees of Class I nuclear facilities must submit to the CNSC.
45. In section 2.3 of its application, McMaster University provided information on the processes it has implemented to ensure that its McMaster Nuclear Reactor is operated safely and in compliance with its licence conditions. McMaster University submitted

²³ REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*, Version 1.1, CNSC, July 2022.

information on its operating and maintenance procedure documents and maintenance activities. Regarding reporting requirements, McMaster University noted that it submits all reports, including its annual compliance report, to the CNSC in accordance with REGDOC-3.1.2.

46. In section 3.3 of CMD 24-H100.A, CNSC staff reported that McMaster University operated its McMaster Nuclear Reactor in accordance with regulatory requirements over the current licence period. CNSC staff submitted that McMaster University maintains appropriate operating procedures and program documents to ensure the safe operation of the McMaster Nuclear Reactor, and that McMaster University has satisfied regulatory reporting requirements per REGDOC-3.1.2. CNSC staff presented the reportable events that occurred at McMaster University's research reactor over the current licence term. CNSC staff reported that McMaster University responded appropriately to these events.
47. CNSC staff reported that, during the current licence term, it conducted 4 inspections related to the operating performance SCA without any non-compliance. CNSC staff noted that it conducted a reactive inspection as a result of a fueling error, which was brought to the Commission's attention as an Event Initial Report [in 2014](#)²⁴. CNSC staff submitted that it verified the corrective actions put in place by McMaster University, and issued 5 recommendations as a result.
48. In section 3.3 of CMD 24-H100.A, CNSC staff reported that it verified McMaster University's program documents and procedural adherence. CNSC staff confirmed that McMaster University has adequate program documents and procedures to ensure the safe operation of its McMaster Nuclear Reactor.
49. The Commission concludes that McMaster University has and will continue to have appropriate programs in place at its McMaster Nuclear Reactor to provide for the protection of the health and safety of persons and the environment. The Commission comes to this conclusion on the following basis:
 - McMaster University operated its McMaster Nuclear Reactor in accordance with regulatory requirements over the current licence period
 - McMaster University's operating programs and procedures meet regulatory requirements
 - McMaster University maintains a program for reporting, in accordance with REGDOC-3.1.2
 - inspection findings during the current licence term show that McMaster University continues to implement and maintain an effective operating program

4.3.4 Safety Analysis

50. Safety analysis, which supports the overall safety case for the facility, includes a systematic evaluation of the potential hazards associated with the conduct of the licensed activity or the operation of a facility and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards.

²⁴ Minutes of the Canadian Nuclear Safety Commission (CNSC) Meeting held on November 5, 2014.

51. Paragraph 6(c) of the *Class I Nuclear Facilities Regulations* provides that an application for a licence to operate a Class I nuclear facility must include a final safety analysis report demonstrating the adequacy of the design of the nuclear facility.
52. [REGDOC-2.4.1, *Deterministic Safety Analysis*](#)²⁵ sets out requirements and guidance for the preparation and presentation of a safety analysis that demonstrates the safety of a nuclear facility. [REGDOC-2.4.3, *Nuclear Criticality Safety, Version 1.1*](#)²⁶ sets out requirements for nuclear criticality safety and provides guidance on how those requirements may be met.
53. In section 2.4 of its application, McMaster University provided information on its safety analysis program, including the documentation which describes the safety analysis for its McMaster Nuclear Reactor. McMaster University submitted that it conducted a Defense in Depth review in 2011 with emphasis on control of severe accident conditions. McMaster University reported that the McMaster Nuclear Reactor has robust measures for protecting workers, the public and the environment against internal and external hazards. McMaster University also reported on additional modifications it made to further enhance safety measures in the area of severe accident management. McMaster University submitted that its Safety Analysis Report was last updated in 2023, reflecting all facility changes and modifications.
54. In section 2.4 of its application, McMaster University specified that its safety analysis program is compliant with [REGDOC-2.4.4, *Safety Analysis for Class IB Nuclear Facilities*](#)²⁷ and provided information on the topics of postulated initiating events, deterministic safety analysis, hazard analysis and nuclear criticality safety.
55. In section 3.4 of CMD 24-H100.A, CNSC staff submitted that McMaster University's documentation under the safety analysis SCA meets regulatory requirements. CNSC staff explained that McMaster University's safety analysis identifies facility hazards, analyzes consequences, and identifies mitigation measures in compliance with regulatory requirements, including REGDOC-2.4.1 and REGDOC-2.4.3. CNSC staff reported that it assessed McMaster University's safety analysis program over the current licence term through documentation reviews and onsite inspection. CNSC staff reported that it did not identify any non-compliances during the inspections.
56. The Commission concludes that McMaster University's safety analysis is adequate for the licensed activities associated with the operation of its reactor research facility under the proposed licence. The Commission comes to this conclusion on the following basis:
- the design of the McMaster Nuclear Reactor will remain adequate throughout the proposed licence period
 - McMaster University's safety analysis for the McMaster Nuclear Reactor is adequate and demonstrates measures for protecting workers, the public and the environment against internal and external hazards
 - McMaster University meets the requirements of REGDOC-2.4.1 and REGDOC-2.4.3

²⁵ REGDOC 2.4.1, *Deterministic Safety Analysis*, CNSC, May 2014.

²⁶ REGDOC 2.4.3, *Nuclear Criticality Safety, Version 1.1*, CNSC, September 2020.

²⁷ REGDOC-2.4.4, *Safety Analysis for Class IB Nuclear Facilities*, CNSC, October 2022.

4.3.5 Physical Design

57. The physical design SCA includes the activities to design systems, structures and components to meet and maintain the design basis of a facility. The design basis is the range of conditions, according to established criteria, that the facility must withstand without exceeding authorized limits for the planned operation of safety systems.
58. 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.
59. Paragraphs 3(a) and 3(b) of the *Class I Nuclear Facilities Regulations* indicate that an application for a licence for a Class I nuclear facility must include a description of the site of the activity to be licensed, as well as plans showing the location, perimeter, areas, structures and systems of the nuclear facility. Paragraphs 6(a) and 6(b) of the *Class I Nuclear Facilities Regulations* provide that an application for a licence to operate a Class I nuclear facility must include a description of the structures, systems and equipment at the nuclear facility, including their design and their design operating conditions.
60. In section 2.5 of its application, McMaster University provided information on its physical design program, including its design governance, site characterization, and facility design. McMaster University submitted that there have been no significant changes to the design of its research reactor over the current licence term.
61. In section 3.5 of CMD 24-H100.A, CNSC staff submitted that McMaster University has implemented and maintained a physical design program in accordance with regulatory requirements. CNSC staff submitted that it conducted 2 inspections related to the physical design SCA over the current licence period. These inspections resulted in 1 notice of non-compliance and 1 recommendation. CNSC reported that the non-compliance was of low safety significance as the findings involved administrative aspects of records management.
62. CNSC staff reported that it requested that McMaster University complete a gap analysis between its current programs and the recent revision of compliance with applicable labour codes and conventional safety training. CNSC staff reported that McMaster University will submit a gap analysis and an implementation plan, expected in December 2024.
63. The Commission concludes that McMaster University continues to implement and maintain an effective physical design program at its McMaster Nuclear Reactor, and that the design is adequate for the requested licence period. The Commission comes to this conclusion on the following basis:
 - McMaster University has a physical design program in place that meets regulatory requirements
 - McMaster University's McMaster Nuclear Reactor meets design requirements
 - McMaster University has an adequate process in place to manage design changes within the licensing basis
 - inspection findings during the current licence term show that McMaster University continues to implement and maintain an effective physical design program

4.3.6 Fitness for Service

64. The fitness for service SCA covers activities that are performed to ensure that systems, structures, and components (SSCs) at McMaster University's McMaster Nuclear Reactor continue to effectively fulfill their intended purpose.
65. Paragraph 6(d) of the *Class I Nuclear Facilities Regulations* requires that an application to operate a Class I nuclear facility contains the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. [REGDOC-2.6.3, Aging Management](#)²⁸ sets out guidance and the requirements for managing aging of structures, systems, and components for reactor facilities. Specific aspects of CSA N393-13 *Fire protection for facilities that process, handle, or store nuclear substances*²⁹ are also applicable to this SCA.
66. In section 2.6 of its application, McMaster University provided information on its fitness for service program and activities, including maintenance, aging management, and aging management practices. McMaster University submitted that its fitness for service program complies with the maintenance requirements specified in International Atomic Energy Agency (IAEA) guidance document [Aging Management for Research Reactors](#)³⁰. McMaster University noted that required maintenance is completed and recorded following a weekly and annual maintenance schedules.
67. In section 3.6 of CMD 24-H100.A, CNSC staff submitted that McMaster University has maintained a fitness for service program in accordance with regulatory requirements. CNSC staff confirmed that McMaster University has adequate maintenance, testing, calibration, and inspection processes in place to ensure that its McMaster Nuclear Reactor remains fit for service. In the interest of continuous improvement, CNSC staff proposed that REGDOC-2.6.3 be included as compliance verification criteria in the Licence Conditions Handbook for the renewed licence. During the current licensing period, CNSC staff reported that it performed 5 inspections related to the fitness for service SCA and identified no non-compliances.
68. Referencing the intervention by D. Winfield ([CMD 24-H100.9](#)), the Commission noted the 65 years of operation of the McMaster Nuclear Reactor and asked, in [CMD 24-H100-Q](#), whether the assessment of the concrete condition, of the in-situ beam tubes and of the concrete embedded stainless steel coolant lines sections would be expanded. In CMD 24-H100.B, CNSC staff stated that operating the McMaster Nuclear Reactor on a 24-hour, 5-days/week schedule is not expected to have any measurable impact on the concrete condition, the in-situ beam tubes or embedded stainless steel coolant lines, since the relatively long distance between the reactor core and these structures, and the shielding from the water in the pool minimize radiation exposure and mitigate any significant radiation damage to these structures. CNSC staff added that the McMaster Nuclear Reactor pool water chemistry is carefully controlled

²⁸ REGDOC-2.6.3, *Aging Management*, CNSC, March 2014.

²⁹ N393-12, *Fire protection for facilities that process, handle, or store nuclear substances*, CSA Group, 2013 (R2018). This standard 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.

³⁰ IAEA, "Aging Management for Research Reactors", Specific Safety Guide No. SSG-10, 2010.

using filters and mixed-bed ion exchange columns designed to provide high purity water, which significantly reduces the possibility of corrosion.

69. On the same topic, the Commission enquired whether REGDOC-2.6.3 addresses aging issues at the McMaster Nuclear Reactor. CNSC staff reported that the key requirements of REGDOC-2.6.3 applicable to McMaster Nuclear Reactor include:

- Licensees shall establish and implement processes, programs and procedures to manage aging and obsolescence of SSCs, to ensure that required safety functions are maintained during the facility operation phase
- Facility operations shall be monitored and recorded to demonstrate compliance with critical service conditions, operational limits and conditions, and any other parameters that were identified as affecting aging assumptions used in safety analyses or equipment qualification
- As part of the deterministic safety analysis review and update, licensees shall account for the effects of the aging of SSCs, research findings, and advances in knowledge and understanding of aging mechanisms. This shall include an evaluation of the cumulative effects of the aging of SSCs on overall system and facility safety performance, as well as on risk insights using probabilistic safety assessments

CNSC staff reported that its compliance activities have verified that these requirements are complied with through McMaster Nuclear Reactor's operating and aging management programs. The Commission is satisfied with the information provided by CNSC staff on this matter.

70. The Commission is satisfied that McMaster University has appropriate programs in place to ensure that the equipment at its McMaster Nuclear Reactor will remain fit for service throughout the proposed licence period. The Commission comes to this conclusion on the following basis:

- McMaster University has a fitness for service program in place that includes adequate maintenance, testing, calibration, and inspection processes and meets regulatory requirements
- McMaster University has implemented adequate aging management practices and that there are no aging issues relevant to the continued safe operation of its McMaster Nuclear Reactor

The Commission is satisfied that REGDOC-2.6.3 will be included as compliance verification criteria in the Licence Conditions Handbook for the renewed licence.

4.3.7 *Radiation Protection*

71. The radiation protection SCA covers the implementation of a radiation protection program in accordance with the *Radiation Protection Regulations*. The radiation protection program must ensure that radiation doses to persons and contamination are monitored, controlled, and kept ALARA, with social and economic factors taken into consideration.

72. Section 4 of the *Radiation Protection Regulations* requires licensees to implement a radiation protection program. As part of this program, licensees must keep effective and equivalent doses received by, and committed to, persons as low as reasonably achievable (ALARA), taking into account social and economic factors, and ascertain the quantity and concentration of any nuclear substance released as a result of the licensed activity. Paragraphs 6(e) and 6(h) of the *Class I Nuclear Facilities Regulations* require that an application to operate a Class I nuclear facility contains the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances, as well as 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.
73. [REGDOC-2.7.1, *Radiation Protection*](#)³¹ provides guidance on radiation protection programs, the principles of worker dose control and the principles of radiological hazard control to ensure the protection of workers and the public. [REGDOC-2.7.2, *Dosimetry, Volume I: Ascertaining Occupational Dose*](#)³² sets out guidance for ascertaining occupational dose and provides guidance for making changes to dose-related information filed with Health Canada's National Dose Registry.
74. In section 2.7 of its application, McMaster University provided information on its radiation protection program including its worker dose control, contamination control program, the facility radiological and the application of the ALARA principle. McMaster University submitted that its radiation protection program complies with the requirements of the *Radiation Protection Regulations*.
75. In section 3.7 of CMD 23-H3, CNSC staff reported that McMaster University has implemented and maintained an effective radiation protection program as required by the *Radiation Protection Regulations*. CNSC staff explained that McMaster University's radiation protection program ensures there are adequate measures in place to monitor and control radiological hazards including contamination control, radiation dose rate control and airborne radiation monitoring and control.
76. During the current licence term, CNSC staff conducted 4 compliance inspections related to the radiation protection SCA, identifying 1 non-compliance. The non-compliance was related to program expectations, such as in the completion of the continuing training for respiratory protection, the documentation of the thyroid screening records and the documentation of the method to ascertain and record doses to the lens of the eye. CNSC staff noted that McMaster University established appropriate corrective actions to address these areas and implemented enhancements to the associated procedures.
77. CNSC staff reported that doses to nuclear energy workers (NEWs) at McMaster University's McMaster Nuclear Reactor remained well below regulatory dose limits³³ over the current licence period. CNSC staff submitted that the maximum effective dose received by a McMaster University NEW during the current licence period was

³¹ REGDOC-2.7.1, *Radiation Protection*, CNSC, July 2021.

³² REGDOC-2.7.2, *Dosimetry, Volume I: Ascertaining Occupational Dose*, CNSC, July 2021.

³³ The regulatory dose limits for nuclear energy workers are 50 mSv in any one year and 100 mSv in a five-year dosimetry period. The regulatory dose limit for members of the public is 1 mSv in one calendar year.

4.36 millisieverts per year (mSv/y), and the maximum effective dose received by a NEW over any of the five-year dosimetry periods during the current licence term was 20.39 mSv. CNSC staff found that McMaster University effectively applied the ALARA principle over the current licence period. CNSC staff added that no McMaster University's research reactor worker reached an action level for worker exposures during the current licensing period.

78. CNSC staff noted that REGDOC-2.7.1 and REGDOC-2.7.2 were published in 2021. In the interest of continuous improvement, CNSC staff included both new REGDOCs as guidance in the draft LCH.
79. The Commission concludes that McMaster University has implemented and maintained an adequate radiation protection program to protect the health and safety of persons and the environment from radiation hazards associated with the McMaster Nuclear Reactor. The Commission comes to this conclusion on the following basis:
- McMaster University has implemented a radiation protection program that meets the requirements of the *Radiation Protection Regulations*
 - doses to workers at the McMaster Nuclear Reactor were kept below regulatory limits during the current licence term
 - McMaster University has implemented satisfactory corrective actions in response to inspection findings over the current licence term

4.3.8 *Conventional Health and Safety*

80. The conventional health and safety SCA covers the management of workplace safety hazards to minimize risk to the health and safety of workers posed by conventional (non-radiological) hazards in the workplace. This program includes compliance with applicable labour codes.
81. The NSCA provides that the Commission must ensure that the applicant takes the necessary measures to safeguard the health of persons. Paragraph 3(f) of the *Class I Nuclear Facilities Regulations* provides that the licence application for a Class I nuclear facility must include a description of the proposed worker health and safety policies and procedures. [REGDOC-2.8.1, *Conventional Health and Safety*](#)³⁴ sets out information regarding conventional health and safety and the implementation and maintenance of a conventional health and safety program. In addition, McMaster University's activities must comply with the [Canada Labour Code](#)³⁵, and the associated [Canada Occupational Health and Safety Regulations](#)³⁶.
82. In section 2.8 of CMD 24-H100.1, McMaster University provided information regarding the implementation of its conventional safety program including information on its health and safety practices, including WHMIS training and its Health and Safety Committee. McMaster University reported that its conventional health and safety

³⁴ REGDOC-2.8.1, *Conventional Health and Safety*, CNSC, July 2019.

³⁵ R.S.C., 1985, c. L-2.

³⁶ SOR/86-304.

program complies with REGDOC-2.8.1 and with Part II of the *Canada Labour Code* and the associated *Canada Occupational Health and Safety Regulations*. McMaster University submitted that no lost-time injuries occurred during the current licence term.

83. In section 3.8 of CMD 24-H100.A, CNSC staff confirmed that McMaster University has maintained a conventional health and safety program that meets regulatory requirements of Part II of the *Canada Labour Code*, and the *Canada Occupational Health and Safety Regulations*. CNSC staff reported that it included REGDOC-2.8.1 as compliance verification criteria in the draft LCH. CNSC staff conducted 4 inspections related to this SCA over the current licence period. CNSC staff did not identify any non-compliances.
84. The Commission concludes that McMaster University has made, and will continue to make, adequate provision for the protection of the health and safety of persons with respect to conventional hazards arising from the operation of its McMaster Nuclear Reactor for the proposed licence period. The Commission comes to its conclusion on the following basis:
- McMaster University's conventional health and safety program meets regulatory requirements, including Part II of the *Canada Labour Code*, and the *Canada Occupational Health and Safety Regulations*
 - McMaster University has not experienced any lost-time injuries at its McMaster Nuclear Reactor

The Commission is satisfied that REGDOC-2.8.1 will be included as compliance verification criteria in the Licence Conditions Handbook for the renewed licence.

4.3.9 *Environmental Protection*

85. Environmental protection programs are intended to identify, control, and monitor all releases of radioactive and hazardous substances, and aim to minimize the effects on the environment which may result from the licensed activities. These programs include effluent and emission control, environmental monitoring, and estimated doses to the public.
86. In accordance with the NSCA, licensees are required to ensure that there are adequate provisions for the protection of the environment. Paragraphs 12(1)(c) and (f) of the GNSCR require each licensee to 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 *Radiation Protection Regulations* prescribe dose limits for the public, which, pursuant to subsection 1(3), are 1 mSv per calendar year.

87. [REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2*](#)³⁷ describes the CNSC's principles of environmental protection, the scope of an environmental review and the roles and responsibilities associated with an environmental review, as well as the CNSC's requirements and guidance for developing environmental protection measures, including an environmental risk assessment (ERA) where required. CSA N288.6, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*³⁸ provides requirements for the performance and maintenance of an ERA at nuclear facilities.
88. In section 2.9 of its application, McMaster University provided information on its environmental protection program, including its effluent and emissions controls, public exposure, environmental monitoring and environmental risk assessment. McMaster University submitted that its environmental protection program complies with REGDOC-2.9.1, and with all federal, provincial, and municipal environmental regulations.
89. McMaster University reported that it continuously sampled air effluents from the reactor building for beta emitting particulates and radioiodine, on a weekly basis. McMaster University added that no trends of concern were observed. McMaster University also reported that releases from its reactor building do not pose an unreasonable hazard to members of the public.
90. In section 3.9 of CMD 24-H100.A, CNSC staff reported that McMaster University has an environmental protection program in place that protects the environment and human health in accordance with regulatory requirements. During the current licence period, CNSC staff performed 2 compliance inspections related to the environmental protection SCA, and did not identify any non-compliances.
91. Regarding emissions and effluent control, CNSC staff submitted that airborne emissions from McMaster University's McMaster Nuclear Reactor have been consistently low during the licence period, producing a maximum dose of 1.9 microsieverts (μSv)³⁹ to a hypothetical person standing at the point of maximum ground level concentration for a full year. CNSC staff reported that I-125 and Ar-41 are the only nuclear substances routinely released to the environment in measurable quantities (i.e., above detection limits). CNSC staff explained that all gaseous emissions pass through activated charcoal filters to minimize the release of I-125, which ensures releases of radioactive particulates are controlled. For liquid effluents, CNSC staff reported that any liquid effluent generated by the McMaster Nuclear Reactor is captured and then processed or evaporated in the facility. CNSC staff added that there were no releases of contaminated liquids to the municipal sewer system during the licensing period.

³⁷ REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures*, Version 1.2, CNSC, September 2020.

³⁸ N288.6-12, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills*, CSA Group, 2012.

³⁹ 1 μSv is equivalent to 0.001 mSv

92. CNSC staff submitted that, through its [Independent Environmental Monitoring Program](#) (IEMP), CNSC staff analyzed samples from publicly accessible areas around the McMaster Nuclear Reactor. CNSC staff completed an IEMP campaign around the McMaster Nuclear Reactor in 2023. CNSC staff noted that the results indicated that concentrations of radioactive substances and hazardous substances around the McMaster Nuclear Reactor were well below guideline levels. CNSC staff also noted that the results indicate that the public and the environment surrounding the McMaster Nuclear Reactor are protected, and no human health impacts are expected⁴⁰.
93. CNSC staff reported that McMaster University submitted an ERA to the CNSC in April 2023, in support of its licence renewal application. CNSC staff explained that the purpose of the ERA was to assess the potential risks to human health and the environment associated with the operation of McMaster Nuclear Reactor, and to determine any appropriate protective measures. CNSC staff reported that McMaster University completed its ERA in accordance with REGDOC-2.9.1 and CSA N288.6-12. CNSC staff confirmed that the ERA demonstrated that people and the environment around the McMaster Nuclear Reactor are protected. CNSC staff also noted that, though REGDOC-2.9.1 and CSA N288.6-12 are not referenced in McMaster University's current LCH, CNSC staff added them as compliance verification criteria in the draft LCH.
94. The Commission concludes that McMaster University has and will continue to provide adequate protection to the health and safety of persons and the environment throughout the proposed licence period. The Commission is satisfied that the measures implemented at the McMaster Nuclear Reactor are adequate for the purposes of environmental protection under the NSCA. The Commission comes to this conclusion on the following basis:
- McMaster University has maintained an environmental protection program that meets regulatory requirements, including REGDOC-2.9.1
 - releases to the environment from the McMaster Nuclear Reactor during the current licence period were well below regulatory limits
 - McMaster University's ERA meets the requirements of REGDOC-2.9.1 and CSA N288.6-12
 - the dose to the public during the current licence period was well below the regulatory limit

4.3.10 Emergency Management and Fire Protection

95. The emergency management and fire protection SCA covers the measures for preparedness and response capabilities implemented by McMaster University in the event of emergencies and non-routine conditions at its McMaster Nuclear Reactor. These measures include nuclear emergency management, conventional emergency response, and fire protection and response.

⁴⁰ [IEMP results](#) for the McMaster Nuclear Reactor are available on the CNSC's website.

96. Subsection 24(4) of the NSCA provides that the applicant, in carrying out the proposed licensed activity, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
97. Paragraph 12(1)(c) of the GNSCR states that the licensee shall “take all reasonable precautions to protect the environment, preserve the health and safety of persons and maintain the security”, while paragraph 12(1)(f) states that the 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”.
98. Paragraph 6(k) of the *Class I Nuclear Facilities Regulations* requires that a licence application include 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.
99. [REGDOC-2.10.1, Nuclear Emergency Preparedness and Response, Version 2](#)⁴¹ sets out the CNSC’s requirements and guidance for emergency preparedness, and applies to licensees and licence applicants for Class I nuclear facilities, including McMaster University.
100. In section 3.10 of its application, McMaster University provided information on its emergency management procedures, which were revised and updated in 2022. McMaster University reported that it performed a full-scale radiological fire exercise in September 2019, in conjunction with Municipal emergency responders and the City of Hamilton Emergency Planning office. McMaster University reported that the exercise demonstrated successful response and coordination between the facility and University, and Hamilton first responders, including fire, police and paramedics.
101. Regarding fire protection, McMaster University submitted that it has implemented a fire protection program that ensures activities being carried out at McMaster Nuclear Reactor do not result in an unreasonable risk to workers, the public or the environment. McMaster University explained that part of the objectives of its fire protection program are:
- No injury to university personnel or members of the public
 - No radioactive release to the environment which could result in a dose to a member of the public exceeding 5 mSv

McMaster University reported that the Hamilton Fire Department and the McMaster University have established a Memorandum of Understanding (MOU) which provides details on how the two entities support each other for emergency preparedness.

⁴¹ REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*, Version 2, CNSC, February 2016.

102. In section 3.10 of CMD 24-H100.A, CNSC staff reported that McMaster University maintains an Emergency Management and Fire Protection Program in accordance with the current licence and applicable codes and standards, including those set out in REGDOC-2.10.1, the [National Building Code of Canada 2020](#)⁴² (NBCC 2020), the [National Fire Code of Canada 2015](#)⁴³ (NFCC 2015), and the [NFPA 801 Annex B Standards for Fire Protection for Facilities Handling Radioactive Materials](#)⁴⁴ (NFPA 801 Annex B). CNSC staff submitted that, during the current licence period, it performed 4 compliance inspections related to the emergency management and fire protection SCA and issued 4 notices of non-compliance. CNSC staff noted that the non-compliances were of low safety significance.
103. In section 3.10 of CMD 24-H100.A, CNSC staff provided information on an emergency exercise it executed in 2014 and a transportation emergency response plan exercise in conjunction with City of Hamilton emergency responders in November 2023. CNSC staff reported that the results of the exercise, reviews and inspections demonstrated an acceptable emergency preparedness response capability and adequate interaction with responders to deal with a credible nuclear emergency.
104. CNSC staff reported that the NBCC 2020 and NFCC 2015 were updated to the 2020 versions during the licence period and CSA N393-22 was also updated in 2022. CNSC staff reported that McMaster University is conducting a gap analysis between the new versions of these codes and standard and McMaster University's emergency management and fire protection program with an implementation date of August 31, 2024.
105. The Commission concludes that McMaster University's nuclear and conventional emergency management program and the fire protection measures are adequate to protect the health and safety of persons and the environment. The Commission comes to this conclusion on the following basis:
- McMaster University's emergency management and fire protection programs meet regulatory requirements, including REGDOC-2.10.1, NBCC 2020, NFCC 2015 and NFPA 801 Annex B
 - McMaster University has successfully executed multi-jurisdictional emergency services training exercises, and the results demonstrate an acceptable emergency preparedness response capability and adequate interaction with responders to deal with a credible nuclear emergency

4.3.11 Waste Management

106. Waste management covers waste-related programs that form part of a facility's operations up to the point where the waste is removed from the licensed site for storage, treatment, or disposal at another licensed location, and includes waste minimization, segregation, characterization, and storage programs.

⁴² *National Building Code of Canada 2020*, National Research Council Canada, 2020.

⁴³ *National Fire Code of Canada 2015*, National Research Council Canada, 2015.

⁴⁴ *NFPA 801 Annex B Standards for Fire Protection for Facilities Handling Radioactive Materials*, National Fire Protection Association, 2020.

107. Paragraph 3(1)(j) of the GNSCR provides that the licence application must include the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including wastes 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 *Class I Nuclear Facilities Regulations* also requires that the application contains the proposed plan for the decommissioning of the nuclear facility or of the site.
108. [REGDOC-2.11.1, *Waste Management, Volume I: Management of Radioactive Waste*](#)⁴⁵ sets out requirements and guidance for managing radioactive waste. [REGDOC-2.11.2, *Decommissioning*](#)⁴⁶ sets out requirements and guidance regarding the planning and preparation for, as well as the execution and completion of decommissioning.
109. In section 2.11 of its application, McMaster University provided information on its waste management program including information on its waste characterization, minimization, and handling practices. McMaster University reported that spent highly enriched uranium⁴⁷ fuel assemblies were returned to a United States Department of Energy facility, during the previous licence period.
110. In section 3.11 of CMD 24-H100.A, CNSC staff reported that McMaster University maintains a waste management program in accordance with Regulatory Guides [G-219, *Decommissioning Planning for Licensed Activities*](#) and [G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*](#), and CSA Standard N294-09, *Decommissioning of facilities containing nuclear substances*⁴⁸. CNSC staff reported that it conducted 2 inspections at the McMaster Nuclear Reactor that included verification criteria associated with the waste management SCA; no non-compliances were identified. CNSC staff also verified elements of McMaster University's waste management program through desktop reviews of program documents, operations reports and annual reports. CNSC staff confirmed that McMaster University's waste management program meets regulatory requirements.
111. Regarding decommissioning, McMaster University submitted that it revised its Preliminary Decommissioning Plan (PDP) in 2021 in compliance with REGDOC-2.11.2. The PDP describes the radiological and non-radiological hazards associated with decommissioning the McMaster Nuclear Reactor. CNSC staff found McMaster University's PDP to meet the applicable regulatory requirements of CNSC regulatory guide G-219 and CSA N294-19. CNSC staff added that the next revision of McMaster University's PDP will be assessed against the requirements of REGDOC-2.11.2. The PDP and related cost estimate are discussed further in section 4.4.2 of this *Record of Decision*.

⁴⁵ REGDOC-2.11.1, *Waste Management, Volume I: Management of Radioactive Waste*, CNSC, January 2021.

⁴⁶ REGDOC-2.11.2, *Decommissioning*, CNSC, January 2021.

⁴⁷ Highly enriched uranium is defined as enriched uranium containing at least 20 percent by weight of isotope uranium-235, uranium-233, or combined uranium-233 and uranium-235.

⁴⁸ CSA Standard N294-09, *Decommissioning of facilities containing nuclear substances*, CSA Group, 2009.

112. CNSC staff noted that REGDOC-2.11.1, *Waste Management Volume I*, and REGDOC-2.11.2 were published in January 2021 and are not referenced in the current LCH. CNSC staff indicated that it would include these REGDOCs as compliance verification criteria in the LCH for the renewed licence to replace Regulatory Guides G-219 and G-206.
113. The Commission is satisfied that McMaster University has implemented, and continues to maintain, a waste management program to safely manage waste at the McMaster Nuclear Reactor. The Commission comes to this conclusion on the following basis:
- McMaster University has implemented a waste management program that meets regulatory requirements, including Regulatory Guides G-219 and G-206
 - McMaster University has a PDP in place that meets regulatory requirements, including CSA N294-19
 - McMaster University had no non-compliances in this SCA during the licence term

4.3.12 Security

114. The security SCA covers the implementation of a program to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment, or information. McMaster University's security program for its McMaster Nuclear Reactor must comply with applicable provisions of the GNSCR and Part 2 of the [Nuclear Security Regulations](#)⁴⁹ (NSR).
115. Paragraph 12(1)(c) of the GNSCR requires the licensee to 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. Paragraphs 12(1)(g) and 12(1)(h) require the licensee to 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, and measures for alerting it to acts or attempts of sabotage, anywhere at the site of the licensed activity. Paragraph 12(1)(j) requires the licensee to instruct workers on the physical security program at the site of the licensed activity and on their obligations under that program.
116. In addition, 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". [REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1](#)⁵⁰ provides regulatory expectations and guidance for licensees regarding the CNSC's expectations under the GNSCR for security.
117. In section 2.12 of its application, McMaster University reported that it maintains a security program that complies with REGDOC-2.12.3 to control access to the McMaster Nuclear Reactor, nuclear substances, and prescribed information. McMaster

⁴⁹ SOR/2000-209.

⁵⁰ REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1*, CNSC, September 2020.

University provided information on its security program, including its site security plan and worker security clearance requirements. McMaster University noted that it routinely planned and executed drills and exercises, in order to enhance its capability.

118. Regarding cyber security, McMaster University submitted that the digital operating system for the McMaster Nuclear Reactor is not connected to the internet and is therefore protected from unauthorized remote operation. McMaster University also provided information on the roles and responsibilities of the involved parties in cyber security.
119. In section 3.12 of CMD 24-H100.A, CNSC staff reported that McMaster University has maintained a security program that meets regulatory requirements under the GNSCR and Part 2 of the NSR. CNSC staff noted that the McMaster Nuclear Reactor security program includes administrative and technical measures that meet current CNSC regulatory requirements for nuclear security. CNSC staff further noted that McMaster University has maintained a security program that provides sufficient security systems and devices for the facility and the areas that involve the processing, use, or storage of nuclear substances. CNSC staff added REGDOC-2.12.3 as compliance verification criteria in the draft LCH for the proposed licence.
120. During the licence period, CNSC staff reported that it performed 2 inspections related to the security SCA and 1 security-focused inspection. CNSC staff noted that there were no identified non-compliances.
121. The Commission is satisfied that McMaster University has adequate programs and measures in place to provide for the physical security of the McMaster Nuclear Reactor during the proposed licence period. The Commission is further satisfied that McMaster University's performance with respect to the security SCA has been acceptable and meets regulatory requirements. The Commission comes to this conclusion on the following basis:
 - McMaster University has implemented a security program that meets regulatory requirements, including those set out in the GNSCR and Part 2 of the NSR
 - The Commission is satisfied that the McMaster University has implemented measures to protect the McMaster Nuclear Reactor from cyber security threats
 - no non-compliances were identified in CNSC staff's inspections in this SCA

4.3.13 Safeguards and Non-Proliferation

122. The CNSC's regulatory mandate includes ensuring conformity with measures required to implement Canada's international obligations under the [*Treaty on the Non-Proliferation of Nuclear Weapons*](#)⁵¹ (NPT). Pursuant to the NPT, Canada has entered into a [*Comprehensive Safeguards Agreement*](#)⁵² and an [*Additional Protocol*](#)⁵³ (safeguards agreements) with the IAEA. The objective of these safeguards agreements

⁵¹ INFCIRC/140.

⁵² INFCIRC/164.

⁵³ INFCIRC/164/Add.1.

is for the IAEA to provide credible assurance on an annual basis to Canada and to the international community that all declared nuclear material is in peaceful, non-explosive uses and that there is no undeclared nuclear material or activity in this country.

123. [REGDOC-2.13.1, *Safeguards and Nuclear Materials Accountancy*](#)⁵⁴ 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.
124. In section 2.13 of its application, McMaster University submitted that it has a safeguards and non-proliferation program in place which complies with REGDOC-2.13.1. McMaster University provided information on its safeguards and non-proliferation activities, including nuclear accountancy and control and access and assistance to the IAEA. McMaster University reported that it provided the IAEA with the necessary access and assistance to perform the activities during the current licence term.
125. In section 3.13 of CMD 24-H100.A, CNSC staff submitted that McMaster University provided the CNSC and the IAEA with all reports and information necessary to comply with its safeguards and non-proliferation regulatory requirements, including those related to nuclear material accounting and reporting. CNSC staff reported that the IAEA performed 11 inspections and 2 complementary accesses during the current licence term. CNSC staff also performed 1 physical inventory-taking evaluation to ensure that McMaster University complied with regulatory requirements. CNSC staff reported that McMaster University provided the required access and assistance for all IAEA inspections and CNSC evaluations, and that the results of all IAEA inspections were satisfactory with 1 non-compliance identified during the licence term. CNSC staff reported that the non-compliance for late reporting was not risk significant and McMaster University took adequate corrective actions to address the root cause of this issue.
126. CNSC staff reported that 1 reportable event under paragraph 30(1)(a) of the GNSCR occurred at the McMaster Nuclear Reactor in 2023. CNSC staff specified that the event, related to the breakage of a safeguards seal, did not cause any impact to the environment, health and safety, or national and international security. CNSC staff reported that the IAEA inspected the broken seal and related nuclear material and that McMaster University took adequate corrective actions to prevent similar events from occurring.
127. The Commission concludes that McMaster University has implemented and is maintaining a satisfactory safeguards program that provides for, and will continue to provide for, the implementation of measures that are necessary for maintaining national security, and for implementing international agreements to which Canada has agreed. The Commission comes to this conclusion on the following basis:
 - McMaster University's safeguards and non-proliferation program meets regulatory requirements, including those set out in REGDOC-2.13.1

⁵⁴ REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*, CNSC, February 2018.

- McMaster University has provided the IAEA with the necessary access and assistance to perform its activities during the current licence term
- McMaster University took adequate corrective actions to address identified non-compliances

4.3.14 Packaging and Transport

128. The packaging and transport SCA covers the safe packaging and transport of nuclear substances and radiation devices to and from a licensed facility. McMaster University must adhere to the [*Packaging and Transport of Nuclear Substances Regulations, 2015*](#)⁵⁵ (PTNSR, 2015) and Transport Canada's [*Transportation of Dangerous Goods Regulations*](#)⁵⁶ (TDGR) for all shipments. These regulations apply to the packaging and transport of nuclear substances at McMaster University, including the design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage and unloading of packages.
129. In section 2.14 of its application, McMaster University provided information on its packaging and transportation program, including relevant procedures and required training. McMaster University reported that its packaging and transportation processes comply with applicable Transport Canada regulations.
130. In section 3.14 of CMD 24-H100.A, CNSC staff confirmed that McMaster University has a packaging and transport program in place to ensure that all shipments to and from its McMaster Nuclear Reactor comply with the PTNSR, 2015 and the TDGR. CNSC staff noted that McMaster reported 9 packaging and transport related events under the PTNSR, 2015 during the current licence period. CNSC staff reported that all events were reported as required by the regulations and that McMaster University implemented corrective actions and that CNSC staff assessed these as satisfactory.
131. The Commission concludes that McMaster University has an adequate program in place to meet regulatory requirements regarding packaging and transport. The Commission comes to this conclusion on the following basis:
- McMaster University has implemented a packaging and transport program that meets regulatory requirements, including the PTNSR, 2015 and the TDGR
 - McMaster University implemented corrective actions to safely package and transport radioactive materials during the current licence term

4.3.15 Conclusions on McMaster University's Performance and Safety and Control Measures at the McMaster Nuclear Reactor Facility

132. Based on its review and analysis of all of the information provided and described above, the Commission is satisfied and concludes that McMaster University is qualified to carry on the licensed activities under the proposed renewed licence. The Commission

⁵⁵ SOR/2015-145.

⁵⁶ SOR/2001-286.

finds that McMaster University has adequate programs in place with respect to the 14 SCAs to ensure that the health and safety of workers, the public and the environment will be protected over the proposed 20-year licence term. The Commission further concludes that McMaster University has measures in place to provide for the maintenance of national security and to implement international obligations to which Canada has agreed.

4.4 Indigenous Engagement and Consultation

133. The Commission considered the information provided by CNSC staff and McMaster University regarding Indigenous consultation and engagement activities in respect of this licence renewal application. Indigenous consultation refers to the common law duty to consult with Indigenous Nations and communities pursuant to section 35 of the [*Constitution Act, 1982*](#)⁵⁷.
134. The common law duty to consult with Indigenous Nations and communities is engaged when the Crown contemplates action that may adversely affect established or potential Aboriginal and/or treaty rights. The CNSC, as an agent of the Crown and as Canada's nuclear regulator, recognizes and understands the importance of building relationships and engaging with Canada's Indigenous Nations and communities. The CNSC ensures that its licensing decisions under the NSCA uphold the honour of the Crown and consider potential impacts to claimed or established Aboriginal and/or treaty rights pursuant to section 35 of the *Constitution Act, 1982*.
135. The duty to consult is engaged wherever the Crown has "knowledge, real or constructive, of the potential existence of an Aboriginal right or title and contemplates conduct that might adversely affect it."⁵⁸ Licensing decisions of the Commission, where Indigenous interests may be adversely impacted, can engage the duty to consult, and the Commission must be satisfied that it has met the duty prior to making the relevant licensing decision.

Indigenous Consultation by CNSC Staff

136. In section 4.1 of CMD 24-H100.A, CNSC staff provided the Commission with information about its consultation activities with the Indigenous Nations and communities that were identified as having a potential interest in McMaster University's licence renewal application. CNSC staff identified the following communities due to the proximity of their communities, treaty areas, and/or traditional territories and homelands to the McMaster Nuclear Reactor, or due to previously expressed interest in being kept informed:
- Mississaugas of the Credit
 - Six Nations of the Grand River
 - Métis Nation of Ontario (MNO) Region 9
 - Haudenosaunee Confederacy Chiefs Council

⁵⁷ Schedule B to the *Canada Act 1982 (UK)*, 1982, c 11.

⁵⁸ *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73 at para 35.

137. CNSC staff submitted that it advised the identified Indigenous Nations and communities of the availability of participant funding and encouraged them to participate in the regulatory review process so they could advise the Commission directly of any concerns they have in relation to this licence renewal application. CNSC staff noted that it had not been made aware of any specific concerns from Indigenous Nations and communities regarding McMaster University's application.
138. CNSC staff submitted that the licensed activities under the licence renewal application are not expected to cause any new adverse impacts to potential or established Indigenous and/or Treaty rights. CNSC staff noted its commitment to ongoing engagement and collaboration with interested Indigenous Nations and communities and reported that it would continue to provide opportunities for meaningful long-term consultation over the proposed licensing term.

Indigenous Engagement by McMaster University

139. In section 3.2 of its application, McMaster University provided information regarding its Indigenous engagement activities. McMaster University reported that it addressed all the applicable requirements stated in [REGDOC-3.2.2, *Indigenous Engagement*](#)⁵⁹. McMaster University reported that it issued an Indigenous Strategic Directions in September 2021 in response to the *Truth and Reconciliation Commission's Calls to Action* and the *United Nations Declaration on the Rights of Indigenous People*.
140. McMaster University provided information on its engagement efforts, reporting that in February 2023, it sent letters to:
- Mississauga of the Credit First Nation
 - Haudenosaunee Confederacy
 - Métis Nation of Ontario
 - Six Nations of the Grand River

McMaster University added that it held a meeting with those Indigenous Nations and communities on April 11, 2023. McMaster University submitted that it incorporated their feedback into the McMaster Nuclear Reactor's goals and actions within its Indigenous Engagement Program.

141. In section 4.1 of CMD 24-H100.A, CNSC staff noted that it verified that McMaster University has informed and engaged with the identified Indigenous Nations and communities of McMaster University's application to renew the McMaster Nuclear Reactor operating licence and reported its overall satisfaction with McMaster University engagement efforts.

Submissions by Indigenous Nations and Communities

142. The Commission did not receive any interventions from Indigenous Nations and communities.

⁵⁹ REGDOC-3.2.2, *Indigenous Engagement*, Version 1.2, CNSC, February 2022.

4.4.1 Conclusion on Indigenous Consultation and Engagement

143. The Commission concludes that its responsibility to uphold the honour of the Crown and its constitutional obligations with regard to engagement and the duty to consult respecting Indigenous interests has been satisfied. The renewal of McMaster University's Non-Power Reactor Operating Licence for the McMaster Nuclear Reactor does not include any new licensed activities that could cause new impacts on the environment or changes in the ongoing licensed activities at the McMaster University site, and therefore, will not cause any new adverse impacts to any potential or established Indigenous and/or treaty rights⁶⁰.
144. The Commission acknowledges CNSC staff's efforts in this regard on behalf of the Commission, including efforts to ensure that Indigenous Nations and communities were properly informed of the licence renewal application and that participant funding was made available to assist Indigenous Nations and communities in participating in the hearing process. The Commission is satisfied with CNSC staff's efforts to engage with Indigenous Nations and communities who may have interest in the McMaster Nuclear Reactor. The efforts made by CNSC staff in this regard are key to the important work of the Commission toward reconciliation and relationship-building with Canada's Indigenous Nations and communities. The Commission expects CNSC staff to continue to build meaningful long-term relationships with Indigenous Nations and communities as part of the CNSC's reconciliation efforts.
145. The Commission also recognizes McMaster University's commitment to continue engagement with and inclusion of Indigenous peoples in matters of mutual interest. The Commission notes McMaster University's ongoing efforts in developing its McMaster Nuclear Reactor Indigenous Engagement Program and looks forward to future updates regarding this program.

4.5 Other Matters of Regulatory Importance

4.5.1 Public Engagement

146. A public information and disclosure program (PIDP) is a regulatory requirement for licence applicants and licensed operators of Class I nuclear facilities. In section 3.1 of CMD 24-H100.1, McMaster University submitted that its PIDP⁶¹ meets the requirements of [REGDOC-3.2.1, Public Information and Disclosure](#)⁶² which sets out requirements and guidance for public information and disclosure for licensees and applicants of Class I and Class II nuclear facilities. McMaster University explained that its PIDP primary objective was to effectively communicate the information related to the health, safety, and security of people and the environment, and issues pertinent to the lifecycle of the facility that are related to the operation of the McMaster Nuclear Reactor. McMaster University added that its PIDP also serves to explain and reinforce Canada's international obligations with respect to the peaceful use of nuclear energy.

⁶⁰ *Rio Tinto Alcan v. Carrier Sekani Tribal Council*, 2010 SCC 43, at paras 45 and 49.

⁶¹ McMaster University's PIDP is available on its [website](#).

⁶² REGDOC-3.2.1, *Public Information and Disclosure*, CNSC, May 2018.

147. McMaster University highlighted that its PIDP objectives were also to promote education with respect to the McMaster Nuclear Reactor within McMaster University and the surrounding community and to inform the public about the effects that the operation of the McMaster Nuclear Reactor may have on the health and safety of the public and the environment. McMaster University added that it considers feedback from target audiences and regulators and makes updates as necessary.
148. In section 4.3 of CMD 24-H100.A, CNSC staff confirmed that McMaster University continues to meet the specifications of REGDOC-3.2.1. CNSC staff reported that McMaster University had demonstrated acceptable public communication activities related to its McMaster Nuclear Reactor. CNSC staff noted that McMaster University could further improve its PIDP by demonstrating mechanisms for audiences to provide feedback, as well as providing a summary of public or media inquiries and examples of communication products.
149. The Commission concludes that McMaster University will continue to communicate to the public information about the health, safety and security of persons and the environment and other issues related to its facility. The Commission comes to this conclusion on the following basis:
- McMaster University's PIDP meets the requirements of REGDOC-3.2.1
 - McMaster University met its public disclosure and reporting obligations throughout the current licence term

4.5.2 *Decommissioning Plans and Financial Guarantee*

150. The NSCA and associated Regulations require licensees to make adequate provision for the safe decommissioning of their facilities and long-term management of waste produced during the facilities' lifespan. In order to ensure that adequate resources are available for the safe and secure future decommissioning of the McMaster Nuclear Reactor, the Commission requires that an adequate financial guarantee for the realization of planned activities be implemented and maintained in a form acceptable to the Commission throughout the licence period.
151. In section 3.4 of its application, McMaster University reported that its financial guarantee for its McMaster Nuclear Reactor was reviewed and accepted by the Commission in 2017⁶³. McMaster University reported that it continues to maintain its Nuclear Reactor Restricted Reserve Fund and provides an annual independent assessment of the fair market value of the fund to the CNSC as required. McMaster University specified that its financial guarantee instruments include a *Deed of Trust* and a *Financial Security and Access Agreement with the CNSC*.
152. In section 5.2 of CMD 24-H100.A, CNSC staff specified that McMaster University proposed a revised financial guarantee in the amount of \$19.25 million. CNSC staff confirmed that McMaster University's revised financial guarantee is sufficient to fund

⁶³ Record of Decision, *Financial guarantee for the Future Decommissioning of the McMaster Nuclear Reactor Located in Hamilton, Ontario*, January 2017.

McMaster University's decommissioning obligations and that it meets the requirements of [REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities*](#)⁶⁴ which sets out requirements and guidance for the establishment and maintenance of funding for the decommissioning of facilities and termination of activities. That is, the financial instruments, a *Deed of Trust* and a *Financial Security and Access Agreement with the CNSC*, meet the criteria of liquidity, certainty of value, adequacy of value and continuity specified in REGDOC-3.3.1.

153. The Commission concludes that McMaster University's revised PDP provide credible cost estimates for the future decommissioning of its McMaster Nuclear Reactor, and that the financial guarantee instruments consisting of a combination of a *Deed of Trust* and a *Financial Security and Access Agreement with the CNSC* are acceptable. The Commission accepts McMaster University's proposed revised financial guarantee for its McMaster Nuclear Reactor in the amount of \$19.25 million.

4.5.3 Cost Recovery

154. Paragraph 24(2)(c) of the NSCA requires that a licence application be accompanied by the prescribed fee, as set out by the [Canadian Nuclear Safety Commission Cost Recovery Fees Regulations](#)⁶⁵ (CRFR), and based on the activities to be licensed.
155. In section 5.1 of CMD 24-H100.A, CNSC staff reported that McMaster University, as an academic institution, is exempt under section 2 of the CRFR:

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)

The Commission is satisfied that McMaster University is exempt under the CRFR and is not required to pay any cost recovery fees.

4.5.4 Nuclear Liability Insurance

156. In section 5.4 of CMD 24-H100.A, CNSC staff reported that the McMaster Nuclear Reactor is identified as a nuclear installation in Schedule 2 of the [Nuclear Liability Compensation Regulations](#)⁶⁶ and that McMaster University is required to maintain valid insurance for the liability amount defined in those regulations, in accordance with the [Nuclear Liability and Compensation Act](#)⁶⁷ (NLCA). While this statutory requirement is not administered by the CNSC but by Natural Resources Canada, the

⁶⁴ REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities*, CNSC, January 2021.

⁶⁵ SOR/2003-212.

⁶⁶ SOR/2016-88.

⁶⁷ S.C. 2015, c. 4, s. 120.

nuclear regulator maintains awareness of NLCA compliance, where its licensees are designated nuclear installations.

157. CNSC staff reported that McMaster University complies with its nuclear liability insurance obligations. CNSC staff added that as part of McMaster University application for a licence renewal, McMaster University submitted a certificate of nuclear liability insurance, and a proof of payment for the Indemnity Fees in accordance with the NLCA to the Department of Natural Resources.
158. The Commission concludes that McMaster University continues to satisfy the requirements for the maintenance of nuclear liability insurance under the NLCA.

4.6 Licence Length and Conditions

159. The Commission considered McMaster University's revised application to renew its licence for a period of 20 years. McMaster University's current licence, NPROL-01.00/2024, is valid until June 30, 2024. McMaster University is not requesting any changes to its licensed activities.

4.6.1 Licence Length

160. McMaster University applied for the renewal of its licence for a 20-year term. In its application, McMaster University submitted that it is qualified to continue to safely carry out the licensed activities for the proposed 20-year licence term:
 - Over the current licence period, McMaster University has operated the McMaster Nuclear Reactor safely, securely, effectively and in compliance with all required regulations
 - McMaster University made consistent improvement in all SCAs over the licence period

McMaster University further submitted that it has demonstrated that it is qualified to carry out the licensed activities under its current NPROL, and that it continues provide for the protection of the environment, the health and safety of workers and the general public and has measures in place to continue to implement the international obligations to which Canada has agreed in regard to safeguarding nuclear materials.

161. CNSC staff recommended the renewal of McMaster University's licence for a period of 20 years, until June 30, 2044. CNSC staff submitted that the CNSC's regulatory approach is effective and can provide appropriate regulatory oversight for McMaster University for any licence period. CNSC staff reported that it assessed McMaster University's request for a 20-year licence term against the criteria from CMD 02-M12, *New Staff Approach to Recommending Licence Periods*⁶⁸ and found that a 20-year licence period is reasonable based on those criteria. In Table 5.2 of CMD 24-H100.A,

⁶⁸ CMD 02-M12, *New Staff Approach to Recommending Licence Periods*, CNSC, 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.

CNSC staff reported that McMaster University meets the criteria because:

- McMaster University's operations of its McMaster Nuclear Reactor have been stable and consistent
- The hazards associated with the licensed activity are well characterized and their impacts well predicted, and they are within the scope considered in the environmental safety case
- McMaster University has in place a management system to provide assurance that its safety-related activities are effective and maintained, and to manage changes within the licensing basis
- Effective compliance programs are in place on the part of both the McMaster University and the CNSC
- McMaster University has shown a consistent and good history of operating experience and compliance in carrying on the licensed activity

162. CNSC staff reported that it also reviewed other considerations before recommending a 20-year licence period, including:

- International approaches to research reactor licensing
- The CNSC's regulatory oversight framework
- The capacity for ongoing communication and engagement during the licence term
- Commission engagement opportunities

CNSC staff noted that its assessment identified no concerns with the 20-year term that McMaster requested.

163. CNSC staff recommended that, should the Commission renew the licence for a 20-year period, McMaster University provides a comprehensive performance update to the Commission at the midpoint of the licence period. CNSC staff noted that this update would also provides an opportunity for the public and Indigenous Nations and communities to provide their views on the McMaster Nuclear Reactor directly to the Commission.

164. In consideration of the submission by D. Winfield ([CMD 24-H100.9](#)), the Commission sought information from CNSC staff regarding the objective of and expectations for mid-term performance updates. CNSC staff responded that the objective of the mid-term update is for the licensee to provide performance-related information and other information of interest to the Commission, the public and Indigenous Nations and communities. CNSC staff added that guidance from CNSC staff has typically been provided to the licensee specific to the facility in question leading up to the midterm and that the content and format of mid-term updates will continue to evolve over time.

4.6.2 Licence Conditions

165. In Part 2 of CMD 24-H100.A, CNSC staff provided a proposed draft licence. CNSC staff explained that the proposed licence had been updated to a format that incorporates the CNSC's standardized licence conditions applicable to McMaster University's Non-Power Reactor Operating Licence, without introducing substantive changes.

4.6.3 *Delegation of Authority*

166. In order to provide adequate regulatory oversight of changes that do not require a licence amendment nor Commission approval, CNSC staff recommended that the Commission delegate authority for certain approval or consent, as contemplated in licence conditions that contain the phrase “a person authorized by the Commission.” In section 5.5 of CMD 24-H100.A, CNSC staff recommended that the Commission delegate authority for licence condition 3.2 (“The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission”) to the following CNSC 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
167. The Commission delegates its authority for the purposes of licence condition 3.2, to the above CNSC staff as recommended. The Commission notes that the delegation of authority of the identified licence condition is for the purpose of the administration of that licence condition. The Commission is satisfied that this approach is reasonable.

4.6.4 *Conclusion on Licence Length and Conditions*

168. The Commission concludes that a 20-year licence term, with a comprehensive performance update to the Commission at the midpoint of the licence period, with public participation, is appropriate. The Commission’s decision is based on the following:
- The Commission agrees with CNSC staff’s assessment of McMaster University’s application against the criteria set out in Table 2 of CMD 24-H100.A
 - McMaster University has successfully characterized and mitigated hazards associated with the operation of its McMaster Nuclear Reactor to ensure the protection of the health and safety of persons and the environment
 - McMaster University has an effective management system in place that meets the requirements of CSA N286-12
 - McMaster University has effective compliance programs in place to ensure that facility operations remain in compliance with the licensing basis
 - the CNSC has effective compliance verification programs in place to ensure that facility operations remain in compliance with the licensing basis

The Commission is satisfied that McMaster University has a good history of operating experience, noting that CNSC staff have rated McMaster University as “satisfactory” in all 14 SCAs, McMaster University has maintained worker dose and public dose well below regulatory requirements, and McMaster University has not reported any lost-time injuries.

169. The Commission notes that CNSC staff’s, as well as the Commission’s, oversight of licensed activities is independent of the length of a licence and is based on a robust regulatory framework. The licence / LCH structure is well-crafted to contemplate

continuous improvement within the licensing basis over time. The Commission is satisfied that, under this structure, McMaster University's programs will continue to be adequately maintained over the 20-year licence period. The Commission also notes that, as per subsection 43(3) of the NSCA, it may at any time, on its own initiative, redetermine any decision or order made by it. As such, the Commission is satisfied that the longer licence term does not in any way affect or impair the robust regulatory oversight that the NSCA both enables and mandates.

170. The Commission is of the opinion that providing opportunities to hear from communities, for intervenors to voice their views and for the Commission to hear them is very important to nurture and maintain a dialogue with members of the public and Indigenous Nations and communities. It is the Commission's view that a public proceeding at the midpoint of the 20-year licence can provide such an opportunity. This public proceeding should occur no later than December 2034 and will allow the opportunity for participation to members of the public and Indigenous Nations and communities. The mid-term update shall include an overview of the aging management and fitness-for-service of the McMaster Nuclear Reactor, as well as on McMaster University's McMaster Nuclear Reactor Indigenous Engagement Program. The Commission notes that the periodic RORs will also provide the opportunity for ongoing public participation throughout the licence term.
171. The Commission also accepts CNSC staff's recommendation regarding the delegation of authority for the purpose of licence condition 3.2.

5.0 CONCLUSION

172. The Commission has considered McMaster University's licence renewal application for its Non-Power Reactor Operating Licence for the McMaster Nuclear Reactor. The Commission has considered the information and submissions of McMaster University, CNSC staff, and all participants, as set out in the material available for reference on the record.
173. Based on its consideration of the evidence on the record of this hearing, the Commission, pursuant to section 24 of the *Nuclear Safety and Control Act*, renews the Non-Power Reactor Operating Licence issued to McMaster University for its McMaster Nuclear Reactor located at the McMaster University Campus, in Hamilton, Ontario. The renewed licence, NPROL-01.00/2044, is valid from July 1, 2024 until June 30, 2044. The Commission directs that, at the midpoint of the 20-year licence period, McMaster University shall present to the Commission a comprehensive midterm update on the conduct of its licensed activities and compliance with requirements, as part of a public Commission proceeding that allows for interventions.



Marcel Lacroix
Presiding Member



Date

Appendix A – Intervenors

Intervenors – Written submissions	Document Number
Bureau Veritas	CMD 24-H100.2
Williams College	CMD 24-H100.3
Activation Laboratories Ltd.	CMD 24-H100.4
Applus+ NRA Y Services	CMD 24-H100.5
Isologic Innovative Radiopharmaceuticals	CMD 24-H100.6
AtomVie Global Radiopharma	CMD 24-H100.7
Canadian Light Source	CMD 24-H100.8
David Winfield	CMD 24-H100.9
Canadian Nuclear Laboratories	CMD 24-H100.10
CANDU Owners Group Inc.	CMD 24-H100.11
Bruce Power	CMD 24-H100.12
Neutrons Canada	CMD 24-H100.13
Canadian Nuclear Isotope Council	CMD 24-H100.14
Paul Sedran, RESD Inc.	CMD 24-H100.15
Ontario Power Generation	CMD 24-H100.16
Michael LaFontaine	CMD 24-H100.17
TRIUMF	CMD 24-H100.18