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CMD: 22-H8

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A Licence Renewal

Un renouvellement de permis

**SRB Technologies  
(Canada) Inc.**

**SRB Technologies  
(Canada) Inc.**

**Application to Renew Licence for  
the SRBT Facility**

**Demande de renouvellement de  
permis pour l'installation de SRBT**

Commission Public Hearing

Audience publique de la Commission

Scheduled for:

April 13 to 14, 2022

Prévue les :

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Submitted by:

CNSC Staff

Soumise par :

Le personnel de la CCSN

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**Summary**

This CMD presents information about the following matters of regulatory interest with respect to SRB Technologies (Canada) Inc.'s:

- request to renew SRBT's Class IB nuclear substance processing facility operating licence (NSPFOL-13.00/2022) for a period of 15 years

CNSC staff recommend the Commission take the following actions:

- renew the nuclear substance processing facility licence to authorize SRBT to operate its facility until June 30, 2037
- authorize the delegation of authority as set out in section 5.8 of this CMD

The following items are attached:

- the proposed licence NSPFL-13.00/2037
- the draft licence conditions handbook
- the current licence NSPFOL-13.00/2022

**Résumé**

Ce CMD présente de l'information sur un ensemble de questions d'ordre réglementaire concernant SRB Technologies (Canada) Inc. (SRBT) :

- Demande de renouvellement du permis d'exploitation de l'installation de traitement des substances nucléaires de catégorie IB (NSPFOL-13.00/2022) de SRBT pendant une période de 15 ans

La Commission pourrait considérer prendre les mesures suivantes :

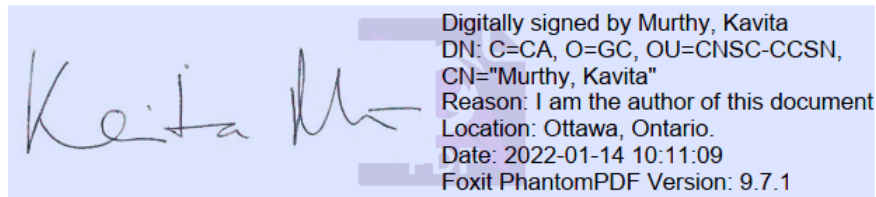
- Renouveler le permis d'installation de traitement des substances nucléaires afin d'autoriser SRBT à exploiter son installation jusqu'au 30 juin 2037
- Autoriser la délégation de pouvoirs prévue dans la section 5.8 du présent CMD

Les pièces suivantes sont jointes :

- le permis proposé, NSPFL-13.00/2037
- l'ébauche du manuel des conditions de permis
- le permis actuel, NSPFOL-13.00/2022

**Signed/signé le**

14 January 2022 / 14 janvier 2022



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Kavita Murthy

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## EXECUTIVE SUMMARY

SRB Technologies (Canada) Inc. (SRBT) operates a gaseous tritium processing facility in Pembroke, Ontario. The facility is approximately 150 kilometres northwest of Ottawa and is situated close to the traditional homelands and treaty territories of many Indigenous Nations and communities, including the Algonquin Anishinabeg Nation Tribal Council, Kitigan Zibi Anishinabeg, Kebaowek First Nation, the Algonquins of Ontario, the Algonquins of Pikwàkanagàn First Nation, and the Métis Nation of Ontario.

This facility has been in operation since 1990. It processes tritium gas to produce light sources and manufactures radiation devices.

Pursuant to subsection 24(2) of the [Nuclear Safety and Control Act \(NSCA\)](#), the Commission renewed SRBT's operating licence in June 2015 for a 7-year term that began on July 1, 2015, and will expire on June 30, 2022.

Since 2012, CNSC staff have presented the licensee's compliance performance to the Commission in annual [regulatory oversight reports for uranium and nuclear substance processing facilities](#).

In June 2021, SRBT applied to the CNSC for the renewal of its operating licence. In its application, SRBT requested a 15-year licence to continue operating the SRBT facility with no changes to the authorized activities.

The purpose of this Commission member document (CMD) is to provide comprehensive information on CNSC staff's assessments performed during the current SRBT licence period and to present the rationale for conclusions and recommendations, in order to inform the Commission decision on SRBT's request to renew its operating licence.

This CMD has 2 parts. Part 1 presents CNSC staff's assessment, conclusions and recommendations in respect of SRBT's licence application. CNSC staff have evaluated the licensee's compliance with the requirements of the NSCA and its regulations.

This CMD provides information on CNSC staff's review, with focused highlights on:

- environmental protection reviews (EPRs)
- relevant safety and control areas (SCAs)
- other matters of regulatory interest

CNSC staff's assessment of the licensee's regulatory performance concludes that:

- the environmental and radiological risks remain low
- effluent quality and radiation doses are effectively controlled and kept well below regulatory limits
- SRBT's performance in the conventional health and safety SCA demonstrates that hazards and risks are managed and that activities are conducted safely



Therefore, CNSC staff conclude that the licensee's performance during the licensing term was satisfactory and met regulatory requirements.

CNSC staff recommend that the Commission take the following actions:

1. renew SRBT's nuclear substance processing facility licence for the SRBT facility for a period of 15-years effective July 1, 2022 to June 30, 2037
2. accept the delegation of authority to CNSC staff as set out in section 5.8 of this CMD

Part 2 of this CMD provides licensing-related documentation pertaining to this hearing, such as proposed licence changes, the proposed licence and the current licence. A draft licence conditions handbook is also included for information purposes only.

Referenced documents in this CMD are available to the public on request.

## PART ONE

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

Part One includes:

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

Part Two provides all available information pertaining directly to the current and proposed licence.

## 1. OVERVIEW

### 1.1 Background

SRB Technologies (Canada) Incorporated (SRBT) is a gaseous tritium light source manufacturing facility located in Pembroke, Ontario, approximately 150 km northwest of Ottawa. This facility is situated in proximity of the traditional and treaty territories of many Indigenous Nations and communities, including:

- Algonquin Anishinabeg Nation Tribal Council
- Kitigan Zibi Anishinabeg First Nation
- Kebaowek First Nation
- The Algonquins of Ontario
- Algonquins of Pikwakanagan First Nation
- The Métis Nation of Ontario

The facility has been in operation since 1990. It processes tritium gas to produce gaseous tritium light sources (GTLS) and manufactures radiation devices containing the GTLS, such as the sign shown in figure 1-1 below. Both the GTLS and the radiation devices are distributed in Canada and internationally.

**Figure 1-1: Example of a GTLS produced by SRBT**



SRBT is located in an industrial park in the southern part of the city of Pembroke (figure 1-2). The area surrounding SRBT is mainly used for industrial and commercial purposes. The closest residences are located in a small residential area approximately 250 metres to the west and north-west of the facility.

The facility is leased space in an industrial building, occupying approximately 1,400 m<sup>2</sup> of floor space. The licensed facility is defined by the outer walls of the leased space and also includes a fenced area behind the building that encloses the ventilation stacks.

**Figure 1-2: Aerial view of SRBT**



## 1.2 Highlights

### SRBT's Licence Application Request

The current Nuclear Substance Processing Facility Operating Licence, NSPFOL-13.00/2022, expires on June 30, 2022.

In June 2021, SRBT submitted an application [1] for the renewal of the Class IB Nuclear Substance Processing Facility Operating Licence NSPFOL-13.00/2022 for the SRBT facility for a term of 15 years with no changes to the authorized activities. The requested licence period is from July 1, 2022 to June 30, 2037.

SRBT's licence allows it to:

- operate a Class IB facility, comprising of a tritium processing facility for the purposes of manufacturing radiation devices
- produce, possess, transfer, service and use, radiation devices arising from the manufacturing of radiation devices
- possess, transfer, use, process, manage, store and dispose of nuclear substances that are required for, associated with, or arise from the manufacturing of radiation devices
- possess tritium up to a limit of 6000 terabecquerels of tritium in any form
- possess and use prescribed information that is required for, associated with, or arise from the manufacturing of radiation devices

This CMD provides information on CNSC staff's review with focused highlights on:

- Environmental Protection Reviews (EPRs)
- Relevant Safety and Control Areas (SCAs)
- Other Matters of Regulatory Interest

CNSC staff assessed SRBT's renewal application with the requested authorization to operate the SRBT facility and determined that the application complies with regulatory requirements. This assessment evaluated SRBT's programs and past performance to assist the Commission in determining whether it is qualified and capable of performing the activities to be authorized by the Commission.

CNSC staff concluded that SRBT's renewal application contains sufficient information to demonstrate that programs are in place to meet CNSC's regulatory requirements. CNSC staff assessment is documented in sections 2, 3, 4 and Appendix C of this CMD.

Based on CNSC staff's assessments of SRBT's past performance and of the licence application, CNSC staff determined that SRBT is qualified and capable of performing the activities authorized the licence.

CNSC's regulatory framework includes a standardized licence and licence Conditions Handbook (LCH), which provides requirements for effective regulatory oversight of this facility. This includes aspects such as the periodic review every 5 years of the safety analysis report and the environmental risk assessment, and continuous improvement through updates to SRBT programs to comply with updated regulatory requirements.

SRBT is required by its licence to report on its compliance performance annually through its [Annual Compliance and Performance Report](#) including changes to its operations. CNSC staff's rationale for recommending the requested licence period is discussed in more detail in Part Two of this CMD under "Proposed Licence Changes".

### 1.3 Overall Conclusions

CNSC staff have reviewed SRBT's licence renewal application and supporting documents and CNSC staff's assessment determined that the application complies with the regulatory requirements and concluded that SRBT's performance during the licensing term was satisfactory and met regulatory requirements

## 1.4 Overall Recommendations

CNSC staff recommend that the Commission:

1. Renew the Nuclear Substance Processing Facility Licence NSPFOL-13.00/2022, renamed NSPFL-13.00/2037 for a 15-year period.
2. Delegate authority to CNSC staff as outlined in section 5.8 of this CMD.

## 2. MATTERS FOR CONSIDERATION

### 2.1 Environmental Review

CNSC staff reviewed the licence application to determine what type of environmental review was required to be conducted, if applicable. CNSC staff determined that the Impact Assessment Act (IAA) does not apply because the proposed activities are not captured in the IAA's Physical Activities Regulations nor are they considered a project on federal lands.

CNSC staff conduct Environmental Protection Reviews (EPRs) for all licence applications with potential environmental interactions, in accordance with CNSC's mandate under section 9 of the NSCA to regulate the production, possession and use of nuclear substances in order to prevent unreasonable risk to the environment. The EPRs inform the Commission's conclusion on whether the proposal provides adequate protection of the environment and the health of people.

An EPR was conducted for this licence application. CNSC staff's assessment included a review of the licence application, past environmental performance and supporting documents, such as the Environmental Risk Assessment, Annual Compliance Monitoring Reports, and the Preliminary Decommissioning Plan. The EPR Report, which contains the results of this assessment, including a summary of past environmental assessments for the SRBT facility, can be found in Appendix E of this CMD. The EPR report for the SRBT facility is also available on the [CNSC's website](#).

CNSC staff concluded that the information provided by SRBT regarding environmental protection is sufficient to meet the applicable regulatory requirements under the NSCA and associated Regulations for the licence renewal.

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

### 2.2 Relevant Safety and Control Areas (SCAs)

The functional areas of any licensed facility or activity consist of a standard set of safety and control areas (SCAs). Each SCA is comprised of "specific areas" of regulatory interest; however, the specific areas associated with each SCA vary between facility types. See Addendum D, "Safety and Control Area Framework", for further information about SCAs.

Table 1 presents the SCAs relevant to the SRBT licence renewal and CNSC staff's overall rating for the current licence period. In the following table:

1. The risk-ranking column indicates the overall level of risk associated with each SCA at SRBT (see Addendum A, "Risk Ranking").
2. The relevance of each SCA to this CMD is indicated.
3. The rating level for each relevant SCA indicates the overall compliance with regulatory requirements for implementation (see Addendum B, "Rating Levels").

**Table 1: SCAs relevant to the SRBT licence renewal and CNSC staff's overall rating for the licence period, 2015 –20**

| Functional Area               | Safety and Control Area                  | Risk Ranking | Relevant to this CMD? | Rating Level |
|-------------------------------|--|--------------|-----------------------|--------------|
| <b>Management</b>             | Management System                        | M            | YES                   | SA           |
|                               | Human Performance Management             | L            | YES                   | SA           |
|                               | Operating Performance                    | M            | YES                   | SA           |
| <b>Facility and Equipment</b> | Safety Analysis                          | L            | YES                   | SA           |
|                               | Physical Design                          | L            | YES                   | SA           |
|                               | Fitness for Service                      | M            | YES                   | SA           |
| <b>Core Control Processes</b> | Radiation Protection                     | M            | YES                   | SA           |
|                               | Conventional Health and Safety           | L            | YES                   | SA           |
|                               | Environmental Protection                 | M            | YES                   | SA           |
|                               | Emergency Management and Fire Protection | L            | YES                   | SA           |
|                               | Waste Management                         | L            | YES                   | SA           |
|                               | Security                                 | L            | YES                   | SA           |
|                               | Safeguards and Non-Proliferation         | L            | NO                    | N/A*         |
|                               | Packaging and Transport                  | L            | YES                   | SA           |

\* There are no safeguard verification activities associated with this facility.

## 2.3 Other Matters of Regulatory Interest

Table 2 identifies other matters that are relevant to this CMD.

**Table 2: Other matters relevant to this CMD**

| OTHER MATTERS OF REGULATORY INTEREST                |                       |
|---|-----------------------|
| Area  | Relevant to this CMD? |
| Public Engagement                                   | Yes                   |
| Cost Recovery                                       | Yes                   |
| Financial Guarantees                                | Yes                   |
| Improvement Plans and Significant Future Activities | Yes                   |
| Licensee's Public Information Program               | Yes                   |
| Nuclear Liability Insurance                         | No                    |

The relevant “other matters” of regulatory interest are discussed in section 5. In addition, a stand-alone section on Indigenous consultation and engagement is provided in section 4.

## 2.4 Regulatory and Technical Basis

The SRBT facility is classified as a Class IB facility under the NSCA. For this type of facility, the key regulatory requirements are set out in the NSCA and associated regulations, including the [Class I Nuclear Facilities Regulations](#) (CINFR) and the [General Nuclear Safety and Control Regulations](#) (GNSCR).

Further information, regarding the regulatory and technical basis for the matters under consideration in this CMD, is provided in Appendix C of this CMD.

## 3. GENERAL ASSESSMENT OF SCAS

The specific areas that comprise the SCAs for this facility or activity type are identified in Addendum D, section D.2. If specific areas are not listed for a given SCA in section 3, then a decision has been made to encompass them in an overall approach to that SCA. Table 3 lists the CNSC inspections conducted at the SRBT facility during the current licence period.



### 3.1 Management System

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

This CMD covers the following specific areas of Management System include:

- management system and organization
- performance assessment, improvement, and management review
- change and record management
- management of contractors
- safety culture

#### 3.1.1 Trends

The following table indicates the overall rating for the management system over the current licensing period:

| MANAGEMENT SYSTEM  |      |      |      |      |      |
|--|------|------|------|------|------|
| Overall Compliance Ratings   |      |      |      |      |      |
| 2015   | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA   | SA   | SA   | SA   | SA   | SA   |
| <p style="text-align: center;"><b>Comments</b></p> <p>SRBT has implemented a management system that complies with the CNSC licence conditions and meets the requirements of Canadian Standards Association (CSA) standard N286-12, <i>Management System Requirements for Nuclear Facilities</i> (CSA N286-12).</p> <p>CNSC staff monitor implementation of the management system at SRBT through compliance verification activities, which include desktop reviews and inspections. The management system SCA at SRBT met applicable CNSC requirements and received a “satisfactory” rating during the licence period.</p> |      |      |      |      |      |

#### 3.1.2 Discussion

SRBT is required by the CNSC to implement and maintain a management system that meets the requirements of CSA N286-12. SRBT has adopted the CSA N286-12 requirements and revised their quality assurance program to meet the new requirement in December 2016.

CNSC staff assessed SRBT's revised management system against the CSA N286-12 requirements in March 2017. One notice of non-compliance and 2 recommendations were issued based on the inspection findings. However, CNSC staff concluded that SRBT's management system meets the CSA N286-12 standard and is compliant with regulatory requirements. The enforcement action issued after the inspection in 2017 is now closed to the CNSC's satisfaction.

As part of the CNSC's ongoing compliance verification process, CNSC staff conducted an inspection of SRBT's management system in August 2021 to verify on-going alignment with the CSA N286-12 requirements. The inspection issued 1 notice of non-compliance and identified 5 recommendations. CNSC staff concluded that SRBT has implemented a management system according to CSA N286-12 standards and meets regulatory requirements.

CNSC staff will continue to monitor performance through regulatory oversight activities pertaining to this SCA over the next compliance cycle to ensure continued compliance with regulatory requirements.

### **3.1.3 Summary**

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

#### **3.1.3.1 Past Performance**

##### **Management System and Organization**

CNSC staff's review concluded that SRBT has implemented a management system according to requirements of N286-12 that meets regulatory requirements. CNSC staff regularly assess SRBT documents and programs through desktop reviews and planned inspections to verify compliance.

Onsite and remote verification activities conducted by CNSC staff included an assessment of performance in the management system SCA by verifying licensee documents and programs through desktop reviews and compliance verification inspections. The specific areas assessed within the management system include organization, planning and controlling business activities, resource management, communication, change management, information management, work management, problem identification and resolution, performance assessment, improvement and management review

CNSC staff concluded that findings from the inspections in 2017 and 2021 were of low safety significance, and have been closed to CNSC staff's satisfaction.

CNSC staff compliance verification conducted during the current licence period concluded SRBT has implemented a framework of processes and programs, and organizational structure with assigned resources, responsibilities and authorities to achieve its safety objectives in compliance with regulatory requirements.

### **Performance Assessment, Improvements and Management Review**

SRBT's top management conducts annual management reviews, which include analyzing performance of the previous year against its set objectives and plans, compliance with standards and regulatory requirements, as well as effectiveness of SRBT's management system. CNSC staff assessed records of management reviews completed and found them adequate and effective.

SRBT management appointed dedicated staff for conducting internal assessments to confirm staff are following documented processes, and to identify any opportunities to improve effectiveness of licensed activities and associated documentation. Findings are reported to the top management as part of the management reviews. Resulting actions are tracked through a database.

CNSC staff compliance verification conducted during the current licence period concluded assessments, management reviews, and identification and implementation of improvements are adequate and meet regulatory requirements.

### **Change Management and Record Management**

Changes to organization structure, facility layout, processes and process documentation, engineering drawings and equipment are documented, justified, reviewed and approved before implementation. Project plans and charters include guidance for assessing risk and hazards related to safety significant changes.

SRBT's records management process includes the development, validation, approval of documents and the tracking of associated changes. CNSC staff confirmed that documents are available at the point of use. Controls such as internal audit are in effect to remove outdated or expired documents from point of use.

CNSC staff compliance verification conducted during the current licence period concluded that change control and record management practices at the SRBT are adequate and meet regulatory requirements.

### **Management of Contractors**

SRBT's contractor management program ensures that contractors employed are competent to do the work, adhere to organizational policies, regulatory requirements, technical and quality requirements, and work procedures.

CNSC staff review concluded that contractor management program and work processes are in place at the SRBT to control and verify activities performed by contractors.

CNSC staff compliance verification conducted during the current licence period concluded that the contractor management program and processes in effect at the SRBT are adequate and meet regulatory requirements.

## Safety Culture

SRBT has performed a gap analysis against [REGDOC-2.1.2, Safety Culture](#) and indicated that its commitment to fostering safety culture is fully described within key management system documents, such as the Quality Policy, the Quality Manual [3], and Safety Culture Monitoring Process [4]. SRBT assesses and monitors the safety culture through different avenues, such as Safety Culture Committee, Safety Culture Review, and Safety Culture Surveys.

### 3.1.3.2 Regulatory Focus

CNSC staff will continue to monitor SRBT's performance in this SCA, through regulatory oversight activities, with focus on compliance with the CSA N286-12 standard.

### 3.1.3.3 Proposed Improvements

No improvements within this SCA are proposed.

### 3.1.4 Conclusion

CNSC staff conclude that SRBT demonstrates continued commitment to maintaining and improving its management system in accordance with regulatory requirements.

Based on CNSC staff assessments of SRBT's licence renewal application, supporting documents and performance, CNSC staff concluded that SRBT has implemented appropriate measures and programs to meet CNSC expectations. CNSC staff will continue to monitor SRBT's performance through regulatory oversight activities pertaining to this management system SCA.

### 3.1.5 Recommendation

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

## 3.2 Human Performance Management

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

This CMD covers the following specific areas of human performance management:

- personnel training
- human performance program
- work organization and job design
- fitness for duty

### 3.2.1 Trends

The following table indicates the overall rating for the human performance management SCA over the current licensing period:

| HUMAN PERFORMANCE MANAGEMENT  |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA  | SA   | SA   | SA   | SA   | SA   |
| <p style="text-align: center;"><b>Comments</b></p> <p>SRBT has implemented and maintains a Systematic Approach to Training (SAT) based training system and program. The satisfactory trend for this SCA has remained stable across the SRBT facility over the licensing period. SRBT has ensured that the training programs have been updated and improved over the course of the current licensing period.</p> |      |      |      |      |      |

### 3.2.2 Discussion

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

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

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

#### Personnel Training

As part of its licensing basis, the licensee is required to implement and maintain training programs for workers in accordance with the requirements set out in [REGDOC-2.2.2 Personnel Training](#). SRBT maintains training governance documentation that addresses regulatory training and qualification requirements, including processes for implementing the various phases of a SAT in accordance with the requirements of [REGDOC-2.2.2 Personnel Training](#).

Overall, SRBT has provided a robust methodology to assure and continue to assure that staff are qualified to perform their duties safely. CNSC staff concluded that SRBT is performing satisfactorily with respect to this SCA.

## **Human Performance Program**

SRBT implemented 3 key processes: Change Control, Continual Improvement and Corrective Action to encourage staff to continuously assess and identify any area where changes, improvements or corrective actions may be needed in all aspects of their work, and ensure that their findings are raised with the appropriate member of the organization as part of these processes. CNSC staff confirmed that SRBT did not report any safety-significant events that had a root cause in human performance throughout the current licence term.

## **Work Organization and Job Design**

SRBT's manufacturing process does not require any processes that require the maintenance of a minimum shift complement. All of the tritium processing operations are performed only when qualified staff members are available. All members of normal operations are assigned to fulfill a role on the Emergency Response Organization and are trained to respond to an emergency situation. In order to maintain production capacity while reducing the number of workers in any given area during COVID-19, SRBT instituted a limited night shift of workers as a work scheduling adjustment.

## **Fitness for Duty**

SRBT indicated that tritium processing operations only take place between the hours of 7am to 7pm and qualified workers must be present to perform tritium processing operations. CNSC staff confirmed that SRBT has health and safety procedures for fitness for duty, which require all employees to work in a safe and productive manner, and not impaired by drugs or alcohol.

### **3.2.3 Summary**

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

#### **3.2.3.1 Past Performance**

##### **Personnel Training**

Since April 2015, SRBT has implemented and maintained a SAT-based training system and program to provide assurance that staff are qualified to perform their duties safely.

SRBT maintains training governance documentation that address regulatory training and qualification requirements, including processes for implementing the various phases of a SAT in accordance with the requirements of REGDOC-2.2.2 *Personnel Training*.

During the current licensing period, CNSC staff conducted 2 inspections focused on the training program at SRBT in 2015 and 2020, as noted in table 3. Stemming from the 2 aforementioned inspections at SRBT, 7 notices of non-compliance pertaining to: training documentation, trainer qualification, training change management including the implementation of a training needs analysis process, training evaluation and refresher training of infrequent tasks were issued. CNSC staff verified that, SRBT staff implemented suitable corrective actions to address the deficiencies identified. All notices of non-compliance have been closed in an effective and timely manner.

There are no open compliance actions pertaining to this SCA. CNSC staff continue to monitor personnel training at SRBT through general and specialist supported inspections, document reviews, as well as annual compliance reports.

SRBT has strengthened the training program [5] over the licensing period, including improvement in the definition of the positions and activities to which a SAT applies and the incorporation of a Training Needs Analysis tool into the training program.

Overall, SRBT has provided a robust methodology to assure and continue to assure that staff are qualified to perform their duties safely. CNSC staff concluded that SRBT is performing satisfactorily with respect to this SCA.

### **3.2.3.2 Regulatory Focus**

CNSC staff will continue to monitor and evaluate SRBT's compliance with regulatory requirements through regulatory oversight activities including inspections, review of compliance reports, and revisions to relevant program documentation.

### **3.2.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

## **3.2.4 Conclusion**

Overall, SRBT has strengthened the training program over the licensing period and provided a robust methodology to assure and continue to assure that staff are qualified to perform their duties safely. CNSC staff conclude that SRBT is performing satisfactorily with respect to this SCA.

## **3.2.5 Recommendation**

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 2.1 requires the licensee to implement and maintain a training program. Compliance verification criteria for this licence condition are included in the draft LCH.

### 3.3 Operating Performance

The operating performance SCA includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.

This CMD covers the following specific areas of operating performance:

- conduct of licensed activity
- procedures
- reporting and trending

#### 3.3.1 Trends

The following table indicates the overall rating for the operating performance SCA over the current licensing period:

| OPERATING PERFORMANCE  |      |      |      |      |      |
|--|------|------|------|------|------|
| Overall Compliance Ratings   |      |      |      |      |      |
| 2015   | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA   | SA   | SA   | SA   | SA   | SA   |
| <b>Comments</b>  |      |      |      |      |      |
| The licensee has maintained an operating program in accordance with CNSC requirements during this licence period. SRBT continues to be rated SA in this SCA. |      |      |      |      |      |

#### 3.3.2 Discussion

SRBT is required by its licence to implement and maintain an operating program, which includes a set of operating limits, and to maintain a program for reporting to the Commission or an authorized person. The CNSC ensures that SRBT has policies, programs, methods and procedures in place for the safe operation and maintenance of its licensed nuclear facilities. The occupational and industrial safety aspects of SRBT's operations are regulated under the [Canada Labour Code](#), and its associated [Canada Occupational Health and Safety Regulations](#). [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills](#), is also a governing document dealing with reporting.

Verification of the licensee's compliance with the requirements of this SCA are included as part of CNSC's compliance activities ranging from desktop reviews of annual reports, reviews of event reports, related corrective actions and inspections. CNSC staff confirmed through these compliance verification activities that SRBT has implemented and maintained an effective operating program in order to ensure licensed activities are conducted safely and in compliance with regulatory requirements.



### 3.3.3 Summary

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

#### 3.3.3.1 Past Performance

##### Conduct of Licensed Activity

SRBT has operated its facility in compliance with CNSC regulatory requirements. Since 2015, CNSC staff carried out a number of compliance verification activities on SRBT's operations, including inspections, review of management system documents, annual compliance reports and event reports. Table 3 lists the inspections conducted at the SRBT facility during the current licence period.

**Table 3: Inspections conducted at SRBT for the current licence period (July 2015 to November 2021)**

| Inspection Date | SCAs Covered  |
|-----------------|---|
| October 2015    | Human Performance Management - Personnel Training, Emergency Management and Fire Protection, Waste Management                                 |
| October 2016    | Environmental Protection  |
| February 2017   | Radiation Protection  |
| March 2017      | Management System   |
| February 2018   | Security  |
| March 2018      | Packaging and Transport   |
| February 2019   | Operating Performance, Fitness for Service, Radiation Protection, Conventional Health and Safety, Environmental Protection, Waste Management. |
| August 2019     | Environmental Protection  |
| January 2020    | Human Performance Management – Personnel Training   |
| October 2020    | Radiation Protection  |
| August 2021     | Management System   |
| October 2021    | Emergency Management (Emergency Exercise)   |
| November 2021   | Fire Protection   |

Non-compliances identified during inspections were addressed by SRBT in a timely manner and in accordance with corrective action plans that were reviewed and accepted by CNSC staff.

The operating limits and conditions for the SRBT facility is contained in the SRBT Safety Analysis Report [6]. This includes limits and conditions for the following parameters:

- Tritium possession limit
- Tritium processing – permitted hours of operation
- Tritium processing – precipitation
- Tritium releases to atmosphere – tritium oxide
- Tritium releases to atmosphere – tritium oxide + elemental
- Minimum differential pressure measurements for tritium processing
- Tritium releases to sewer – water-soluble tritium
- Pyrophoric Uranium Tritium Trap (PUTT) filling cycles
- PUTT/Bulk container tritium loading limit
- Bulk container heating limit
- Onsite depleted uranium inventory
- Facility action levels and administrative limits

SRBT provides a summary of compliance against these operating limits and conditions as part of their annual reports to the CNSC. CNSC staff review this information and confirmed that the SRBT facility has operated within the operating limits and conditions for the facility.

SRBT also maintains 2 procedures: Tritium Inventory Management [7] and Nuclear Substances Inventory Management [8], for maintaining nuclear substance inventory control at the facility. CNSC staff reviewed these procedures and considered them acceptable.

### **Procedures**

SRBT's management system consists of high-level program documents supported by lower level procedures and work instructions. SRBT maintains a comprehensive suite of procedures across all programs at its facility as noted in Document and Process Structure [9].

CNSC staff review procedural-level documents as part of ongoing compliance verification activities to ensure proper maintenance of procedures to reflect actual practices as well as procedural adherence by SRBT personnel.

Based on these reviews, CNSC staff concluded that SRBT adequately maintains its procedures and there were no significant changes to operating procedures with the potential to affect the safe operation of the SRBT facility.

### **Reporting and Trending**

SRBT maintains a Regulatory Reporting Program document [10] to ensure that events are reported in accordance with regulatory requirements. CNSC staff have reviewed this document and consider it acceptable.

In February 2016, a CNSC Designated Officer issued a request pursuant to subsection 12(2) of the [General Nuclear Safety and Control Regulations](#) to all operating uranium mines and mills and Class IB nuclear facilities (including SRBT). The request sought clarification from all licensees with respect to public disclosure and the reporting of events to the CNSC Duty Officer. SRBT provided a response on March 2016 and the CNSC considered this request closed on June 2016.

In February 2018, CNSC staff requested SRBT to submit an implementation plan for [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills](#). SRBT completed the implementation of REGDOC-3.1.2 in April 2018. CNSC staff concluded that SRBT is currently meeting the requirements of REGDOC-3.1.2. Table 4 lists the events reported to the CNSC by the licensee during the current licence period.

**Table 4: Events reported by SRBT during the current licence period**

| Date               | Description  |
|--------------------|--|
| September 25, 2015 | During maintenance work on the air compressor, an oil hose became disconnected from a pressurized section of the compressor, ejecting a fine mist of oil into the room, and activating the smoke detector and setting off the facility fire alarm. The Pembroke Fire Department responded to the false alarm within minutes. There was no hazard to workers, the facility or the environment.  |
| June 1, 2016       | The facility fire alarm sounded, and all personnel evacuated and responded accordingly. It was determined that the smoke had been detected in the compressor room, caused by friction associated with the entanglement of a failed drive belt on the unit. There was no hazard to workers, the facility or the environment. SRBT increased the frequency of drive belt maintenance from annual to semi-annual as a result of this event.   |
| November 28, 2016  | <p>SRBT reported that a trailer containing 4 pallets of expired tritium exit signs had been stolen while in transport to the SRBT facility in Pembroke. The trailer was stolen while parked in the yard of Sera Global Logistics in Mississauga, Ontario while awaiting further transport.</p> <p>The trailer was reported as being found on December 15, 2016. The carrier and Peel Regional Police inspected the trailer in close consultation with SRBT, where it was determined that the packages had not been tampered with, and remained in good condition for transport. Once the shipment arrived in Pembroke, members of the SRBT Health Physics Team performed a radiological assessment of the trailer and its contents, finding no evidence of any hazard. An inventory check confirmed that there were no missing exit signs.</p> |

| Date              | Description   |
|-------------------|---|
| June 6, 2017      | A package was returned to SRBT with clear evidence of damage in transport. The package was categorized as UN2910, Excepted Package, Limited Quantity of Material, and was destined for a customer located in Bulgaria when it was refused loading for export by aircraft due to the apparent damage to the outside of the package. The package was assessed upon receipt, and although the physical damage was visually evident, an assessment found no radiological hazard associated with the package (i.e., no evidence of contamination, products contained within were still in excellent condition). There was no hazard to workers, the facility or the environment. |
| November 21, 2017 | A contracted freight carrier notified SRBT that they had declared a package containing 26 tritium powered self-luminous aircraft safety signs lost. The package was intended for a customer in Germany, and was categorized as UN2911, Excepted Package, Articles. On December 6, 2017, the carrier informed SRBT that the package had been located in Munich, and delivery to the customer was completed on December 12, 2017.   |
| March 1, 2018     | On February 5, 2018, a spent bulk tritium container was transported and delivered to a consignee as a Type 'A' package, but was later determined to have contained a Type 'B' quantity of tritium. The consignee notified SRBT of this finding after conditioning the tritium container in preparation for filling. As a result, SRBT altered internal packaging procedures to categorize all spent bulk tritium containers as UN2916 Type 'B' in the future. There was no hazard to workers, the facility or the environment.  |
| January 2, 2019   | SRBT reported that a major fire was in progress at a nearby lumberyard, resulting in a loss of power to a significant part of the City of Pembroke, including the SRBT facility. Power was restored the next morning, and there was never any threat to the SRBT facility from the fire at any time. A member of SRBT's organization was onsite at all times once alerted of the loss of power. There was no hazard to workers, the facility or the environment.  |
| January 22, 2019  | SRBT erroneously accepted 3 tritium-powered aircraft safety signs from a customer in the European Union. The signs had recently been sold and exported by SRBT in accordance with an export licence. The signs were received by the customer, but after inspection the signs were rejected as they were found to not meet the design requirements for their purpose. The customer sent the 3 signs back without authorization from SRBT, and the shipment was mistakenly accepted upon arrival, without having the required import licence. There was no hazard to workers, the facility or the environment.  |

| Date              | Description   |
|-------------------|---|
| February 19, 2021 | <p>A fire alarm occurred at the facility at approximately 7:45 am. A malfunction of the compressor generated a small quantity of smoke just prior to the unit automatically shutting down. The Pembroke Fire Department responded to the event within minutes of the alarm, noted no further hazard, and gave the all-clear after assessing the facility. The compressor malfunction was likely due to a very brief power fluctuation on the municipal grid just prior to the false alarm. A momentary ‘brownout’ caused a voltage drop on the motor under load conditions, likely leading to the generation of smoke from overheating as the motor recovered under load, and eventually an automatic safety trip on the compressor. There was no hazard to workers, the facility or the environment.</p>   |
| August 16, 2021   | <p>A fire alarm occurred at the facility at approximately 8:30 am. All personnel were evacuated safely from the facility, and accounted for at the muster point. It was immediately apparent that the alarm was caused by a malfunction of a hand-held, oxy-acetylene torch in Zone 3. The malfunction caused a brief excess flame which was detected by the monitoring system, resulting in the alarm. Staff in the area shut off the gas to the torch, eliminating the hazard, and once confirming a safe state had been achieved, proceeded to respond to the fire alarm in accordance with their training.</p> <p>The Pembroke Fire Department was automatically dispatched to the facility by way of communication via the facility security system; the first responders arrived within approximately 5 minutes after the alarm sounded. The responding fire firefighters checked the area and the affected equipment, and noted that the hazard was effectively eliminated. The all clear was given at about 8:45 am, and personnel were allowed to return to work. There was no hazard to workers, the facility or the environment.</p> |

CNSC staff review all reported events to identify if there are any regulatory concerns and report the events to the Commission at public meetings of the Commission. CNSC staff are satisfied with SRBT’s actions with respect to the reportable events and all events are considered closed.

In accordance with REGDOC-3.1.2, SRBT continues to provide information on its operating performance by submitting annual compliance reports, which are available on [SRBT’s website](#). CNSC staff reviewed these reports and are satisfied with SRBT’s performance during this licence period.

### **3.3.3.2 Regulatory Focus**

CNSC staff will continue to monitor SRBT's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation. CNSC staff will focus on procedural adherence and maintenance of the operating limits and safety envelope with compliance verification focus on the safe conduct of licensed activities.

### **3.3.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

### **3.3.4 Conclusion**

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

### **3.3.5 Recommendation**

Two licence conditions are included in the proposed licence for this SCA. Licence condition 3.1 requires the licensee to implement and maintain an operating program, which includes a set of operating limits. Licence condition 3.2 requires the licensee to implement and maintain a program for reporting to the Commission or a person authorized by the Commission. Compliance verification criteria for both licence conditions are included in the draft LCH.

## **3.4 Safety Analysis**

The safety analysis SCA covers maintenance of the safety analysis that supports the overall safety case for the facility. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

This CMD covers the following specific areas of safety analysis:

- deterministic safety analysis
- hazard analysis

### 3.4.1 Trends

The following table indicates the overall rating for the safety analysis SCA over the current licensing period:

| SAFETY ANALYSIS   |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA  | SA   | SA   | SA   | SA   | SA   |
| <b>Comments</b>   |      |      |      |      |      |
| The SRBT Safety Analysis Report (SAR) effectively identifies facility hazards and structures, systems and components (SSC) relied upon for safety to control or mitigate these hazards. |      |      |      |      |      |

### 3.4.2 Discussion

Paragraph 3(1)(i) of the GNSCR requires that an application include a description and the results of any test, analysis or calculation performed to substantiate the information included in the application. Paragraph 5(f) of the CINFR requires that an application to construct a Class I nuclear facility include a preliminary SAR. SRBT's preliminary SAR sets the operating limits and conditions (OLCs) within which SRBT must operate. Paragraph 6(a) of the CINFR requires that an application for a licence to operate a Class I nuclear facility include a description of the structures at the nuclear facility, including their design and their design operating conditions. Paragraph 6(b) of the CINFR requires that an application for a licence to operate a Class I nuclear facility include a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions. Paragraph 6(c) requires that an application for a licence to operate include a final SAR. A safety analysis must include an analysis of the postulated sequences and consequences of conditions that could arise from initiating events and associated hazards.

The SRBT licence renewal application's supporting documentation included a SAR for the SRBT facility [6]. The SAR includes a description of the facility and the measures in place to protect the safety of the workers, the public and the environment, under normal operations, abnormal operations and accident conditions. One of the compliance verification criteria in the LCH is that SRBT review its SAR at a minimum of every 5 years.

CNSC staff evaluated the information provided in the SAR for SRBT against International Atomic Energy Agency (IAEA) SSR-4, *Safety of Nuclear Fuel Cycle Facilities* and determined that the licensee has adequately assessed the hazards associated with licensed activities and demonstrated an adequate level of protection over a broad range of operating conditions.

CNSC staff concluded based on their review of the submitted application and supporting documents that the radiological and non-radiological risks associated with SRBT's operations are low. SRBT remains in compliance with regulatory requirements for the safety analysis SCA.

### **3.4.3 Summary**

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

#### **3.4.3.1 Past Performance**

##### **Deterministic Safety Analysis**

During the current licence period, CNSC staff conducted several desktop reviews of the safety analysis documentation. Compliance inspections included verification that the licensee has been adequately maintaining the safety barriers and protective systems as specified in the SRBT facility's SAR.

The SAR was last updated by SRBT and underwent technical assessment by CNSC staff in 2018. CNSC staff assessed the report against the guidance provided in IAEA SSR-4. CNSC staff determined that SRBT SAR is consistent with provisions of this standard. CNSC staff's assessment of the SRBT SAR concluded that it meets regulatory requirements. The next revision of the SAR is expected in 2022.

##### **Hazard Analysis**

SRBT maintains an acceptable Fire Hazard Assessment (FHA) for the SRBT facility [11]. The FHA reports demonstrate compliance with the requirements of the National Building Code of Canada (NBCC), the National Fire Code of Canada (NFCC) and CSA standard N393-13, *Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances* [12]. The FHA is discussed in section 3.10 of this CMD.

#### **3.4.3.2 Regulatory Focus**

CNSC staff will continue to monitor SRBT's performance in this area through regulatory oversight activities including desktop reviews of compliance reporting and revisions to relevant program documentation pertaining to this SCA.

#### **3.4.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

### **3.4.4 Conclusion**

CNSC staff assessed SRBT's documentation and analyses under the safety analysis SCA and conclude that it meets regulatory requirements. The facility has not been modified to require further analysis during the licensing period.



### 3.4.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Standardized Licence condition 4.1 requires the licensee to implement and maintain a safety analysis program. Compliance verification criteria for this licence condition are included in the draft LCH.

## 3.5 Physical Design

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

This CMD covers the following specific areas of physical design:

- design governance
- site characterization
- facility design

### 3.5.1 Trends

The following table indicates the overall rating for the physical design SCA over the current licensing period:

| PHYSICAL DESIGN   |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA  | SA   | SA   | SA   | SA   | SA   |
| Comments  |      |      |      |      |      |
| The licensee has maintained a physical design program in accordance with CNSC requirements over this licence period. SRBT continues to be rated SA in this SCA. |      |      |      |      |      |

### 3.5.2 Discussion

During the licensing period, SRBT has not made significant changes to the design of the facility. Some upgrades to existing systems were completed as part of facility maintenance and continuous improvement. Changes were implemented using SRBT's Engineering Change Request (ECR) process.

CNSC staff confirmed that SRBT has implemented and maintained an adequate physical design program with appropriate change control. CNSC staff concluded that SRBT's physical design measures meet regulatory requirements and when design changes are made within the licensing basis, the licensee has adequate resources in place to manage them and to ensure safety.

### 3.5.3 Summary

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

#### 3.5.3.1 Past Performance

##### Design Governance

SRBT maintains an ECR process under the Quality Manual [3]. The ECR process ensures that changes within the facility are controlled in a fashion that is commensurate with potential risk. SRBT provides a summary of ECRs filed annually as part of their annual reports to the CNSC.

CNSC staff verified the ECR process during a management system inspection in 2021. CNSC staff concluded that SRBT's ECR process met the requirements of CSA N286-12.

CNSC staff will continue to monitor the performance of SRBT in this area through routine inspections.

##### Site Characterization

Information on the SRBT facility site characterization is documented in the SRBT Safety Analysis Report (SAR) [6]. The site characterization includes information such as the geological, meteorological, seismological, hydrological and hydrogeological characteristics of the site on which the SRBT facility is located. CNSC staff reviewed the SAR and consider it acceptable.

##### Facility Design

Information on the SRBT facility design is documented in the SRBT SAR [6]. Information on the SRBT facility systems and components are provided as well as general design aspects such as safety objectives for normal operations as well as emergency conditions. CNSC staff reviewed the SAR and consider it acceptable.

The following are examples of upgrades to the SRBT facility completed during the current licence period:

- replacement of ventilated wooden cabinets (fume hoods) with stainless steel units in the rig room
- removal of a laser cutting system from the Laser Room
- removal of the reclaim rig from the Tritium Laboratory.

These upgrades were completed in accordance with SRBT's ECR process.

Through document reviews and onsite inspections, CNSC staff monitor SRBT's implementation of physical design SCA requirements in accordance with CNSC regulatory requirements. Based on the above capabilities and past performance, CNSC staff are satisfied with the licensee's overall performance in this SCA.

### 3.5.3.2 Regulatory Focus

CNSC staff will continue to monitor SRBT's performance in this SCA through regulatory oversight activities including onsite inspections and desktop reviews of relevant program documentation, and the third-party reviews of design modifications to the facilities.

### 3.5.3.3 Proposed Improvements

No improvements within this SCA are proposed.

### 3.5.4 Conclusion

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

### 3.5.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 5.1 requires the licensee to implement and maintain a design program. Compliance verification criteria for both licence conditions are included in the draft LCH.

## 3.6 Fitness for Service

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

This CMD covers the following specific area of fitness for service:

- maintenance

### 3.6.1 Trends

The following table indicates the overall rating for the fitness for service SCA over the current licensing period:

| FITNESS FOR SERVICE   |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| FS  | FS   | FS   | FS   | SA   | SA   |
| <b>Comments</b>   |      |      |      |      |      |
| The licensee has maintained a fitness for service program in accordance with CNSC requirements over this licence period. SRBT has the programs in place to ensure the facility is maintained appropriately and that it remains fit for service. |      |      |      |      |      |

| <b>FITNESS FOR SERVICE</b>   |
|--|
| <b>Overall Compliance Ratings</b>  |
| The “Fully Satisfactory (FS)” rating was not used after the 2018 reporting year. Starting in 2019, facility performance assessment ratings were simplified, and the FS and “Satisfactory (SA)” ratings were replaced by the SA rating. Thus, the lack of FS in subsequent years does not indicate a reduction in licensee performance. |

### 3.6.2 Discussion

SRBT is required to implement and maintain a fitness for service program to cover activities that affect the physical condition of SSC to ensure that they remain effective over time. Paragraph 6(d) of the CINFR requires that an application to operate a Class I nuclear facility contain the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. Further requirements under this SCA are provided under the NBCC and the NFCC. Specific aspects of CSA N286-12 and CSA N393-13 are also applicable for this SCA.

### 3.6.3 Summary

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

#### 3.6.3.1 Past Performance

##### Maintenance

SRBT’s Maintenance Program [13] details its preventive maintenance, periodic inspection and testing requirements for equipment at its facility. The Maintenance Program ensures that equipment functions are designed so that over its lifetime the safety systems remain available, meet the design intent in the safety report and that equipment failures are minimized. This is accomplished by completion of corrective and preventative maintenance activities along with routine inspection on system components to ensure that they remain in good operating condition. The Maintenance Program was developed using guidance from CSA Standard N286-12, *Management System Requirements for Nuclear Facilities* [2] and CNSC regulatory document [REGDOC-2.6.2 Maintenance Program for Nuclear Power Plants](#). CNSC staff reviewed SRBT’s Maintenance Program and consider it acceptable. SRBT routinely reports on equipment maintenance information to the CNSC in its annual compliance reports.

Fire protection systems are tested according to an established schedule using the NBCC and NFCC. Reviews of aspects of the fire protection systems are completed as required by CSA N393-13: *Fire protection for facilities that process, handle or store nuclear substances* [12].

CNSC staff review the information provided to ensure that the required maintenance is being conducted and that structures, systems and components at the SRBT facility remain effective over time. CNSC staff concluded based on its assessment of SRBT's governing documents for the conduct of maintenance, and onsite verification activities, that SRBT's fitness for service program meets regulatory requirements.

SRBT has acceptable preventative maintenance and in-service inspection programs in place at its facility. SRBT's performance in this SCA is satisfactory.

### **3.6.3.2 Regulatory Focus**

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

### **3.6.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

## **3.6.4 Conclusion**

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

## **3.6.5 Recommendation**

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

## **3.7 Radiation Protection**

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

This CMD covers the following specific areas of radiation protection:

- application of ALARA
- worker dose control
- radiation protection program performance
- radiological hazard control

### 3.7.1 Trends

The following table indicates the overall rating for the radiation protection SCA over the current licensing period:

| RADIATION PROTECTION   |      |      |      |      |      |
|--|------|------|------|------|------|
| Overall Compliance Ratings   |      |      |      |      |      |
| 2015   | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA   | SA   | SA   | SA   | SA   | SA   |
| <p style="text-align: center;"><b>Comments</b></p> <p>Performance levels for this SCA have been consistent from year to year, with satisfactory ratings given from 2015 to 2020. SRBT has implemented and maintained an effective radiation protection program as required by the <i>Radiation Protection Regulations</i>.</p> |      |      |      |      |      |

### 3.7.2 Discussion

The [Radiation Protection Regulations](#) require licensees to implement a radiation protection (RP) program. As part of that program, licensees must also keep effective and equivalent doses received by and committed to persons ALARA, taking into account social and economic factors, through the implementation of: management control over work practices, personnel qualification and training, control of occupational and public exposures to radiation, and planning for unusual situations. The *Radiation Protection Regulations* also prescribe dose limits for Nuclear Energy Workers (NEWs) and persons who are not NEWs.

SRBT has implemented and continues to maintain a RP program [14] that ensures contamination levels and radiation doses received by individuals are monitored, controlled and maintained ALARA. CNSC staff conducted 2 planned compliance inspections for the radiation protection SCA in 2017 and 2020. A detailed assessment of the licensee performance in the radiation protection specific areas is provided below in section 3.7.3 of this CMD.

Overall, based on the review of SRBT's application, supporting documents and the outcome of compliance verification activities, CNSC staff concluded that SRBT's radiation protection program is acceptable and compliant with regulatory requirements.

### 3.7.3 Summary

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

### 3.7.3.1 Past Performance

#### Application of ALARA

As required by the *Radiation Protection Regulations*, and by licence condition 7.1, SRBT continued to implement RP measures throughout the current licensing period to keep radiation exposures and doses to persons ALARA, taking into account social and economic factors. On an annual basis, SRBT establishes ALARA targets for average and maximum worker doses taking into consideration the previous year's dose results as well as anticipated production levels.

SRBT establishes annual radiation safety objectives as part of its Health Physics Committee that meets at least 8 times a year. This committee reviews radiation safety performance as well as related issues and concerns and makes recommendations for reducing worker exposures.

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

#### Worker Dose Control

All workers at SRBT are identified as NEWs. Doses to workers are monitored to ensure compliance with the CNSC's regulatory dose limits and with keeping radiation doses ALARA.

Radiological exposures to workers at SRBT primarily result from inhalation, ingestion or skin absorption of tritium. Consequently, internal doses are ascertained by a urine bioassay. SRBT holds a CNSC dosimetry service licence, which authorizes SRBT to provide in-house dosimetry services for ascertaining doses to their workers.

Throughout the current licensing period, no worker's radiation exposure reported by SRBT exceeded the CNSC regulatory dose limits. The maximum effective dose received by a worker in the current licensing period was 0.87 mSv, or approximately 2% of the regulatory limit of 50 mSv in a 1-year dosimetry period.

Exposure to radiation is controlled through engineering controls including negative airflow from lower to higher zones of contamination and personal protective equipment such as lab coats, gloves, shoe covers and respirators when required. Additional protection is provided through ongoing training, ensuring that no worker exclusively performs dose-intensive activities, and frequent and routine use of portable tritium in air monitors during processing operations. Table 5 provides the average and maximum doses received by NEWs over the current licensing period.

**Table 5: Average and Maximum Effective Doses to Workers, 2015 to 2020**

| Statistic                                       | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  |
|---|-------|-------|-------|-------|-------|-------|
| <b>Average Effective Dose (mSv)</b>             | 0.070 | 0.049 | 0.045 | 0.044 | 0.065 | 0.077 |
| <b>Maximum Individual Effective Dose (mSv)*</b> | 0.87  | 0.34  | 0.46  | 0.48  | 0.57  | 0.43  |
| <b>Number of NEWs monitored</b>                 | 47    | 45    | 45    | 47    | 45    | 43    |

\*The regulatory limit for effective dose to a NEW is 50 mSv/year.

During the current licensing period, average doses have remained relatively consistent below 0.1 mSv, and these doses are considered very low and within an acceptable range given the regulated activity. The maximum individual effective dose over these years has fluctuated between 0.34 mSv to 0.87 mSv. The yearly variation in SRBT staff's radiation exposure is directly correlated with 3 primary factors: the level of production, the types of light sources being manufactured, and the results of ALARA-driven improvements to manufacturing processes.

When the increase in average effective dose was noted at the end of 2019, SRBT launched an internal investigation to determine the cause. In early 2020, SRBT took action to improve the processes for receiving and assessing pallets of expired tritium safety signs. CNSC staff will continue to monitor SRBT's efforts to enhance program performance and to maintain worker doses ALARA.

During the current licence period, there has been one, 5-year dosimetry period; from 2016 to 2020. The maximum cumulative effective dose received by a NEW over the 5-year dosimetry period was 2.20 mSv. This radiation dose represents 2.2% of the CNSC regulatory effective dose limit of 100 mSv in a 5-year dosimetry period.

CNSC staff are satisfied that doses to workers are being controlled and are well below the regulatory limits.

### **Radiation Protection Program Performance**

RP program performance at SRBT was assessed during the current licence period through various CNSC staff compliance verification activities, including desktop reviews of annual compliance reports. Aspects of the radiation protection SCA have been covered during all CNSC inspection activities. In addition, 2 focused RP inspections at SRBT occurred in the years 2017 and 2020.

CNSC staff's assessment of SRBT's RP program performance identified areas of strength and opportunities for improvement. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections have been closed to CNSC staff's satisfaction. SRBT implemented positive enhancements to the RP program and established appropriate corrective actions to improve procedural documentation to formalize actions performed.



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

SRBT undertook a complete review of their action levels in 2019 to ensure that they are appropriately set to detect the emergence of a potential loss of control of the RP program. These revised action levels were reviewed and accepted by CNSC staff. During the current licensing period, there were no action level exceedances at SRBT.

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

### **Radiological Hazard Control**

Radiological contamination controls have been established at SRBT to control and minimize the spread of radioactive contamination. Methods of contamination control include the use of a radiation zone control program and monitoring to confirm the effectiveness of the program. Tritium contamination control is maintained through routine sampling of levels of contamination in the facility and the use of alarming tritium-in-air monitors (in Zones 3 and 2).

CNSC staff are satisfied that radiological hazards at SRBT are being controlled in accordance with regulatory requirements.

#### **3.7.3.2 Regulatory Focus**

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

#### **3.7.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

### **3.7.4 Conclusion**

CNSC staff assessed SRBT's documentation under the radiation protection SCA and found it to be acceptable. CNSC staff conclude that the overall performance for this SCA is satisfactory.

### **3.7.5 Recommendation**

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

### 3.8 Conventional Health and Safety

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

The specific areas that comprise this SCA at the SRBT facility include:

- performance
- practices
- awareness

#### 3.8.1 Trends

The following table indicates the overall rating for the conventional health and safety SCA over the current licensing period:

| CONVENTIONAL HEALTH AND SAFETY   |      |      |      |      |      |
|--|------|------|------|------|------|
| Overall Compliance Ratings   |      |      |      |      |      |
| 2015   | 2016 | 2017 | 2018 | 2019 | 2020 |
| FS   | FS   | SA   | FS   | SA   | SA   |
| <b>Comments</b>  |      |      |      |      |      |
| <p>The licensee has maintained a conventional health and safety program that meets the requirements of the NSCA and is in accordance with CNSC requirements over this licence period. SRBT has continued to demonstrate its ability to keep the workers safe from occupational injuries.</p> <p>The “Fully Satisfactory (FS)” rating was not used after the 2018 reporting year. Starting in 2019, facility performance assessment ratings were simplified, and the FS and “Satisfactory (SA)” ratings were replaced by the SA rating. Thus, the lack of FS in subsequent years does not indicate a reduction in licensee performance.</p> |      |      |      |      |      |

#### 3.8.2 Discussion

Conventional health and safety programs at uranium and nuclear substance processing facilities fall under the dual regulatory oversight of the CNSC and Employment and Social Development Canada. SRBT submits hazardous-occurrence investigation reports to both regulators, in accordance with their respective reporting requirements. CNSC staff monitor compliance with regulatory reporting requirements through various means including desktop reviews and inspections.

SRBT is obligated under its licence to implement and maintain a conventional health and safety program. SRBT’s activities must comply with the [Canada Labour Code](#), and the associated [Canada Occupational Health and Safety Regulations](#). SRBT’s occupational health and safety program applies to all work performed by SRBT employees and contractors. Paragraph 12(1)(c) of the GNSCR also requires SRBT to take all reasonable precautions to protect the health and safety of persons.

CNSC inspectors annually verify SRBT's conventional health and safety program at SRBT, to observe workers' compliance with requirements related to workplace safety, proper use of personal protective equipment, use of signage and barriers along with the general housekeeping of the facility.

Based on the above, CNSC staff concluded that SRBT's conventional health and safety SCA met all applicable regulatory requirements and CNSC expectations.

### **3.8.3 Summary**

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

#### **3.8.3.1 Past Performance**

##### **Performance**

Licensees are required to report to the CNSC as set out under paragraph 29(1)(h) of the GNSCR. These reports include serious illnesses or injuries incurred or possibly incurred as a result of a licensed activity.

SRBT maintains a Health and Safety Policy [15] and Hazard Prevention Program [16] as part of this SCA. CNSC staff reviewed these documents and consider them acceptable. These programs incorporate various elements, such as accident reporting and investigation, hazard prevention, preventive maintenance, health and safety committees, training, and personal protective equipment.

SRBT sets programmatic targets that are tracked by responsible safety committees throughout the year. Actions are taken that are intended to help the organization reach safety goals, as well as when they may be missed.

The key performance indicators typically reported to the Commission for conventional health and safety are the number of lost-time injuries (LTI) that occur per year, LTI severity and LTI frequency. An LTI is defined as an injury that takes place at work, and results in the worker being unable to return to work and carry on their duties for a period of time. The LTI frequency and LTI severity are both based on 100 full time workers (100 FTE = 200,000 hours worked). LTI statistics for the SRBT are outlined in table 6.

**Table 6: Lost-time injury statistics, SRBT, 2015 to 2020**

| Year                            | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------------------------------|------|------|------|------|------|------|
| Lost-time injuries <sup>1</sup> | 0    | 0    | 3    | 0    | 0    | 0    |
| Severity rate <sup>2</sup>      | 0    | 0    | 17.7 | 0    | 0    | 0    |
| Frequency rate <sup>3</sup>     | 0    | 0    | 7.6  | 0    | 0    | 0    |

<sup>1</sup> An injury that takes place at work and results in the worker being unable to return to work for a period of time.

<sup>2</sup> The accident severity rate measures the total number of days lost to injury for every 200,000 person-hours worked at the site. Severity = [(# of days lost in last 12 months) / (# of hours worked in last 12 months)] x 200,000.

<sup>3</sup> The accident frequency rate measures the number of LTIs for every 200,000 person-hours worked at the site. Frequency = [(# of injuries in last 12 months) / (# of hours worked in last 12 months)] x 200,000.

During the current licence period, SRBT reported 3 LTIs, occurring in 2017 as shown in table 7 below. CNSC staff have reviewed and are satisfied with the corrective actions taken by SRBT to prevent recurrence of the events.

**Table 7: LTI Information**

| LTI   | Actions Taken  |
|---|--|
| In January 2017, an employee lacerated their hand during an assembly operation. The worker received medical attention and required stitches at the Pembroke Regional Hospital. The doctors recommended that the worker take several days off before returning to work. Following an investigation into the event, it became apparent that the worker had not been adequately guarding the blade when changing it. This injury resulted in two days lost time. | SRBT organized a safety stand-down meeting with supervisors to discuss the event and to ensure that expectations when handling sharp items were emphasized with the employees.<br><br>SRBT's Workplace Health and Safety Committee investigated the event and procured alternative tooling in collaboration with the workers, in order to reduce the hazard when the assembly work is being performed. |
| In August 2017, while kneeling down, an employee attempted to pick up an item on the floor and injured their back. The worker was subsequently transported to the local hospital and missed the following day of work due to the injury, resulting in one day lost time.  | Upon returning to the workplace, the employee was advised on the proper methodology for lifting items, including avoiding twisting of the back when bending over.  |
| In October 2017, an employee in the coating department experienced shoulder pain. The worker received medical attention and was advised by SRBT to take the week off work, resulting in four days lost time.  | The worker returned to modified duties and SRBT highlighted expectations regarding job rotation to reduce injury risk as a result of repetitive movements.   |

## **Practices**

SRBT's activities and operations must comply with Part II of the Canada Labour Code. This means that SRBT is required to report to ESDC on incidents resulting in an injury. The SRBT Workplace Health and Safety Committee inspects the workplace and meets frequently to resolve and track any issues related to health and safety. CNSC staff review health and safety documentation to verify that any identified issues related to health and safety are promptly resolved.

CNSC inspectors routinely verify SRBT's conventional health and safety program during inspections. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

CNSC staff are satisfied with SRBT's past performance in the conventional health and safety SCA and that SRBT continues to meet regulatory requirements.

## **Awareness**

Licensees are responsible for ensuring that workers have the knowledge to identify workplace hazards and take the necessary precautions to protect against these hazards. This is accomplished through training and ongoing internal communications with workers.

During routine onsite inspections, CNSC staff verified that workers are trained to identify hazards at the SRBT facility. CNSC staff confirmed that SRBT has effectively implemented their conventional health and safety programs to keep workers safe.

CNSC staff confirmed that SRBT has health and safety programs that promote conventional health and safety through the provision of information, training, instructions and supervision.

SRBT provided updates to their operations as a result of the COVID-19 pandemic. SRBT instituted measures to minimize the spread of COVID-19 by requiring workers wear facemasks, limiting the size of groups of employees in any areas, as well as encouraging workers to work from home if they are able. Due to the COVID-19 pandemic, all training conferences that were normally attended yearly were cancelled in 2020. This was replaced with online training for both the *Canada Labour Code* and Health and Safety Committees and Representatives.

### **3.8.3.2 Regulatory Focus**

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

### **3.8.3.3 Proposed Improvements**

No improvements to this SCA are proposed.

### 3.8.4 Conclusion

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

### 3.8.5 Recommendation

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

## 3.9 Environmental Protection

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

This CMD covers the following specific areas of environmental protection:

- effluent and emissions control (releases)
- environmental management system (EMS)
- assessment and monitoring
- protection of people
- environmental risk assessment (ERA)

### 3.9.1 Trends

The following table indicates the overall rating for the environmental protection SCA over the current licensing period:

| <b>ENVIRONMENTAL PROTECTION</b>   |             |             |             |             |             |
|---|-------------|-------------|-------------|-------------|-------------|
| <b>Overall Compliance Ratings</b>   |             |             |             |             |             |
| <b>2015</b>   | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
| SA  | SA          | SA          | SA          | SA          | SA          |
| <b>Comments</b>   |             |             |             |             |             |
| SRBT has developed, implemented and maintained an effective environmental protection program that protects the environment and the public in accordance with CNSC regulatory requirements.  |             |             |             |             |             |
| During the current licence period, releases to the environment were well below the release limits specified in the CNSC licence. CNSC staff monitored SRBT's implementation of the environmental protection program through compliance verification activities. |             |             |             |             |             |
| SRBT submitted its Environmental Risk Assessment (ERA) and CNSC staff accepted it in April 2021. The ERA concluded that human health and ecological risks attributable to the SRBT facility's operations are negligible.  |             |             |             |             |             |

### 3.9.2 Discussion

SRBT is required by its licence and by paragraph 12(1)(c) of the GNSCR to implement and maintain an environmental protection program which takes all reasonable precautions to protect the health and safety of persons. Licensees may achieve this by developing and maintaining an environmental protection program to control releases of nuclear and hazardous substances and to assess the effects of these releases on the environment. The design and implementation of the environmental protection program at the SRBT facility is in accordance with [REGDOC-2.9.1: Environmental Principles, Assessments and Protection Measures](#).

SRBT has implemented the requirements contained in:

- CSA N288.1-14, Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities [17]
- CSA N288.4-10, Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills [18]
- CSA N288.5-11, Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills [19]
- CSA N288.6-12, Environmental risk assessments at Class I nuclear facilities, and uranium mines and mills [20]
- CSA N288.7-15, Groundwater protection programs at Class I nuclear facilities and uranium mines and mills [21]
- CSA N288.8-17, Establishing and implementing action levels for releases to the environment from nuclear facilities [22]

SRBT is required to abide by all provincial and federal requirements for the handling of nuclear and other hazardous substances. SRBT controls releases of hazardous substances from the SRBT facility to the environment in accordance with CNSC regulatory requirements as well as requirements prescribed in the Environmental Compliance Approval issued by the Ontario Ministry of the Environment, Conservation and Parks (MECP).

During the current licensing period, CNSC staff verified SRBT's performance with respect to environmental protection through inspections and desktop reviews. CNSC staff conducted 2 environmental protection inspections, in 2016 and 2019. CNSC staff raised 1 notice of non-compliance and 3 recommendations to SRBT following the 2016 inspection. The non-compliance

was related to contractor health and safety – specifically ladder safety and the use of high visibility vests when conducting sampling in high traffic areas. The recommendations were administrative in nature and included updating sampling procedures to reflect in-field practices; updating procedure documents to reflect how instruments are calibrated; and ensuring effluent records are available, even when no effluent is discharged. The items raised were classified as low safety significance and did not pose an immediate or unreasonable risk to the environment or to the health and safety of persons.

SRBT submitted corrective actions to the satisfaction of CNSC staff. Following the 2019 inspection, CNSC staff raised 1 recommendation to improve SRBT's compliance reporting, which was classified as low safety significance. SRBT staff followed the recommendation to CNSC staff's satisfaction. CNSC staff conclude that SRBT's implementation of the environmental protection program at the SRBT facility meets CNSC's regulatory requirements and expectations based on the inspections.

CNSC staff did not raise any items of safety significance upon review of SRBT's compliance reports. CNSC staff concluded that SRBT's implementation of the environmental protection program at the SRBT facility meets regulatory requirements based on desktop reviews of compliance information throughout the licence period.

### **Environmental Protection Review (EPR) Report**

As noted in Section 2.1, The CNSC conducted an EPR to assess SRBT's environmental protection and environmental compliance activities conducted under the NSCA. CNSC staff's technical review of every aspect of SRBT's environmental protection conclude that human health and the environment around the facility are protected. The EPR report [23] for SRBT can be found in Appendix E of this CMD. The EPR report for the SRBT facility is also available on the [CNSC's website](#).

## **3.9.3 Summary**

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

### **3.9.3.1 Past Performance**

#### **Effluent and Emissions Control (releases)**

SRBT monitors and controls its airborne emissions and liquid effluent to the environment through implementation of an effluent monitoring program [24]. CNSC staff reviewed and accepted SRBT's updated effluent monitoring program in August 2021. The program complies with REGDOC-2.9.1, 2020 and CSA N288.5-11, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills* [19].

Based on compliance and technical assessment activities, CNSC staff concluded that the effluent monitoring program currently in place for SRBT continues to protect human health and the environment.

#### Release Limits

SRBT has calculated derived release limits (DRLs) for their facility following the methodology in CSA N288.1-14, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities* [17]. The most recent SRBT DRL report is *Derived Release Limits for the SRBT Pembroke Facility – 2021 Update* [25].



The DRLs for SRBT are as follows:

- 108,000 Gigabecquerel (GBq)/week for tritium oxide (HTO)
- 3,630,000 GBq/week for tritium gas (HT)

The DRL for a given radionuclide is defined as the release rate that would cause an individual of the most highly exposed group to receive and be committed to a dose equal to the regulatory annual dose limit due to release of the radionuclide to air or surface water during normal operation of a nuclear facility over the period of a calendar year. DRLs are calculated to demonstrate that the public dose limit of 1 mSv/year has not been exceeded. DRLs inform licence release limits for nuclear facilities and typically represent the maximum acceptable level of emitted contaminants from facility operations.

In SRBT's case, DRLs are not incorporated into the licence, but they do form part of SRBT's licensing basis. This is because the calculated DRLs for the SRBT facility are much higher than the licence release limits; the lower licence release limits provide additional conservatism to ensure protection of the public and environment.

The SRBT facility's licence has release limits to the atmosphere and to the sewer, in order to control releases to the environment as provided in table 8. The annual release limits for airborne tritium were calculated conservatively using airborne dispersion modelling to determine the amount of tritium that could be released from the facility to ensure the sustainable use of groundwater resources and the protection of the public and the environment. The annual release limits for liquid effluent to the sewer were derived based on 20% of the clearance level for tritium releases to river systems (1000 GBq), as documented in IAEA-TECDOC-1000, Clearance of materials resulting from the use of radionuclides in Medicine, Industry and Research [26]. The current release limits were derived by SRBT and accepted by CNSC as they are protective of the health and safety of the public and the environment.

SRBT has also established action levels in accordance with CSA N288.8, as noted in table 8, that are lower than the facility's release limits. Action levels provide early indication of a potential loss of control of the environmental protection program so that the licensee can take corrective actions to ensure that they do not exceed the release limits.

**Table 8: Licence release limits and action levels for the SRBT facility**

| Parameter   | Licence limit (GBq/year) | Action level (GBq) |
|---|--------------------------|--------------------|
| <b>Airborne – Tritium as tritium oxide (HTO)</b>          | 67,200                   | 840 (weekly)       |
| <b>Airborne – Total tritium as HTO + Tritium gas (HT)</b> | 448,000                  | 7,753 (weekly)     |
| <b>Liquid effluent to sewer – Tritium water soluble</b>   | 200                      | 0.15 (daily)       |

### Atmospheric Emissions

The SRBT facility contains 2 ventilation stacks that release tritium to the atmosphere. The stacks are monitored continuously, and air emissions are measured in real time as well as collected and analyzed weekly. SRBT releases tritium in 2 forms: elemental tritium gas (HT), and tritium oxide (HTO). SRBT does not release any hazardous substances (non-radiological) through gaseous effluent pathways in any significant quantity and therefore does not carry out effluent monitoring of any hazardous substances. SRBT has a valid Environmental Compliance Approval issued by the MECP for the limited quantities of non-radiological emissions released at the facility.

The SRBT facility's air emissions are compared with the licence release limits in table 9. In addition to licence release limits, the SRBT facility has established air emission action levels and internal administrative limits, to prevent action level exceedances. Exceedances of action levels are reported to the CNSC, documented, investigated, and appropriate corrective actions are taken where warranted. SRBT did not report any action level exceedances during the current licensing period. Reported air emissions of HT and HTO were well below licence limits throughout the current licensing period.

CNSC staff concluded that SRBT's effluent monitoring program provides adequate protection to people and the environment from gaseous effluent released to the atmosphere.

**Table 9: Annual airborne releases from SRBT compared to applicable release limits, 2015 –20**

| Parameter  | Licence limit (GBq/year) | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   |
|--|--------------------------|--------|--------|--------|--------|--------|--------|
| <b>Tritium as tritium oxide (HTO) (GBq/year)</b> | 67,200                   | 11,554 | 6,293  | 7,198  | 10,741 | 11,858 | 9,755  |
| <b>Total tritium as HTO + HT (GBq/year)</b>      | 448,000                  | 56,237 | 28,945 | 24,822 | 33,180 | 31,769 | 25,186 |

\* Releases are measured in gigabecquerels per year (GBq/year). The becquerel is the International System of Units (SI) unit for radioactivity, and one becquerel (Bq) is the activity of a quantity of radioactive material in which one nucleus decays per second

### Liquid Effluent Discharges

SRBT controls and monitors liquid effluent from the facility to the environment. The single contaminant of concern that is released by SRBT is water-soluble tritium. SRBT does not release any non-radiological hazardous substances through liquid effluent pathways in any significant quantity.

SRBT monitors liquid effluent for water-soluble tritium using a batch collection strategy. Water is collected in batches, and then analyzed for tritium concentration. Once verified that the tritium concentrations in the samples meet all acceptance criteria, the batch is authorized for release into the sewer system. There are no direct releases to surface water from SRBT.

Table 10 summarizes the concentrations of liquid effluent released over a 5-year period from 2015 to 2020. Similar to airborne releases, the SRBT facility has liquid effluent action levels and internal administrative limits. SRBT did not report any action level exceedances for liquid releases throughout the licensing period. Liquid releases of tritium remained well below the licence limit as shown in table 10.

CNSC staff concluded that SRBT's effluent monitoring program provides adequate protection of people and the environment from effluent released to the municipal sewer system.

**Table 10: Annual liquid effluent releases from SRBT compared with applicable release limits, 2015 –20**

| Parameter                        | Licence limit (GBq/year) | 2015 | 2016 | 2017 | 2018  | 2019  | 2020 |
|----------------------------------|--------------------------|------|------|------|-------|-------|------|
| Tritium-water soluble (GBq/year) | 200                      | 6.50 | 5.18 | 6.85 | 10.02 | 13.67 | 5.56 |

### Environmental Management System (EMS)

SRBT has developed and is maintaining an EMS [27] that provides a framework for integrated activities for the protection of the environment at the SRBT facility. SRBT's EMS includes a framework for establishing annual environmental objectives and targets. CNSC staff review these objectives and targets through compliance verification activities.

CNSC staff, as part of their compliance verification activities, review documents relating to environmental protection and follow up with SRBT staff on any outstanding issues. The results of these compliance verification activities demonstrate that SRBT conducts an annual management review in accordance with CNSC requirements and that SRBT addresses the identified issues properly. CNSC staff are satisfied that SRBT is conducting effective reviews and addressing identified issues properly.

### Assessment and Monitoring

The SRBT facility conducts environmental monitoring under its implementation of the environmental protection program [28]. The environmental monitoring program [29] is in accordance with CSA N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills* [18].

### Air Monitoring

SRBT has 40 passive air samplers surrounding the facility. The passive air samplers represent tritium exposure pathways for inhalation and skin absorption and are used in the calculations to determine public dose. The samples are typically collected and analyzed by a qualified third-party laboratory. However, in March 2020, SRBT began performing passive air sampling and analysis in-house due to the COVID-19 pandemic. SRBT's analysis resulted in a higher minimum detectable activity (MDA) than the third-party laboratory. The higher MDA resulted in an increase from 2019, in the calculated cumulative total of tritium oxide<sup>1</sup>. Despite the increased result due to higher MDA in 2020, tritium levels in air remained low throughout the licensing period. The results are consistent with the reported atmospheric emissions that are well below SRBT's licence release limits.

### Groundwater Monitoring

The groundwater originating at SRBT moves easterly towards the Muskrat River. The Muskrat River represents the main discharge area for shallow groundwater in the area and is about 420 meters from the SRBT property along the shortest pathway. The horizontal velocity in the fractured shallow bedrock in the region is estimated to be 4 meters/year [23].

As part of the environmental protection program, SRBT designed and implemented a Groundwater Protection Program [30] and Groundwater Monitoring Program [31] in compliance with CSA N288.7-15, *Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills* [21].

SRBT is currently monitoring tritium from 29 monitoring wells and 5 residential wells. Of all the wells monitored, only 1 groundwater well, well MW06-10, exceeded the Ontario Drinking Water Quality Standard of 7,000 Bq/L in 2020 with a mean tritium concentration of 29,513 Bq/L. This well is located directly beneath the area where the active ventilation stacks are located. These high values of tritium are representative of contamination from the site in the early 2000's and wet deposition under normal operational conditions. This well is a dedicated, engineered groundwater monitoring well at the facility within a secured area and is not available to be used as a source of water consumption [23]. Groundwater at SRBT travels east and enters the Muskrat River, which has consistently measured tritium at, or below the detection limit of 5 Bq/L.

As seen in table 11, tritium in the groundwater around SRBT continues to decline over time. For example, the mean tritium concentration in groundwater from well MW06-10 has decreased by approximately 39% since 2016 [23].

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<sup>1</sup> It is standard practice that samples that are analyzed as being lower than the MDA are assigned the MDA value as a default. Since the MDA for the in-house sampling was higher, the MDA value used for calculation purposes was also higher. This skews the cumulative results upward. The increase in the MDA does not result in any appreciable change in the effective doses calculated to members of the public nor risk to the environment.

**Table 11: Tritium concentrations in groundwater at the SRBT Site, 2016 –20**

| Parameter                      | Units | Data Measured                        | Value     | 2016   | 2017   | 2018   | 2019   | 2020   | Ontario drinking water quality standard [32] |
|--------------------------------|-------|--------------------------------------|-----------|--------|--------|--------|--------|--------|--|
| Tritium as tritium oxide (HTO) | Bq/L  | All Monitoring Wells                 | Maximum*  | 60,571 | 49,457 | 51,809 | 52,321 | 43,247 | N/A***                                       |
|                                |       |                                      | Average   | 3,814  | 2,837  | 2,883  | 2,510  | 2,063  |  |
|                                |       | All Monitoring Wells without MW06-10 | Maximum** | 12,133 | 9,594  | 7,785  | 6,436  | 4,951  |  |
|                                |       |                                      | Average   | 2,166  | 1,739  | 1,534  | 1,329  | 1,067  |  |
|                                |       | Residential Wells                    | Average   | 59     | 36     | 23     | 21     | 20     |  |

\* The maximum values in the dataset represents the high values at Well MW06-10 and skews the average high.

\*\* The maximum values without MW06-10 corresponds to well MW07-13, the next closest well to the tritium source, after MW06-10.

\*\*\* These wells are used for monitoring purposes only and are not used for drinking water.

Some private residences near SRBT use groundwater and SRBT began monitoring nearby residential wells in 2006. The tritium concentration in groundwater sampled from these wells has significantly decreased and has remained below the Ontario Drinking Water Quality Standard since 2006. In 2020, the maximum reported tritium concentration in residential wells sampled was 49 Bq/L. SRBT provides homeowners with results from their groundwater monitoring program and posts results on their website [23].

Additional information on tritium concentrations in groundwater at the SRBT site is available in section 3.2.3 of the EPR Report [23].

In 2021, SRBT proposed to reduce the frequency of sampling of monitoring wells from monthly to quarterly and of residential wells from tri-annually to bi-annually. CNSC staff determined that the reduced sampling frequency of groundwater in monitoring and residential wells near the facility would not result in any increased risk to humans or the environment and accepted SRBT's proposal.

Based on the review of the hydrogeological conditions and monitoring results reported in SRBT supporting documents, CNSC staff concluded that tritium releases from SRBT present negligible impact to surrounding residential wells and to the nearest receiving surface waterbody, the Muskrat River. Therefore, SRBT operations continue to be protective of the environment and human health.

### Other Monitoring

Monitoring results for precipitation, downspout runoff, surface water, food (produce, milk, and wine), and (sewer) sludge cake were consistent throughout the licensing period. SRBT reported a higher average tritium concentration in downspout runoff in 2020 compared to 2019. In 2020, the average concentration of tritium in downspout runoff was 1,030 Bq/L while in 2019 the average value was 432 Bq/L. SRBT attributed the increased average concentration of tritium in downspout runoff to a heavy rainfall event that occurred in May 2020, where values of up to 6,766 Bq/L were measured in runoff samples. This rainfall event followed a long period of warm, dry conditions, which resulted in a buildup of tritium on the building roof. As a result, the rainfall event in May 2020 skewed the average concentration of tritium in downspout runoff high, to 1,030 Bq/L. The increased tritium concentration resulting from the heavy rainfall event and the annual average remained below the Ontario Drinking Water Quality Standard of 7,000 Bq/L. Therefore, CNSC staff concluded that the risk to the public and the environment was negligible as a result of the rainfall event.

SRBT updated their environmental monitoring program in 2021 [29]. CNSC staff reviewed and accepted SRBT's proposed changes in August 2021. Changes included reducing sampling frequency of milk and eliminating wine monitoring from the program. CNSC staff determined that the reduced sampling frequency of milk would not have any adverse impact on human health or the environment. Elimination of wine sampling was appropriate as the wine producer in the area permanently closed in 2020 and therefore sampling is no longer possible.

SRBT is required to maintain its environmental monitoring program to be in compliance with REGDOC-2.9.1, 2020 and relevant standards, including CSA N288.4-10, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills* [18]. Based on compliance activities and technical assessments, CNSC staff concluded that SRBT is in compliance with REGDOC-2.9.1, 2020 and continues to implement and maintain an effective environmental monitoring program that adequately protects the environment and the health of persons.

### **Protection of People**

SRBT is required by REGDOC-2.9.1, which forms part of its licensing basis, to demonstrate that it made adequate provision for protecting the health and safety of the public from exposures to radiological and non-radiological substances released from the SRBT facility. SRBT uses the effluent and environmental monitoring programs to verify that releases of nuclear substances do not adversely affect public health.

The CNSC receives reports of discharges to the environment through the reporting requirements outlined in the SRBT licence and licence conditions handbook. CNSC staff's review and evaluation of discharges from the SRBT facility to the environment during the 2015 to 2020 licensing period indicate that negligible risks to the public occurred during this period.

Based on their review of these programs at the SRBT facility, CNSC staff concluded that SRBT continues to protect the public from facility emissions.

#### Estimated dose to public

SRBT calculates the annual dose to the public from the SRBT facility from air emissions and liquid effluent releases. The requirement for following the ALARA principle, taking into account social and economic factors, means that SRBT must monitor their facility and keep doses to the public below the annual public dose limit of 1 mSv/year and as low as reasonable achievable (ALARA), as prescribed in the *Radiation Protection Regulations*.

Table 12 shows the estimated doses to the public from the SRBT facility. The doses continue to be well below the regulatory annual public dose limit of 1 mSv/year.

**Table 12: Estimated dose to the public from the SRBT facility, 2015 –20**

| Year | Estimated Dose to the Public (mSv/year) | Regulatory dose limit |
|------|---|-----------------------|
| 2015 | 0.0068                                  | 1 mSv/year            |
| 2016 | 0.0046                                  |                       |
| 2017 | 0.0033                                  |                       |
| 2018 | 0.0038                                  |                       |
| 2019 | 0.0021                                  |                       |
| 2020 | 0.0024                                  |                       |

#### **Environmental Risk Assessment**

An environmental risk assessment (ERA) of nuclear facilities is a systematic process used by licensees to identify, quantify and characterize the risk posed by contaminants and physical stressors in the environment on human and other biological receptors, including the magnitude and extent of the potential effects associated with a facility. CNSC staff use CSA Standard N288.6-12, Environmental risk assessments at Class I nuclear facilities and uranium mines and mills [20] to assess if licensees comply with regulatory requirements regarding the protection of the environment and human health.

In accordance with CSA N288.6-12, licensees must review their ERAs every 5 years or earlier, if there are changes to operations, or when there are changes in scientific knowledge. SRBT completed and submitted an ERA in December 2020 [33] to the CNSC to support the licence renewal application.

CNSC staff performed a technical assessment of SRBT's 2020 ERA and requested additional information. SRBT submitted a revised ERA [33] in April 2021 that addressed CNSC staff's comments. CNSC staff reviewed the revised 2021 ERA, and confirmed it complied with CSA standard N288.6-12. The accepted 2021 SRBT ERA [33] provided the following:

- a review of facility operations and site characterization
- environmental monitoring data collected between 2014 and 2019 calendar years
- a methodology for the selection of valued ecosystem components, contaminants and physical stressors of potential concern, and exposure pathways to human and non-human biota
- a review of the results from the human health risk assessment and the ecological risk assessment performed
- a review of the results from a 2020 collaborative environmental sampling campaign with the Algonquins of Pikwàkanagàn First Nation community.

CNSC staff found the 2021 SRBT ERA [33] to be acceptable. The ERA is described in more detail in the EPR report for SRBT, which can be found in Appendix E of this CMD. The ERA concluded that the human health and ecological risks attributable to the SRBT facility's operations are negligible.

#### CNSC Independent Environmental Monitoring Program

The CNSC implements an Independent Environmental Monitoring Program (IEMP) as an additional mechanism to demonstrate that the public, Indigenous Nations and communities, and the environment around nuclear facilities are protected. It is separate but complementary to the CNSC's ongoing compliance verification program. The IEMP involves taking samples from public areas around the facility and measuring and analyzing the amount of radiological (nuclear) and hazardous substances in those samples.

CNSC staff conducted IEMP sampling around the SRBT facility in 2013, 2014, 2015, 2018 and 2021. The results are available on the CNSC's [IEMP webpage](#). The results from the samples analyzed indicate that Indigenous peoples, the public and the environment near SRBT are protected and that there are no expected health impacts as a result of SRBT's operations. The results are consistent with those submitted by SRBT and reviewed by CNSC's environmental protection staff, demonstrating that the licensee's environmental protection program protects the health and safety of people and the environment.

#### **3.9.3.2 Regulatory Focus**

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

#### **3.9.3.3 Proposed Improvements**

SRBT has updated several program documents related to the environmental protection SCA to support their licence renewal application. CNSC staff have reviewed and accepted the proposed changes. SRBT has committed to reviewing and updating their DRL document. If updates are necessary, SRBT will submit the revised document to CNSC staff for review and approval before implementation.



### 3.9.4 Conclusion

The SRBT facility has implemented and maintained an environmental protection program that adequately protects the environment and the public in accordance with regulatory requirements. CNSC staff expect no adverse effects on human health and the environment during the operation of the facility.

### 3.9.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 9.1 requires the licensee to implement and maintain an environmental protection program, which includes a set of action levels with a requirement to notify the CNSC within 7 days of any exceedances. Compliance verification criteria for this licence condition are included in the draft LCH.

## 3.10 Emergency Management and Fire Protection

The emergency management and fire protection SCA covers emergency plans and emergency preparedness programs that exist for emergencies and for non-routine conditions. This area also includes any results derived from the participation in exercises.

The specific areas that comprise this SCA at the SRBT facility include:

- conventional emergency preparedness and response
- fire emergency preparedness and response

### 3.10.1 Trends

| EMERGENCY MANAGEMENT AND FIRE PROTECTION  |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA  | SA   | SA   | SA   | SA   | SA   |
| <p style="text-align: center;"><b>Comments</b></p> <p>SRBT has implemented and maintained an Emergency Management and Fire Response program in accordance with CNSC regulatory requirements, as specified in <a href="#">REGDOC-2.10.1. Nuclear Emergency Preparedness and Response</a> (hereafter referred to as REGDOC 2.10.1). SRBT's emergency preparedness and fire response measures meet applicable CNSC regulatory and performance objectives. CNSC staff will continue to monitor SRBT's implementation of this program through regular compliance verification activities.</p> <p>SRBT has a fire protection program (FPP) in place to minimize both the probability of occurrence and the consequences of fire at the facility and the most recent Fire Hazard Assessment (FHA) indicates that the mitigation measures in place provide adequate life safety and environmental protection.</p> |      |      |      |      |      |

### 3.10.2 Discussion

SRBT implements a comprehensive emergency preparedness (EP) program [34], as required by REGDOC-2.10.1., CNSC staff also confirmed that SRBT has an FHA and FPP [35] that complies with the NFCC.

The SRBT EP plan includes 4 main components: planning basis, emergency response plan and procedures, preparedness, and program management. The design of the plan complies with CNSC REGDOC-2.10.1., with the SRBT President having the overall responsibility for the oversight and management of the EP program at the SRBT facility.

In addition, SRBT maintains an FPP to minimize both the likelihood of occurrence and the severity of the consequences of a fire at the facility. This is achieved through appropriate fire protection system design, fire safe operation and fire prevention. SRBT's FPP complies with the requirements of CSA standard N393-13, *Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances* [12].

The SRBT emergency management and response plan relies on internal and external response assistance from SRBT staff and from the Pembroke Fire Department (PFD) to deal with an emergency at their facility. CNSC staff find this approach complies with regulatory requirements. Furthermore, SRBT and PFD have concluded a Memorandum of Understanding (MOU), signed in January 2015, which formally recognizes this Mutual Aid Assistance and Response.

CNSC staff has received regular written confirmation from SRBT that the PFD will respond to a fire or other emergency involving nuclear substances, and provide Mutual Aid Assistance and Response. CNSC staff confirmed that the PFD has provided such responses in past fire alarm events at SRBT.

Finally, CNSC staff confirmed that there is a strong collaboration between SRBT and PFD staff, as PFD performs a yearly inspection of the SRBT facility. These inspection visits include fire extinguisher training for SRBT management and staff (which includes classroom theory and hands-on demonstration for each attendant), building fire evacuation drills, and testing of the manual pull station alarm and the subsequent timing of the response by the fire alarm monitoring station to the alarm.

SRBT performs fire drills on a regular basis and include mutual aid exercises with PFD responders to ensure interoperability (i.e., in situations where emergencies requiring offsite assistance would be required for onsite fires).

CNSC staff conducted 3 focused Emergency Preparedness and Fire Response inspections/observations in 2015 and 2021. Note that due to the COVID-19 pandemic, SRBT requested deferral of their 2020 Mutual-Aid Emergency and Fire Response Exercise to 2021. CNSC staff assessed the request and concluded that from a technical safety standpoint, the request to defer the Mutual-Aid Emergency Exercise would not increase the fire response risk-level at the SRBT facility. SRBT would retain its ability to adequately respond to any emergencies that may occur onsite, including in conjunction with offsite emergency response capability, namely with the Pembroke Fire Department (PFD). CNSC staff granted the deferral request.

No major findings/deficiencies were observed as a result of these inspections, and inspection recommendations are detailed in section 3.10.3.1 '*Past Performance*'.

In summary, CNSC staff are satisfied with the emergency preparedness and fire protection measures taken by SRBT during the current licensing period with respect to this SCA and concluded that they meet CNSC regulatory requirements.

### 3.10.3 Summary

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

#### 3.10.3.1 Past Performance

##### Conventional Emergency Preparedness and Fire Response

Based on annual reporting and other documentation related to this SCA, SRBT's performance during this licensing period has been rated as Satisfactory (SA) with a stable trend over the current licensing period. This is supported by the absence of any emergency preparedness and/or fire response issues requiring CNSC staff regulatory action or additional oversight, and a lack of occurrence of any emergency or fire situations at the SRBT facility throughout the current licence term.

As described in the SRBT Emergency Management and Response Plan, SRBT has a Mutual Aid Agreement in place with PFD to provide emergency and fire response mutual aid assistance. These arrangements are tested routinely during the conduct of joint training, onsite visits, drills and exercises.

SRBT continues to improve its emergency preparedness and response program based on updates to regulatory requirements, as well as lessons learned from events, exercises and drills. Specific compliance and verification activities performed during this current licensing period include reviews of SRBT's emergency management plan and procedure updates, annual compliance reports, event reviews, and onsite inspections of Mutual-Aid exercises.

Regarding past events that occurred at the SRBT facility during the current licensing term, 5 events were reported to CNSC staff:

- 1 smoke detector activation due to faulty smoke detector in 2015
- 3 fire alarm activations in 2016 and 2021, twice due to a compressor malfunction resulting in smoke detection and once due to an oxy-acetylene torch malfunction
- 1 offsite fire in 2019, due to a fire at a lumber facility in Pembroke, causing damage to a main power line, and resulting in a loss of power at the SRBT facility

In all 5 instances, CNSC staff concluded that SRBT emergency contingency plan was successfully and adequately activated and implemented. The PFD was automatically dispatched to the facility by way of communication via the facility security system; and the first responders arrived within minutes of the alarms sounding.

In addition, during the 2019 offsite fire event, CNSC staff concluded that SRBT also provided timely [emergency information and communication](#) to the public regarding this fire event, confirming that there was no impact on the SRBT facility.

In accordance with SRBT's corrective action process, investigations were completed and a number of corrective actions had been identified and implemented to prevent or mitigate a recurrence of these events. CNSC staff are satisfied with SRBT's responses to these events and the corrective actions taken.

Regarding past inspections conducted by CNSC staff during the current licensing term, CNSC staff conducted 3 focused compliance inspections at SRBT focusing on emergency management:

1. CNSC staff observed 1 Mutual-Aid Exercise in February 2015, which was designed to test SRBT's emergency response plan and procedures, as well as involving a mutual aid response from offsite emergency response organizations, such as the PFD. Based on observations made by CNSC staff, it was concluded that SRBT was able to successfully demonstrate their ability to respond to emergency situations at their facility, and they successfully met all of their stated objectives for the exercise. Although CNSC staff made some observations resulting in opportunities for improvement in the areas of documentation, communications and exercise design and control, these observations were not considered major or safety significant, and therefore would not impede SRBT's ability to effectively respond to a real emergency situation.
2. CNSC staff conducted 1 inspection in October 2015. The inspection findings were mainly related to implementing and maintaining SRBT staff training qualification requirements records. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections were addressed and closed to CNSC staff's satisfaction.
3. CNSC staff conducted 1 Mutual-Aid Exercise Inspection in October 2021. CNSC staff concluded that SRBT met the objectives for testing of their emergency measures with an adequate response to a significant fire event at the SRBT Facility. CNSC staff made observations resulting in opportunities for improvement in the areas of documentation, communications, and exercise design and control. These observations were not considered major or safety significant and would not impede SRBT's ability to effectively respond to a real emergency situation.

This emergency exercise was also conducted during the COVID-19 pandemic and CNSC staff also observed good practices by SRBT to minimize the spread of COVID-19. These practices include having a pre-screening questionnaire before going into the facility, use of face masks and hand sanitizers within the facility, and physical distancing where practicable.

In addition, this emergency exercise was conducted both in-person and remotely by CNSC staff, using new and innovative inspection practices such as use of audio & video recording and teleconference software capabilities between SRBT site and CNSC staff location.

In summary, CNSC inspection activities and events review have consistently identified adequate implementation of emergency management and fire protection response at SRBT's facility. Of the few non-compliances identified, the action items were rapidly and effectively addressed by SRBT staff, in accordance with a risk-based approach, where appropriate.

CNSC staff are satisfied with the corrective actions, which were implemented, and all notices of non-compliance have been closed.

### **Fire Protection**

CSA N393 requires that the FHA be maintained as necessary to reflect modifications, significant changes in fire hazards, operating experience, and operational changes. The FHA is required to be updated or confirmed at least once every 5 years. SRBT submitted an updated FHA in 2020 [11] that consolidated SRBT's previous FHA in 2015 and 2016. The FHA concluded that fire hazards are being controlled. It further noted that the worst-case fire events would not be expected to result in an unacceptable release of radioactive or hazardous materials and that adequate fire protection and life safety features have been provided.

SRBT conducted a Fire Protection Program Audit in 2018 by a third-party contractor. The review of the Inspection Testing and Maintenance (ITM) identified one low safety significant finding regarding monthly testing of all exit doors. The submission concluded that SRBT's fire protection program is thorough, comprehensive and compliant with the requirements of the NFCC, CSA N393 and other referenced standards.

SRBT submitted the 2020 annual conditions inspection of SRBT's facility. The inspection did not identify any non-conformances (findings) and concluded that SRBT is following good housekeeping practices and procedural controls to reduce the fire hazards within the facility. In addition to the third-party audit and inspection, SRBT conducted an internal audit of the Emergency Management and Fire Protection. The purpose of the audit was to verify that the documentation and practices for this SCA were in place, implemented and met requirements of SRBT's Quality Manual (Management Systems) as well as the requirements of the Operating Licence, the compliance verification criteria in the Licence Conditions Handbook, CNSC Regulations and the requirements of ISO 9001. The audit identified non-safety related findings and concluded that SRBT has sufficient provisions in place related to emergency management and fire protection to prevent or mitigate the effects on the environment, health and safety of persons in the event of accidental releases of nuclear substances or hazardous substances resulting from a fire.

Based on reviews of annual reports, and other documentation related to this SCA, CNSC staff have rated SRBT's performance as satisfactory over the last 5 years. There were no issues requiring regulatory action or additional oversight during the licensing period.

### **3.10.3.2 Regulatory Focus**

CNSC staff will continue to monitor SRBT performance in this area through routine inspections and annual documentation and/or events reviews.

### **3.10.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

### **3.10.4 Conclusion**

CNSC staff have assessed SRBT's documentation and analyses under the emergency management and fire protection SCA and conclude that SRBT has an acceptable emergency management and fire response plan. CNSC staff therefore conclude that SRBT's overall performance for this SCA is satisfactory and SRBT is qualified to carry out the authorized activities in this SCA.

CNSC staff reaffirm that SRBT continues to implement and maintain its Emergency Management Plan and Fire Response Program, taking measures to ensure that the licensee can adequately respond to emergencies in accordance with documented procedures.

### **3.10.5 Recommendation**

Two standardized licence conditions are included in the proposed licence for the emergency management and fire protection SCA. Standardized licence condition 10.1 requires the licensee to implement and maintain an emergency preparedness program. Standardized licence condition 10.2 requires the licensee to maintain a fire protection program. Compliance verification criteria for these licence conditions are included in the draft LCH.

## **3.11 Waste Management**

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

This CMD covers the following specific areas of waste management:

- waste characterization
- waste minimization
- waste management practices
- decommissioning plans

### 3.11.1 Trends

The following table indicates the overall rating for the waste management SCA over the current licensing period:

| WASTE MANAGEMENT  |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA  | SA   | SA   | SA   | SA   | SA   |
| <p style="text-align: center;"><b>Comments</b></p> <p>SRBT's Waste Management Program met applicable CNSC regulatory and performance objectives. CNSC staff monitor SRBT's implementation of this program through regular compliance verification activities.</p> |      |      |      |      |      |

### 3.11.2 Discussion

SRBT is required through their licence to implement and maintain a waste management program. SRBT maintains a waste management program [36] for their facility in compliance with CSA Group standards N292.0-14, *General principles for the management of radioactive waste and irradiated fuel* [37], N292.3-14, *Management of low- and intermediate-level radioactive waste* [38], and N292.5-11, *Guidelines for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances* [39]. In accordance with paragraph 3(k) of the [Class I Nuclear Facilities Regulations](#), SRBT was required to submit a decommissioning plan along with its application to operate a Class I nuclear facility. SRBT maintains a preliminary decommissioning plan (PDP) [40] for their facility in compliance with CSA Group standard N294-09, *Decommissioning of facilities containing nuclear substances* [41] and CNSC regulatory guide [G-219, Decommissioning Planning for Licensed Activities](#).

SRBT regularly assesses its waste management program and PDP to ensure the adequacy and effectiveness of its programs.

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

### 3.11.3 Summary

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

#### 3.11.3.1 Past Performance

##### Waste characterization, minimization, and management practices

The routine processing of tritium for the purposes of manufacturing gaseous tritium light sources and devices results in the generation of small quantities of tritium-contaminated waste materials. In order to manage these materials effectively and safely, SRBT implemented and maintains a waste management program that was submitted as part of their application for a licence renewal.

The Waste Management Program [36] includes a comprehensive set of subordinate procedures, all of which are aimed at ensuring that waste is minimized, appropriately classified and segregated, characterized for hazards, stored and processed safely, and cleared or managed in accordance with regulatory requirements. A detailed waste management policy is included in the Waste Management Program, which includes several principles that are followed when managing these materials.

Tritium-contaminated waste materials are characterized by qualified members of the SRBT Health Physics Team, and routinely directed through the most appropriate waste stream. Waste materials that are characterized as being contaminated to levels that exceed clearance levels are dispositioned through licensed radioactive waste management service providers.

SRBT manufactures radiation devices in the form of tritium-powered self-luminous safety signs and offers end-users a service for the return of expired or otherwise disused devices for management. As part of this service, SRBT safely dismantles devices that contain tritium light sources, so that the light sources may be either safely re-used, or managed through a licensed radioactive waste service provider as low-level radioactive waste. By dismantling the device and removing the light sources, the mass and volume of low-level radioactive waste generated is minimized.

SRBT details the number of expired tritium safety signs and devices processed, and the amount of low-level radioactive waste generated and safely managed as part of this process in their annual compliance reports submitted to the CNSC. Over the course of the current licence term, SRBT has processed over 150,000 tritium safety signs from various manufacturers, ensuring a closed-loop life cycle for the tritium light sources used in their products.

CNSC staff have reviewed the Waste Management Program, along with the additional information contained within the application, and find it to be satisfactory.

### **Decommissioning Plans**

On November 29, 2019, SRBT submitted an updated Preliminary Decommissioning Plan (PDP) and cost estimate for the decommissioning of their facility. CNSC staff accepted the revised PDP, including the cost estimate, on February 3, 2020. The updated cost estimate triggered an update to SRBT's financial guarantee as noted in section 5.3. This review was conducted prior to the submission of SRBT's licence renewal application, and is outside the scope of this CMD. Licence renewals do not inherently trigger an update to a PDP.



The CNSC requires SRBT to revise its PDP for their facility at a minimum every 5 years or when requested by the Commission or a person authorized by the Commission. CNSC staff expect the next scheduled update of the PDP and associated cost estimate in 2024.

### 3.11.3.2 Regulatory Focus

CNSC staff will continue to monitor and evaluate SRBT's compliance with regulatory requirements through regulatory oversight activities including inspections, review of compliance reports, and revisions to relevant program documentation.

### 3.11.3.3 Proposed Improvements

In their licence application [1], SRBT initially committed to revise the waste management program and bring it into compliance with the following CNSC Regulatory Document and CSA Group standard by December 31, 2021: [REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#), and CSA N292.0-19, *General principles for the management of radioactive waste* [42]. Following discussions with CNSC staff [43], SRBT revised its commitment and will incorporate the aforementioned documents along with the recently published CSA N292.8-21 *Characterization of radioactive waste and irradiated fuel* [44] into their Waste Management Program by December 31, 2022. CNSC staff will conduct a review of the updated waste management program once it has been revised.

In their licence application SRBT has committed to revise the PDP and bring it into compliance with the following CNSC Regulatory Document and CSA Group standard by the next scheduled submission in 2024: [REGDOC-2.11.2, Decommissioning](#) and CSA N294-19, *Decommissioning of facilities containing nuclear substances* [45].

### 3.11.4 Conclusion

Based on the assessment of SRBT's Waste Management Program, CNSC staff conclude that the program meets the applicable regulatory requirements.

Based on the previous assessment of SRBT's PDP [40], CNSC staff conclude that the PDP meets the applicable regulatory requirements.

### 3.11.5 Recommendation

Two standardized licence conditions are included in the proposed licence for the waste management SCA. Standardized licence condition 11.1 requires the licensee to implement and maintain a waste management program. Standardized licence condition 11.2 requires the licensee to maintain a decommissioning plan. Compliance verification criteria for these licence conditions are included in the draft LCH.

### 3.12 Security

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

This CMD covers the following specific areas of security:

- facilities and equipment
- response arrangements
- security practices

#### 3.12.1 Trends

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

| <b>SECURITY</b>  |             |             |             |             |             |
|--|-------------|-------------|-------------|-------------|-------------|
| <b>Overall Compliance Ratings</b>  |             |             |             |             |             |
| <b>2015</b>  | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
| SA   | SA          | SA          | SA          | SA          | SA          |
| <b>Comments</b>  |             |             |             |             |             |
| <p>SRBT has implemented and maintained a satisfactory security program that meets regulatory requirements under the GNSCR and Part 2 of the <a href="#">Nuclear Security Regulations</a> (NSR) to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment or information.</p> |             |             |             |             |             |

#### 3.12.2 Discussion

Part 2 of the NSR require that licence applications in respect of a nuclear facility set out in Schedule 2 of the NSR contain a description of physical protection measures to ensure compliance with sections 42 to 48 of the NSR as well as the proposed measures to control access to the site of the activity to be licensed, the nuclear substance, and the prescribed equipment or prescribed information.

This facility is identified as a named entity within Schedule 2 of the NSR. As such, and as identified by paragraph 40(1)(b) of the NSR, SRBT is subject to Part 2 of the NSR, specifically sections 39 to 48. Part 2 of the NSR provides additional requirements, specifically with regard to access control at the nuclear facility, facility access security clearance, entry of land vehicles, security of nuclear substances, arrangement with offsite response force and supervisory awareness program.

Furthermore, paragraph 12(1)(c) requires all licensees to take all reasonable precautions to maintain the security of nuclear facilities and of nuclear substances. SRBT is also subject to [REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1](#) that sets out the minimum security measures that licensees must implement to prevent the loss, sabotage, illegal use, illegal possession or illegal removal of sealed sources during their entire lifecycle, including while the sources are in storage, transport or being stored during transportation.

### 3.12.3 Summary

During the licensing period, CNSC staff conducted 2 focused inspections in 2015 and 2018. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections have been addressed to CNSC staff's satisfaction and are now closed.

As noted in Table 4, SRBT reported 1 security-related event in November 2016 related to the theft and recovery of a trailer containing expired signs destined to the SRBT facility.

SRBT has implemented and maintained a security program that meets regulatory requirements under the GNSCR and Part 2 of the NSR to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment or information.

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

#### 3.12.3.1 Past Performance

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

#### Facilities and Equipment

SRBT has implemented and maintained a facility 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. In addition, SRBT has identified processes for effectively testing and maintaining the security devices and assessment and detection systems. A qualified, independent third party performs maintenance of the facility security system at minimum every 6 months to meet regulatory requirements.

#### Response Arrangements

Alarm detection and assessment systems are continuously monitored by an alarm monitoring service company under contract with the licensee. SRBT has established a response protocol with the Pembroke Police Service to ensure timely offsite armed response, should a security-related incident occur.

## **Security Practices**

CNSC staff assessed and verified SRBT's implementation of the physical protection program from the access control perspective. Measures for controlling access to persons and vehicles were assessed as meeting regulatory requirements.

The licensee has implemented a satisfactory Facility Access Security Clearance (FASC) process that includes a Criminal Record Name Check for individuals with the FASC. Workers and contractors are required to have a valid FASC or be escorted at all times by a staff member with a valid FASC. In addition, SRBT has a security awareness program for all staff and a supervisory awareness program for managers and supervisors to enhance capabilities in identifying and responding to changes in employee behaviour. The facility's physical protection program includes administrative and technical measures that meet regulatory requirements for nuclear security.

Through ongoing compliance oversight, CNSC staff have confirmed that effective security measures have been implemented at the facility. The facility has been operating in a manner compliant with regulatory requirements for the security SCA. CNSC staff are satisfied that an effective security program has been implemented at the facility, and expect this to continue at SRBT.

### **3.12.3.2 Regulatory Focus**

CNSC staff will continue to monitor SRBT's performance for the security SCA through regulatory oversight activities, including onsite inspections and technical assessments of relevant program documentation.

### **3.12.3.3 Proposed Improvements**

No improvements within this SCA are proposed.

### **3.12.4 Conclusion**

CNSC staff conclude that SRBT has met regulatory requirements for the security SCA throughout the licensing period, and that the performance rating of "Satisfactory" is supported. CNSC staff will continue to monitor and provide regulatory oversight of SRBT's implementation and operation of their security program.

### **3.12.5 Recommendation**

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

### 3.13 Safeguards and Non-Proliferation

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

This SCA is not relevant to this CMD and therefore CNSC staff have not provided a rating. No IAEA safeguards activities have taken place at SRBT since the last licence renewal, and with respect to non-proliferation, SRBT does not currently possess any nuclear material of foreign origin or obligation.

#### 3.13.1 Discussion

SRBT maintains a small inventory (less than 10 kg) of depleted uranium that is used in its Pyrophoric Uranium Tritium Traps (PUTT).

The CNSC has applied for, and the IAEA has granted, an exemption for this material from safeguards. Therefore, IAEA reporting requirements and related verification activities for this material are held in abeyance until the material is de-exempted at the end of its lifecycle.

While SRBT does not have a licence condition in their licence under the safeguards and non-proliferation SCA, as a CNSC licensee, they are obligated under paragraph 12(1)(i) of the [General Nuclear Safety and Control Regulations](#) to take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement. In the event the IAEA requested information or access to the site, this requirement would ensure that the CNSC could confirm that Canada would continue to meet its safeguards obligations.

The import and export of controlled nuclear substances, equipment and information identified in the [Nuclear Non-proliferation Import and Export Control Regulations](#) (NNIECR) require separate authorization from the CNSC, consistent with subsection 3(2) of the GNSCR. CNSC [REGDOC-2.13.2, Import and Export](#) provides guidance on this type of authorization. SRBT currently maintains CNSC import and export licences and remains in compliance with the conditions of these licences, the NNIECR, as well as the NSCA with respect to the import/export of nuclear substances.

#### 3.13.2 Conclusion

A summary of the licensee's past performance, challenges and proposed improvements is not available for SRBT due to the lack of safeguards and non-proliferation related activities over the licensing period.

Based on CNSC staff's assessment of SRBT's licence application, CNSC staff conclude that the safeguards SCA is not applicable and a licence condition is not required.

### 3.14 Packaging and Transport

The packaging and transport SCA comprise of programs that cover the safe packaging and transport of nuclear substances to and from the licensed facility.

This CMD covers the following specific areas of packaging and transport:

- package design and maintenance
- packaging and transport

#### 3.14.1 Trends

The following table indicates the overall rating for the packaging and transport SCA over the current licensing period:

| PACKAGING AND TRANSPORT   |      |      |      |      |      |
|---|------|------|------|------|------|
| Overall Compliance Ratings  |      |      |      |      |      |
| 2015  | 2016 | 2017 | 2018 | 2019 | 2020 |
| SA  | SA   | SA   | SA   | SA   | SA   |
| <b>Comments</b>   |      |      |      |      |      |
| Throughout the licensing period, SRBT implemented and maintained a packaging and transport program that ensures the compliance with the applicable regulations. |      |      |      |      |      |

#### 3.14.2 Discussion

The following publications contain regulatory requirements that are relevant over the current licensing period:

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

The *Packaging and Transport of Nuclear Substances Regulation, 2015* apply to the packaging and transport of nuclear substances, including the design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage and unloading of packages.

SRBT is required to have appropriate training for personnel involved in the handling, offering for transport and transport of dangerous goods, and is required to issue a training certificate to those workers in accordance with the *Transportation of Dangerous Goods Regulations*.

#### 3.14.3 Summary

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

### 3.14.3.1 Past Performance

SRBT has developed and implemented a packaging and transport program [46] to ensure all shipments leaving their facility are in compliance with the *Packaging and Transport of Nuclear Substances Regulations, 2015* and the *Transportation of Dangerous Goods Regulations*. SRBT's packaging and transport program covers elements of package design and maintenance, and the registration for use of certified packages as required by the regulations. Details of CNSC's staff assessment are presented in the following paragraphs.

As noted in Table 4, there were 4 transport related events reported under the *Packaging and Transport of Nuclear Substances Regulations, 2015* for consignments transported to or from the SRBT facility. There was no impact to the health and safety of the public or SRBT staff, or the environment as a result of the events. All events are considered closed, and CNSC staff are satisfied with the actions taken by SRBT.

CNSC staff conducted 1 packaging and transport inspection at the SRBT facility in 2018. As a result of the inspection, there were no notices of non-compliance noted related to the packaging and transport SCA. CNSC staff concluded packaging and transport of nuclear substances at SRBT meets regulatory requirements and expectations.

### 3.14.3.2 Regulatory Focus

CNSC staff will continue to ensure shipments transported to and from the SRBT facility meet all regulatory requirements through the CNSC compliance verification program.

### 3.14.3.3 Proposed Improvements

Transport Canada has recently published a number of amendments to the [\*Transportation of Dangerous Goods Regulations\*](#). Although regulatory changes are minor, these revised regulations may have a small impact and SRBT will need to review its packaging and transport program to ensure continued compliance with the revised regulations.

## 3.14.4 Conclusion

Based on CNSC staff assessments of SRBT's licence application, supporting documents and past performance, SRBT's implementation of the packaging and transport SCA has met and continues to meet all applicable regulatory requirements.

## 3.14.5 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition 13.1 requires that the licensee implements and maintains a packaging and transport program. Compliance verification criteria for this licence condition is included in the draft LCH.

## 4. INDIGENOUS CONSULTATION AND ENGAGEMENT

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

### 4.1 Indigenous Consultation and Engagement

CNSC staff have identified Indigenous Nations and communities who may have an interest in or be potentially affected by the renewal of the SRBT licence. These groups include:

- The Algonquins of Ontario
- Algonquins of Pikwàkanagàn First Nation
- Algonquin Anishinabeg Nation Tribal Council
- Kitigan Zibi Anishinabeg First Nation
- Kebaowek First Nation
- The Métis Nation of Ontario

These Indigenous Nations and communities were identified due to the proximity of their communities, treaty areas and/or traditional territories and homelands to the SRBT facility, or due to previously expressed interest in being kept informed of CNSC licensed activities occurring in or proximal to their territories. The umbrella organization Anishinabek Nation was also notified of updates provided to their member nations, as previously requested.

#### **CNSC Staff Engagement Activities**

In September 2021, CNSC staff sent letters of notification to the Indigenous Nations and communities listed above. These letters provided information regarding the licence application and details on how to participate in the Commission's public hearing process, including information about the availability of participant funding to help support and enhance participation in the hearing process. CNSC staff followed up by phone, email and/or regularly scheduled meetings after each written notification to ensure that the notifications had been received and to answer any questions regarding the licence renewal application, the regulatory process, or participant funding. The Algonquins of Ontario and the Algonquins of Pikwàkanagàn First Nation applied for and were awarded participant funding. (see section 5.1).

All of the identified Indigenous Nations and communities have been encouraged to participate in the regulatory review process and in the public hearing to advise the Commission directly of any concerns they may have in relation to this licence renewal application. CNSC staff met with Kebaowek First Nation in October 2021 to provide an overview of the SRBT licence renewal application and details on how to participate in the Commission's public hearing process. CNSC staff also



encouraged SRBT to engage directly with Kebaowek First Nation to further discuss any concerns regarding the SRBT facility and activities including the licence renewal application. CNSC staff remain open to meeting all interested and potentially affected Indigenous Nations and communities to discuss this licence renewal application and encourage and maintain productive and respectful relationships.

To date, the identified Indigenous Nations and communities have not expressed any specific concerns with regards to SRBT's licence renewal application. Should any concerns be identified, CNSC staff will provide additional information with regards to on-going engagement activities, including any concerns expressed by Indigenous Nations and communities, to the Commission and the public in CNSC staff's presentation to the Commission and/or a supplemental CMD, if required.

### **Licensee Engagement Activities**

CNSC [REGDOC-3.2.2, \*Indigenous Engagement\*](#), sets out requirements and guidance for licensees whose proposed projects may raise the Crown's duty to consult. Based on the information received in the licensee's application, this licence renewal is not expected to cause any new adverse impacts to potential or established Indigenous and/or treaty rights and therefore does not raise the formal requirements of REGDOC-3.2.2.

SRBT has shared a copy of their licence renewal application, through mail and email, with the identified Indigenous Nations and communities, and committed to providing any information required or answer any questions regarding their operations and licence renewal application. These Indigenous Nations and communities are also target audiences in SRBT's Public Information Program, which commits to keeping the Nations and communities informed, offering further engagement, and responding to requests. SRBT has responded to requests from Indigenous Nations and communities for access to documentation related to the licence renewal application. To date, CNSC staff have not been made aware of any concerns expressed by Indigenous Nations and communities through SRBT's engagement activities.

CNSC staff encourage SRBT to continue engaging with the identified Indigenous Nations and communities regarding the SRBT facility and activities including the licence renewal application.

## **4.2 Conclusion**

Based on all information reviewed, including the information received in SRBT's licence renewal application, CNSC staff do not expect this licence renewal to cause any new adverse impacts to potential or established Indigenous and/or Treaty rights.

However, the CNSC is committed to meaningful, ongoing engagement with Indigenous Nations and communities that have an interest in or may be potentially affected by CNSC-regulated facilities and activities. CNSC staff engaged with the identified Indigenous Nations and communities in relation to this licence renewal application and encouraged them to identify any concerns and to participate in the regulatory review process, including the Commission hearing.

SRBT has informed and engaged with the identified Indigenous Nations and communities regarding this licence renewal application. CNSC staff encourage SRBT to continue to engage with interested Indigenous Nations and communities on this licence renewal application and other ongoing activities of interest.

## **5. OTHER MATTERS OF REGULATORY INTEREST**

### **5.1 Public Engagement**

As per its normal public notification process for Commission proceedings, CNSC staff informed the public via the CNSC's website, email subscription list, and social media channels of the public Commission hearing and availability of participant funding.

Part of CNSC's mission is to provide objective scientific and regulatory information to the public concerning nuclear activities. The availability and clarity of information pertaining to nuclear activities is essential to establishing an atmosphere of openness, transparency and trust between the licensee and the public. Licensees have an important role in informing the public about their nuclear facility and activities. Since 2012, the CNSC requires major licensees to develop and implement a public information program supported by a robust disclosure protocol that addresses local communities and stakeholders' needs.

CNSC staff annually report to the Commission and the public on the regulatory oversight of all nuclear substance facilities, including SRBT. The list of regulatory oversight reports are also available on the [CNSC's website](#). The public has the opportunity to review, question and comment on the regulatory oversight report. Through CNSC's Participant Funding Program (PFP), financial support was made available for participation in the review of this CMD.

CNSC staff will host a webinar in 2022 after submission of this CMD to the Secretariat to provide an overview of the CNSC regulatory process, information on the SRBT licence renewal application, how to participate in the licensing hearing, and to answer any questions from the participants. Additionally, there will be a focus on specific SCAs that are of interest to the public.

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

#### **5.1.1 Discussion**

The CNSC made up to \$50,000 available through its PFP to assist Indigenous peoples, members of the public, and stakeholders in participating in the regulatory process for SRBT's licence renewal application, including to provide value added information to the Commission through informed and topic-specific interventions. This funding was offered to review this CMD and SRBT's licence renewal application and associated documents, and to prepare for and participate in the Commission's public hearing.

The deadline for applications was October 29, 2021. A Funding Review Committee (FRC), independent from CNSC staff, reviewed the funding applications received, and made recommendations on the allocation of funding to eligible recipients. Based on the recommendations from the FRC, the CNSC awarded a total of \$39,218 in funding to the following recipients:

- The Algonquins of Ontario
- Algonquins of Pikwàkanagàn First Nation
- Anna Tilman
- Concerned Citizens of Renfrew County
- David Winfield

### **5.1.2 Conclusion**

CNSC staff continued to inform the public of regulatory activities through regular website updates, publicly webcast Commission proceedings, social media and discussion with key audiences in the Pembroke area.

Through the PFP, the CNSC has offered assistance to interested members of the public, Indigenous Nations and communities, and other stakeholders to prepare for and participate in the Commission's public hearing on SRBT's application to renew its licence.

## **5.2 Cost Recovery**

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

### **5.2.1 Discussion**

CNSC staff confirmed that SRBT is in good standing with respect to CRFR requirements and has paid their cost recovery fees in full. CNSC staff do not have concerns regarding payment of future cost recovery fees for this licensee.

### **5.2.2 Conclusion**

Based on previous performance there is no concern over the payment of future cost recovery fees.

### **5.2.3 Recommendation**

There is no requirement for any additional licensing activity or any additional licence conditions.

## **5.3 Financial Guarantees**

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

a financial guarantee for decommissioning are provided in [REGDOC-3.3.1, \*Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities\*](#), published in January 2021. Prior to that, a regulatory guidance and the associated acceptance criteria for establishing a financial guarantee were provided in the CNSC regulatory guide [G-206, \*Financial Guarantees for the Decommissioning of Licensed Activities\*](#).

A financial guarantee for decommissioning must be established to fund the activities described in a decommissioning plan. The financial guarantee shall be in a form acceptable to the Commission. SRBT currently maintains a financial guarantee for the decommissioning of their facility as per licence condition 1.3 of its current licence, NSPFOL-13.00/2022.

### 5.3.1 Discussion

Under its existing licence, SRBT currently maintains a financial guarantee valued at \$727,327.00 for the decommissioning of their facility, in the form of a cash fund held in escrow.

As discussed in Section 3.11.3 of this CMD on decommissioning plans, a revised and updated PDP was submitted to CNSC staff on November 29, 2019 [40]. CNSC staff accepted the revised PDP, including the revised cost estimate, on February 3, 2020. The cost estimate increased from the 2014 estimate of C\$652,488.00 to C\$727,327.000, thus necessitating an update to the financial guarantee.

On February 4, 2020, SRBT submitted the revised financial documentation, as well as a proposal to fully fund the financial guarantee to C\$727,327.00 by the end of April 2020. On April 24, 2020, SRBT provided evidence to CNSC staff that the financial guarantee was fully funded to the updated value in advance of consideration by the Commission during a hearing focused on the acceptability of the financial guarantee. Regulatory guide G-206 was in effect when reviewing the financial guarantee for SRBT in 2019/2020.

The [Record of Decision](#) on this matter was issued by the Commission on December 8, 2020, noting that the Commission accepted [46] SRBT's revised financial guarantee amount of C\$727,327.00.

Interest accrued on the funds deposited remain held in escrow over time; as a result, as of the end of March 2021, the financial guarantee is funded to C\$738,571.67, or 101.54% of the required guarantee of C\$727,327.00.

This review was conducted prior to the submission of SRBT's licence renewal application, and so is outside the scope of this CMD.

CNSC staff will require that SRBT implement REGDOC-3.3.1 for the next full revision of the SRBT financial guarantee expected in 2024.

### 5.3.2 Conclusion

SRBT currently has in place a financial guarantee that is valid and enforceable, and is sufficient to fund SRBT's decommissioning obligations.

### 5.3.3 Recommendation

One standardized licence condition is included in the proposed licence. Standardized licence condition G.3 requires the licensee to maintain a financial guarantee for decommissioning that is acceptable to the Commission.

## 5.4 Improvement Plan and Significant Future Activities

SRBT has not identified any significant future activities at the SRBT facility.

## 5.5 Licensee Public Information Program

A Public Information and Disclosure Program (PIDP) is a regulatory requirement for licence applicants and licensees of Class I nuclear facilities. These requirements are found in [REGDOC-3.2.1, Public Information and Disclosure](#).

The primary goal of the PIDP is to ensure that information related to the health, safety and security of persons and the environment, and other issues associated with the lifecycle of nuclear facilities are effectively communicated to the public.

The program must include a commitment to, and protocol for ongoing, timely communication of information related to the licensed facility during the course of the licence period.

CNSC's expectations of a licensee's public information program and disclosure protocol are commensurate with the level of risk of the facility, as well as the level of public interest in the licensed activities. The program and protocol may be further influenced by the complexity of the nuclear facility's lifecycle and activities, and the risks to public health and safety and the environment perceived to be associated with the facility and activities.

### 5.5.1 Discussion

SRBT is a nuclear substance processing facility and as such is required under its licence to maintain a PIDP as per REGDOC-3.2.1, Public Information and Disclosure.

During the current licence period, SRBT has been successful in meeting its public disclosure and reporting obligations. SRBT has made improvements to its [website](#), adopted social media platforms and documented its areas of community engagement (tours, media, government and stakeholder relations, and community events). Within their website, SRBT proactively publishes documents such as their Annual Compliance Reports, Preliminary Decommissioning Plan, Environmental Risk Assessment and Safety Analysis Report.

As expected, the COVID-19 pandemic has provided challenges for SRBT. However, they have detailed in their annual compliance reports, how they have addressed this, including adapting to more digital media as a means of disseminating information. Specific examples include but are not limited to:

- increased social media use
- ongoing website updates
- meetings with stakeholders

CNSC staff have reviewed SRBT's current PIDP [48] (revised on September 2021) and determined that the document:

- Identifies clear goals and objectives in terms of dissemination of information to targeted audiences.
- Identifies multiple target audiences such as:
  - Residents within 500 metres of the facility
  - Residents with wells or gardens monitored by SRBT
  - Local and adjacent businesses
  - Local media
  - Local Indigenous communities
  - Local elected officials
  - Local First Responders
  - Local special interests groups
- Provides contact information for the Health Physics & Regulatory Affairs Manager and additional staff, allowing members of the public to obtain additional information.
- Provides key topics intended for sharing with target audience and/or other interested parties.
- Outlines communications tactics that SRBT will deploy to reach target audiences:
  - Newsletters
  - Email lists
  - Website content
  - Facility tours
  - Social media
  - Public meetings
  - Public advertisements, volunteering, community investment and community relations activities

SRBT has committed to refine and update its PIDP on a regular basis to meet the changing information needs of its target audiences.

CNSC staff will continue to monitor SRBT's compliance against their public information requirements and ensure ongoing implementation and revising of their PIDP.

## 5.5.2 Conclusion

CNSC staff concluded that SRBT's current PIDP meets regulatory requirements for public information and disclosure. CNSC staff continue to oversee SRBT's implementation of the PIDP to ensure that it meets obligations regarding disseminating and notifying the public and Indigenous communities on its licensed activities.

## 5.5.3 Recommendation

One standardized licence condition is included in the proposed licence. Standardized licence condition G.4 requires the licensee to implement and maintain a PIDP. Compliance verification criteria for these licence conditions are included in the draft LCH.

## 5.6 Licence Period

SRBT has submitted an application [1] with a request to renew its CNSC-issued operating licence for the SRBT for a period of 15 years.

### 5.6.1 Discussion

CNSC staff note that the length of a licence term does not impact the effectiveness of CNSC staff's compliance verification program. It also does not impact the authority of the Commission to amend, suspend, revoke or replace the licence, including the establishment of new licence conditions at any time.

As discussed in section 2.2, SRBT is a medium-risk facility with hazards that are well understood and characterized, and the licensee has well-established and effective programs for their mitigation. The potential risks from physical stressors, as well as from radiological and hazardous releases to the atmospheric, hydrogeological, aquatic, terrestrial and human environments from the SRBT facility are negligible, resulting in no significant adverse effects. The predictions documented in the ERA have been validated through actual measurements over an extended period of time. Over the course of the current licence period, there were no offsite consequences from reported events as noted in table 3.

SRBT's primary licensed activities, compared to other Class I facilities, are significantly less complex and expected to remain stable over the proposed licence period. SRBT's performance over the current licence period has been consistent, with worker doses kept low, worker injuries kept to a minimum. Effluent releases have been consistently below licence limits and all provincial and federal guidelines. The potential risks to the environment from these releases are similar to natural background and the potential risks to human health are indistinguishable to health outcomes in the general public.

CMD 02-M12 *New Staff Approach to Recommending Licence Periods* [49] presents a risk-informed process on the basis for recommending licence periods to the Commission. CNSC staff evaluated the criteria for making recommendations to the Commission on licence periods as per CMD 02-M12 and find that a 15-year licence period is justified considering:

| <b>PROPOSED CHANGES TO THE LICENCE PERIOD</b>   |   |
|---|---|
| <b>CMD 02-M12 Licence Period Criteria</b>   | <b>CNSC Staff Position for 15-year Licence</b>  |
| <p><i>The recommended duration of the licence should be commensurate with the licensed activity.</i></p>  | <p>CNSC staff do not consider the licensed activities covered under NSPFOL-13.00/2022 to be complex. SRBT's primary licensed activities involve coating glass tubes with phosphor and filling the glass tubes with tritium gas to create self-illuminating lights. These light sources are assembled into emergency exit signs, landmine markers and other safety products not requiring batteries or other external sources of power.</p> <p>There are adequate programs in place to safely manage the hazards associated with licensed activities at the SRBT facility. A 15-year licence period is appropriate and commensurate with the licensed activity.</p>  |
| <p><i>A longer licence period can be recommended when 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.</i></p> | <p>Hazards associated with the licensed activities are well characterized and their impacts are well predicted and within the scope in the environmental safety case. This is documented through SRBT's Safety Analysis Report [6], Environmental Risk Assessment [33] and Fire Hazard Assessment [11]. CNSC staff have reviewed these documents and considered them to be acceptable. These documents are part of the licensing basis for the SRBT facility and are reviewed at a minimum on a 5-year frequency or if there are any significant changes to the facility.</p> <p>CNSC staff have also prepared an Environmental Protection Review Report [Appendix E] that summarizes CNSC staff's technical assessment of how effectively SRBT is protecting human health and the environment in the community in which they are operating.</p> <p>Based on CNSC staff's assessment of SRBT's EP documentation, CNSC staff concluded that the potential risks from physical stressors, as well as from radiological and hazardous releases to the atmospheric, hydrogeological, aquatic, terrestrial and human environments from the SRBT facility are negligible, resulting in no significant adverse effects. The potential risks to the environment from these releases are similar to natural background and</p> |



| <b>PROPOSED CHANGES TO THE LICENCE PERIOD</b>   |  |
|---|--|
| <b>CMD 02-M12 Licence Period Criteria</b>   | <b>CNSC Staff Position for 15-year Licence</b>   |
|   | <p>the potential risks to human health are indistinguishable to health outcomes in the general public. Therefore, CNSC staff concluded that SRBT implements and maintains effective EP measures to adequately protect the environment and the health of persons. CNSC staff will continue to verify and ensure that, through ongoing licensing and compliance activities and reviews, the environment and the health of persons are protected.</p>   |
| <p><i>A longer licence period can be recommended when licensees have in place a management system, such as a quality assurance program, to provide assurance that their safety-related activities are effective and maintained.</i></p> | <p>As noted in section 3.1, SRBT has a management system that meets the requirements of CSA N286-12. CNSC staff have inspected SRBT's management system and found that it meets the requirements of CSA N286-12.</p>   |
| <p><i>A longer licence period can be recommended when effective compliance programs are in place on the part of both the applicant/licensee and the CNSC.</i></p>   | <p>The CNSC has a robust and effective compliance verification program to ensure that there is adequate regulatory oversight over the licensed activities at SRBT. CNSC staff verify compliance through desktop reviews, inspections and event reviews.</p> <p>CNSC has conducted 13 inspections at SRBT over the current licence period (2015-present) as noted in section 3.3.</p> <p>Findings from these inspections are documented in inspection reports and provided to the licensee to take action.</p> <p>In addition, CNSC staff report on the compliance performance of SRBT to the Commission in public meetings, through the <a href="#"><i>Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities</i></a>. During the current licence period, SRBT's performance in all applicable SCAs has been rated as satisfactory or better.</p> |
| <p><i>A longer licence period can be recommended when the licensee has shown a consistent and good history of operating experience and compliance in carrying out the licensed activity.</i></p>  | <p>SRBT's performance over the current licensing period shows a consistent and good operating history. Worker doses are kept low (section 3.7), worker injuries are kept to a minimum (section 3.8), effluent releases are consistently below licence limits (section 3.9) and radiological impacts to members of the</p>  |

| <b>PROPOSED CHANGES TO THE LICENCE PERIOD</b>  |  |
|--|--|
| <b>CMD 02-M12 Licence Period Criteria</b>  | <b>CNSC Staff Position for 15-year Licence</b>   |
|  | <p>public as a result of licensed activities are very low (table 12).</p> <p>SRBT has a program [10] to report events to the CNSC in accordance with regulatory requirements. Events during the licence period have been minor in nature as noted in section 3.3.</p>  |
| <p><i>The licence period must be consistent with the requirements of the <a href="#">CNSC Cost Recovery Fees Regulations</a>.</i></p>                                | <p>As per section 5.2, SRBT is currently in good standing with the <a href="#">CNSC Cost Recovery Fees Regulations</a>.</p>  |
| <p><i>The licence period should take account of the planning cycle of the facility and the licensee's plans for any significant change in licensed activity.</i></p> | <p>SRBT has noted that its operations are stable and there are no foreseen changes to the licensed activities for the requested licence period.</p> <p>CNSC staff consider the 15-year licence to be appropriate as there would be no major changes to the safety case or anything that would impact the licensing basis. Improvements to the licensee's operations and programs can be done within the existing CNSC compliance verification framework.</p> |

## 5.6.2 Conclusion

Given the above analysis, CNSC staff conclude that a 15-year licence period is appropriate. SRBT's performance has been consistent and adequate over the current licence period and reporting processes are in place to monitor performance over the proposed licensing period.

## 5.6.3 Recommendation

It is recommended that the Commission grant a licence to SRBT for a period of 15 years.

## 5.7 Licence Conditions Handbook

The LCH associated with the SRBT's operating licence for this facility provides compliance verification criteria used to determine whether the conditions in the licence have been met. The LCH sets out how CNSC staff will assess SRBT's compliance with the licence. It provides details associated with each licence condition, such as applicable CSA Group standards and CNSC regulatory documents, regulatory interpretation, compliance verification criteria, version-controlled documents, licensees' written notification documents and guidance. The Commission does not make any decision with respect to the LCH and it is not a part of the licence or the licensing basis. Consequently, changes may be made to

the LCH by CNSC staff, so long as the compliance verification criteria remain within the licensing basis as authorized by the Commission. This structure allows more freedom for the facility to evolve and update its documentation within the licensing basis. The draft LCH for the SRBT facility is included for the information of the Commission and can be found in Part Two of this CMD.

## 5.8 Delegation of Authority

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

There is 1 proposed licence condition, LC 3.2 Reporting Requirements, in the proposed SRBT licence, NSPFL-13.00/2037 that contains the phrase “the Commission or a person authorized by the Commission”:

CNSC staff recommend that the Commission delegate its authority for the purposes described in the above licence condition to the following staff:

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

## 6. OVERALL CONCLUSIONS AND RECOMMENDATIONS

CNSC staff’s conclusions and recommendations consider an overall assessment of SRBT’s compliance with the NSCA and its regulations during the current licence period (2015-2020). SRBT has programs, resources, and measures in place at the SRBT facility to ensure the health and safety of persons and the environment and of the measures related to security and Canada’s international obligations during the proposed licence period.

CNSC staff’s assessment determined that the application complies with the regulatory requirements. CNSC staff concluded that SRBT’s performance during the current licensing term was satisfactory and met regulatory requirements.

Based on the above conclusions, CNSC staff recommend the Commission:

1. Renew SRBT’s nuclear substance facility processing licence for the SRBT facility for a period of 15-years effective July 1, 2022 to June 30, 2037.
2. Delegate authority as set out in section 5.8 of this CMD.

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## GLOSSARY

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

Additional terms and acronyms used in this CMD are listed below.

| <b>Acronym</b> | <b>Term</b>   |
|----------------|---|
| AANTC          | Algonquin Anishinabeg Nation Tribal Council           |
| ALARA          | As low as reasonably achievable                       |
| AOO            | Algonquins of Ontario                                 |
| BE             | Below Expectations                                    |
| Bq             | Becquerel   |
| CINFR          | <i>Class I Nuclear Facilities Regulations</i>         |
| CMD            | Commission Member Document                            |
| CRFR           | <i>Cost Recovery Fees Regulations</i>                 |
| CSA            | CSA Group (formerly Canadian Standards Association)   |
| DRL            | Derived Release Limits                                |
| ECR            | Engineering Change Request                            |
| EMS            | Environmental Management System                       |
| EP             | Emergency Preparedness                                |
| EPR            | Environmental Protection Review                       |
| ERA            | Environmental Risk Assessment                         |
| FASC           | Facility Access Security Clearance                    |
| FHA            | Fire Hazard Assessment                                |
| FPP            | Fire Protection Program                               |
| FRC            | Funding Review Committee                              |
| FS             | Fully Satisfactory                                    |
| GBq            | Gigabecquerel   |
| GNSCR          | <i>General Nuclear Safety and Control Regulations</i> |
| GTLS           | Gaseous Tritium Light Source                          |
| HT             | Elemental tritium gas                                 |
| HTO            | Tritium Oxide   |
| IAA            | <i>Impact Assessment Act</i>                          |
| IAEA           | International Atomic Energy Agency                    |

|        |  |
|--------|--|
| IEMP   | Independent Environmental Monitoring Program                           |
| ITM    | Inspection, Testing and Maintenance                                    |
| LCH    | Licence Conditions Handbook  |
| LTI    | Lost-time injury   |
| MDA    | Minimum detectable activity  |
| MECP   | Ontario Ministry of the Environment, Conservation and Parks            |
| MOU    | Memorandum of Understanding  |
| mSv    | Millisievert   |
| NEW    | Nuclear Energy Worker  |
| NNIECR | <i>Nuclear Non-Proliferation Import and Export Control Regulations</i> |
| NBCC   | National Building Code of Canada                                       |
| NFCC   | National Fire Code of Canada   |
| NSCA   | <i>Nuclear Safety and Control Act</i>                                  |
| NSPFL  | Nuclear Substance Processing Facility Licence                          |
| NSPFOL | Nuclear Substance Processing Facility Operating Licence                |
| NSR    | <i>Nuclear Security Regulations</i>                                    |
| PDP    | Preliminary Decommissioning Plan                                       |
| PFD    | Pembroke Fire Department   |
| PIDP   | Public Information and Disclosure Program                              |
| PUTT   | Pyrophoric Uranium Tritium Trap  |
| REGDOC | Regulatory Document  |
| RP     | Radiation Protection   |
| SA     | Satisfactory   |
| SAR    | Safety Analysis Report   |
| SAT    | Systematic Approach to Training  |
| SCA    | Safety and Control Area  |
| SI     | International System of Units  |
| SRBT   | SRB Technologies (Canada) Inc.   |
| SSC    | Systems, structures and components                                     |
| UA     | Unacceptable   |



## A. RISK RANKING

The CNSC uses a risk-informed regulatory approach in the management and control of regulated facilities and activities. CNSC staff have therefore established an approach to identifying appropriate levels of regulatory monitoring and control for specific classes of licensed facilities and types of licensed activities based on risk ranking.

Risk ranking is applied to each SCA and is determined by considering the probability and consequence of adverse incidents associated with each SCA as it relates to the given facility and activity types.

The methodology used to determine risk ranking is based on Canadian Standards Association guideline CAN/CSA-Q850, Risk Management: Guideline for Decision Makers. This guideline provides a description of the major components of the risk management decision process and their relationship to each other, and describes a process for acquiring, analyzing, evaluating, and communicating information that is necessary for making decisions.

In section 2.2 of the CMD, in the Relevant Safety Control Areas table, the “Risk Ranking” column shows a high (H), moderate (M) or low (L) indicator for each SCA that is relevant to the current facility and activities being addressed in this CMD. The risk rankings are not static and will change over time for a given facility and activities (e.g., facilities age, facilities and equipment are upgraded, activities cease or begin, licensees change, technology and programs mature, knowledge and understanding of impacts and probabilities increase, etc.).

The following matrix provides a high-level overview of risk ranking, and the management and monitoring approach associated with the various degrees of risk.

| <b>APPROACH TO ASSESSING AND MANAGING POTENTIAL RISK</b> |   |  |  |
|--|---|--|--|
| <b>CONSEQUENCE</b>                                       |   | <b>MANAGEMENT/MONITORING APPROACH</b>                |  |
| <b>Significant Impact</b>                                | Considerable management of risk is required | Must manage and monitor risk with occasional control | Extensive management is essential. Constant monitoring and control |
| <b>Moderate Impact</b>                                   | Occasional monitoring                       | Management effort is recommended                     | Management effort and control is required                          |
| <b>Low Impact</b>  | Random monitoring                           | Regular monitoring                                   | Manage and monitor   |
| <b>Probability of Occurrence</b>                         | Unlikely to Occur                           | Might Occur  | Expected to Occur  |
| <b>RISK RANKING SCALE</b>                                |   |  |  |
| <b>L</b>   | Low Risk                                    | <b>M</b>   | Moderate Risk  |
|  |   | <b>H</b>   | High Risk  |

On this basis, a high-risk SCA would be subject to increased regulatory scrutiny and control while a low-risk SCA would generally require minor verification and control.

## **B. SAFETY PERFORMANCE RATING LEVELS**

### **Fully Satisfactory (FS)**

Safety and control measures implemented by the licensee are highly effective. In addition, compliance with regulatory requirements is fully satisfactory, and compliance within the safety and control area (SCA) or specific area exceeds requirements and CNSC expectations. Overall, compliance is stable or improving, and any problems or issues that arise are promptly addressed.

### **Satisfactory (SA)**

Safety and control measures implemented by the licensee are sufficiently effective. In addition, compliance with regulatory requirements is satisfactory. Compliance within the SCA meets requirements and CNSC expectations. Any deviation is minor and any issues are considered to pose a low risk to the achievement of regulatory objectives and CNSC expectations. Appropriate improvements are planned.

### **Below Expectations (BE)**

Safety and control measures implemented by the licensee are marginally ineffective. In addition, compliance with regulatory requirements falls below expectations. Compliance within the SCA deviates from requirements or CNSC expectations to the extent that there is a moderate risk of ultimate failure to comply. Improvements are required to address identified weaknesses. The licensee is taking appropriate corrective action.

### **Unacceptable (UA)**

Safety and control measures implemented by the licensee are significantly ineffective. In addition, compliance with regulatory requirements is unacceptable and is seriously compromised. Compliance within the SCA is significantly below requirements or CNSC expectations, or there is evidence of overall non-compliance. Without corrective action, there is a high probability that the deficiencies will lead to unreasonable risk. Issues are not being addressed effectively, no appropriate corrective measures have been taken and no alternative plan of action has been provided. Immediate action is required.

## C. BASIS FOR THE RECOMMENDATION(S)

### C.1 Regulatory Basis

The recommendations presented in this CMD are based on compliance objectives and expectations associated with the relevant SCAs and other matters. The regulatory basis for the matters that are relevant to this CMD are as follows.

#### Management System

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

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

#### Human Performance Management

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

- The [\*Class I Nuclear Facilities Regulations\*](#) require that an application for a licence shall contain, under paragraphs:
  - 3(d.1), the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty.
  - 6(m), the proposed responsibilities of and the qualification requirements and training program for workers, including the procedures for the requalification of workers
  - 6(n), the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.
- The [\*General Nuclear Safety and Control Regulations\*](#) require that licensees, under paragraphs:

- 12(1)(a), ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence.
- 12(1)(b), train the workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence.
- 12(1)(e), require that every person at the site of the licensed activity to use equipment, devices, clothing and procedures in accordance with the Act, the regulations made under the Act and the licence.

### **Operating Performance**

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

- The [\*Class I Nuclear Facilities Regulations\*](#) require that an application for a licence to operate a Class I nuclear facility shall contain, under paragraph:
  - 6(d), the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

### **Safety Analysis**

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

- The [\*General Nuclear Safety and Control Regulations\*](#) require that an application for a licence shall contain, under paragraph:
  - 3(1)(i), a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.
- The [\*Class I Nuclear Facilities Regulations\*](#) require that an application for a licence shall contain, under paragraphs:
  - 6(c), a final safety analysis report demonstrating the adequacy of the design of the nuclear facility.
  - 6(h), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects.

### **Physical Design**

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

- Paragraph 3(1)(d) of the [\*General Nuclear Safety and Control Regulations\*](#) requires that an application for a licence shall contain a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.
- The [\*Class I Nuclear Facilities Regulations\*](#) require that an application for a licence shall contain, under paragraphs:
  - 3(a), a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;

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

### **Fitness for Service**

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

- The [Class I Nuclear Facilities Regulations](#) require that an application for a licence shall contain, under paragraph:
  - 6(d), the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

### **Radiation Protection**

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

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

### **Conventional Health and Safety**

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

- The [Class I Nuclear Facilities Regulations](#) require that an application for a licence shall contain, under paragraph:

- 3(f), the proposed worker health and safety policies and procedures.
- SRBT's activities and operations must comply with the [Canada Labour Code, Part II: Occupational Health and Safety](#).

### **Environmental Protection**

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

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

### **Emergency Management and Fire Protection**

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

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

- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 6(k) information on the licensee's proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to:
    - Assist offsite authorities in planning and preparing to limit the effects of an accidental release;
    - Notify offsite authorities of an accidental release or the imminence of an accidental release;
    - Report information to offsite authorities during and after an accidental release;
    - Assist offsite authorities in dealing with the effects of an accidental release; and
    - Test the implementation of the measures to prevent or mitigate the effects of an accidental release.

### **Waste Management**

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

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

### **Security**

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

- It is a requirement of all Class I licensees to comply with the [Nuclear Security Regulations](#).

### **Packaging and Transport**

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

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

### **Decommissioning Plan and Financial Guarantees**

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

- The *General Nuclear Safety and Control Regulations* require that an application for a licence shall contain, under paragraph:

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

**Licensee's Public Information Program**

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



## C.2 Detailed Summary of CNSC Assessment of Application

CNSC staff's assessment of SRBT's licence application included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements. The completeness check verified whether the application included the prescribed information in accordance with the [Nuclear Safety and Control Act](#) and its Regulations. The sufficiency check verified whether the application included sufficient and quality information in order for CNSC staff to conduct the technical assessment. The technical assessment verified whether the application included adequate safety and control measures to address CNSC requirements. Documents originally submitted as part of the application may have been revised, updated or replaced over the course of the assessment in order to address CNSC requirements. Additional information and clarifications on the application and supporting documents was provided by SRBT and is considered part of the application.

| Pursuant to Subsection 3 of the <i>General Nuclear Safety and Control Regulations</i><br>Licences – General Application Requirements                            | Description of How <a href="#">Application</a> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|---|--|-----------|-------------|-----------|
| <b>(1) An application for a licence shall contain the following information:</b>  |  |           |             |           |
| (a) the applicant's name and business address;  | Part 2 (a) includes the applicant's name and business address  | Yes       | Yes         | Yes       |
| (b) the activity to be licensed and its purpose;  | Part 2 (b) describes the activity to be licensed and its purpose.  | Yes       | Yes         | Yes       |
| (c) the name, maximum quantity and form of any nuclear substance to be encompassed by the licence;  | Part 2 (c) describes the nuclear substances to be encompassed by the licence, including maximum quantities and form.   | Yes       | Yes         | Yes       |
| (d) a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence;                                     | Part 4 (a) and (b) include references to comprehensive description of the SSCs that comprise the facility and its equipment to be encompassed by the licence | Yes       | Yes         | Yes       |
| (e) the proposed measures to ensure compliance with the <a href="#">Radiation Protection Regulations</a> , the <a href="#">Nuclear Security Regulations</a> and | Part 5 (a) describes the measures proposed to ensure compliance with the <a href="#">Radiation Protection Regulations</a> . Part 5 (f)                       | Yes       | Yes         | Yes       |

| <p><b>Pursuant to Subsection 3 of the <i>General Nuclear Safety and Control Regulations</i></b><br/><b>Licences – General Application Requirements</b></p>               | <p><b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b></p>  | <p><b>Complete?</b></p> | <p><b>Sufficient?</b></p> | <p><b>Adequate?</b></p> |
|--|--|-------------------------|---------------------------|-------------------------|
| <p>the <a href="#"><i>Packaging and Transport of Nuclear Substances Regulations, 2015</i></a>;</p>   | <p>describes the measures proposed to ensure compliance with the <i>Nuclear Security Regulations</i>. Part 5 (h) describes the measures proposed to ensure compliance with the <i>Packaging and Transport of Nuclear Substances Regulations, 2015</i>.</p>   |                         |                           |                         |
| <p>(f) any proposed action level for the purpose of section 6 of the <a href="#"><i>Radiation Protection Regulations</i></a>;</p>  | <p>Part 5 (a) refers to SRBT management system document Licence Limits, Action Levels and Administrative Limits, which describes the proposed action levels for the purpose of section 6 of the <i>Radiation Protection Regulations</i>, and is included as Appendix {13} with this application.</p> | <p>Yes</p>              | <p>Yes</p>                | <p>Yes</p>              |
| <p>(g) the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information;</p> | <p>Part 5 (f) describes the measures proposed to ensure compliance with the <i>Nuclear Security Regulations</i>, including controlling access to the site of the activity to be licensed, and the nuclear substances and equipment encompassed by the licence.</p>                                   | <p>Yes</p>              | <p>Yes</p>                | <p>Yes</p>              |
| <p>(h) the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information;</p>         | <p>Part 5 (f) describes the measures proposed to ensure compliance with the <i>Nuclear Security Regulations</i>, including preventing the loss or illegal use, possession or removal of the nuclear substances and equipment encompassed by the licence.</p>   | <p>Yes</p>              | <p>Yes</p>                | <p>Yes</p>              |

| <p><b>Pursuant to Subsection 3 of the <i>General Nuclear Safety and Control Regulations</i></b></p> <p><b>Licences – General Application Requirements</b></p>  | <p><b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b></p>  | <p><b>Complete?</b></p> | <p><b>Sufficient?</b></p> | <p><b>Adequate?</b></p> |
|--|--|-------------------------|---------------------------|-------------------------|
| <p>(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;</p>   | <p>Part 4 (a) notes that the application includes several references to documented analyses, in support of substantiating the information included in this application. These include:</p> <ul style="list-style-type: none"> <li>• Safety Analysis Report – Appendix {10}</li> <li>• Derived Release Limits – Appendix {15}</li> <li>• Environmental Risk Assessment – Appendix {16}</li> <li>• Comprehensive Report – Groundwater Studies – Appendix {17}</li> <li>• Fire Hazard Assessment – Appendix {18}</li> <li>• Conditional Clearance Levels – Appendix {19}</li> </ul> | <p>Yes</p>              | <p>Yes</p>                | <p>Yes</p>              |
| <p>(j) the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste;</p> | <p>Part 5 (e) includes information pertaining to the radioactive and hazardous wastes that may result from the activity to be licensed, as described in the SRBT Waste Management Program, which is included as Appendix {34} to this application.</p>   | <p>Yes</p>              | <p>Yes</p>                | <p>Yes</p>              |
| <p>(k) the applicant’s organizational management structure insofar as it may bear on the applicant’s compliance with the <u>Act</u> and the regulations made under the <u>Act</u>, including the internal allocation of</p>  | <p>Part 3 (a) describes the organizational management structure, insofar as it may bear on compliance with the act. A full description of the organization and its structure is found in SRBT management system</p>  | <p>Yes</p>              | <p>Yes</p>                | <p>Yes</p>              |

| <b>Pursuant to Subsection 3 of the <i>General Nuclear Safety and Control Regulations</i></b><br><b>Licences – General Application Requirements</b>  | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>                             | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|--|------------------|--------------------|------------------|
| functions, responsibilities and authority;  | document Organizational Structure and Responsibilities, which is included as Appendix {4}.                             |                  |                    |                  |
| (l) a description of any proposed financial guarantee relating to the activity to be licensed; and  | The proposed financial guarantee relating to the activity to be licence is described in Part 6 (a) of the application. | Yes              | Yes                | Yes              |
| (m) any other information required by the <u>Act</u> or the regulations made under the <u>Act</u> for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence. | Part 6 contains all other information requested by CNSC staff as part of this application.                             | Yes              | Yes                | Yes              |

| <b>Pursuant to Subsection 5 of the <i>General Nuclear Safety and Control Regulations</i></b><br><b>Licences – Application for Renewal of Licence</b>   | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>  | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|--|---|------------------|--------------------|------------------|
| 5. An application for the renewal of a licence shall contain<br>(a) the information required to be contained in an application for that licence by the applicable regulations made under the Act ; and | SRBT is applying for renewal of a nuclear substance processing facility operating licence, as a Class IB nuclear facility. The licence application requirements of both the <i>Class I Nuclear Facilities Regulations</i> and the <i>Nuclear Substances and Radiation Devices Regulations</i> are both met by this application. | Yes              | Yes                | Yes              |
| (b) a statement identifying the changes in the information that was previously submitted.  | Part 2 (f) includes this statement.   | Yes              | Yes                | Yes              |

| <b>Pursuant to Subsection 15 of the <i>General Nuclear Safety and Control Regulations</i> Obligations – Representatives of Applicants and Licensees</b>   | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b> | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|--|------------------|--------------------|------------------|
| 15. Every applicant for a licence and every licensee shall notify the Commission of:  |  |                  |                    |                  |
| a) the persons who have authority to act for them in their dealings with the Commission;  | Part 2 (d) includes this information.  | Yes              | Yes                | Yes              |
| b) the names and position titles of the persons who are responsible for the management and control of the licensed activity and the nuclear substance, nuclear facility, prescribed equipment or prescribed information encompassed by the licence; | Part 2 (d) includes this information.  | Yes              | Yes                | Yes              |
| c) any change in the information referred to in paragraphs (a) and (b), within 15 days after the change occurs.   | No change to this information has taken place in the current licence period.               | Yes              | Yes                | Yes              |

| <b>Pursuant to Subsection 3 of the <i>Class I Nuclear Facilities Regulations</i> Licence Applications – General Requirements</b>  | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>      | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|---|------------------|--------------------|------------------|
| 3. An application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain the following information in addition to the information required by section 3 of the <a href="#">General Nuclear Safety and Control Regulations</a> : |   |                  |                    |                  |
| (a) a description of the site of the activity to be licensed, including the location of any exclusion zone and any  | Part 4 (a) refers to the SRBT Safety Analysis Report, which includes comprehensive descriptions | Yes              | Yes                | Yes              |

| Pursuant to Subsection 3 of the <i>Class I Nuclear Facilities Regulations</i><br>Licence Applications – General Requirements                  | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT  | Complete? | Sufficient? | Adequate? |
|---|--|-----------|-------------|-----------|
| structures within that zone;  | of the site of the activity to be licensed, including the location of the exclusion zone and the structures within said zone, as defined in the <i>Class I Nuclear Facilities Regulations</i> . The SAR is included as Appendix {10} to the application.   |           |             |           |
| (b) plans showing the location, perimeter, areas, structures and systems of the nuclear facility;   | Part 4 (a) refers to the SRBT Safety Analysis Report, which contains these plans and descriptions. The SAR is included as Appendix {10} to the application.  | Yes       | Yes         | Yes       |
| (c) evidence that the applicant is the owner of the site or has authority from the owner of the site to carry on the activity to be licensed; | Part 2 (e) refers to a letter from the owner of the site, which is included as Appendix {2} to the application.<br>The letter notes that SRBT has the authority to carry on the activity to be licensed.   | Yes       | Yes         | Yes       |
| d) the proposed management system for the activity to be licensed, including measures to promote and support safety culture;                  | Part 3 (a) describes all aspects of the proposed management system to be implemented for the activity to be licensed, including measures to promote and support safety culture. Several referenced management system documents are included as Appendices to the application in support of this information. | Yes       | Yes         | Yes       |
| (d.1) the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty.         | Part 3 (b) describes all aspects of the human performance management program proposed for the activity to be licensed, including measures to   | Yes       | Yes         | Yes       |

| Pursuant to Subsection 3 of the <i>Class I Nuclear Facilities Regulations</i><br><b>Licence Applications – General Requirements</b>                   | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>   | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|--|------------------|--------------------|------------------|
|   | ensure workers' fitness for duty. The SRBT Training Program Manual is included as Appendix {8} to the application in support of this information.  |                  |                    |                  |
| (e) the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on; | Part 2 (c) describes the nuclear substances to be encompassed by the licence, including maximum quantities and form. Part 5 (c) describes the Environmental Risk Assessment for the facility, which includes a comprehensive description of all conventionally hazardous substances that may be onsite while the activity is carried on. This assessment is included as Appendix {16} to this licence application. | Yes              | Yes                | Yes              |
| (f) the proposed worker health and safety policies and procedures;  | Part 5 (b) describes the proposed worker health and safety policies and procedures. The Health and Safety Policy and Hazard Prevention Program documents are included as Appendices {24} and {25}, respectively, to this licence application.  | Yes              | Yes                | Yes              |
| (g) the proposed environmental protection policies and procedures;  | Part 5 (c) describes the proposed Environmental Management System for the activities to be licensed, including several subordinate protection programs, which are included as Appendices to this application.  | Yes              | Yes                | Yes              |

| Pursuant to Subsection 3 of the <i>Class I Nuclear Facilities Regulations</i><br>Licence Applications – General Requirements   | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
| (h) the proposed effluent and environmental monitoring programs;   | Part 5 (c) describes the proposed Environmental Management System for the activities to be licensed, including several subordinate monitoring programs, which are included as Appendices to this application. | Yes       | Yes         | Yes       |
| (i) if the application is in respect of a nuclear facility referred to in paragraph 2(b) of the <i>Nuclear Security Regulations</i> , the information required by section 3 of those Regulations;  | N/A<br>The facility to be licensed is not a nuclear power plant.  | N/A       | N/A         | N/A       |
| (j) the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed; and | Part 6 (b) describes the Public Information Program, which represents the proposed program in question.<br>This program is included as Appendix {38} to this application.                                     | Yes       | Yes         | Yes       |
| (k) the proposed plan for the decommissioning of the nuclear facility or of the site.  | Part 5 (e) describes the Preliminary Decommission Plan, which represents the proposed plan for decommissioning the facility. The PDP is included as Appendix {36} to this application.                        | Yes       | Yes         | Yes       |

| Pursuant to Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i><br>Licence Applications – Licence to Operate | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
| 6. An application for a licence to operate a Class I nuclear facility shall contain the following                          |   |           |             |           |



| Pursuant to Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i> Licence Applications – Licence to Operate               | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT  | Complete? | Sufficient? | Adequate? |
|---|--|-----------|-------------|-----------|
| information in addition to the information required by section 3:   |  |           |             |           |
| (a) a description of the structures at the nuclear facility, including their design and their design operating conditions;            | Part 4 (a) refers to the SRBT Safety Analysis Report, which contains these descriptions and the design operating conditions. The SAR is included as Appendix {10} to the application.  | Yes       | Yes         | Yes       |
| (b) a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions; | Part 4 (a) refers to the SRBT Safety Analysis Report, which contains these descriptions and the design operating conditions. The SAR is included as Appendix {10} to the application.  | Yes       | Yes         | Yes       |
| (c) a final safety analysis report demonstrating the adequacy of the design of the nuclear facility;                                  | Part 4 (a) refers to the SRBT Safety Analysis Report, which represents this analysis. The SAR is included as Appendix {10} to the application.   | Yes       | Yes         | Yes       |
| (d) the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility;                       | Part 3 (c) describes the proposed measures, policies, methods and procedures for operating the nuclear substance processing facility. Relevant procedures to the activity to be licenced are included as Appendix {9} to the application.<br><br>Part 4 (c) refers to the Maintenance Program, which represents the proposed measures, policies, methods and procedures for maintaining the nuclear facility. The Maintenance Program is included as Appendix {20} to the application. | Yes       | Yes         | Yes       |

| <b>Pursuant to Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i> Licence Applications – Licence to Operate</b>  | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>  | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|---|------------------|--------------------|------------------|
| (e) the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances;  | Part 5 (a), (b), (e) and (h) all describe components of the proposed procedures for handling, storing, loading and transporting nuclear and hazardous substances.   | Yes              | Yes                | Yes              |
| (f) the proposed measures to facilitate Canada’s compliance with any applicable safeguards agreement;   | Although the current operating licence does not include specific requirements to this effect, the application describes certain measures that have been made towards the goal of ensuring that SRBT complies with such measures. A description of these measures is included in Part 5 (g) of the application for completeness.   | Yes              | Yes                | Yes              |
| (g) the proposed commissioning program for the systems and equipment that will be used at the nuclear facility;   | A description of how systems and equipment are commissioned at the facility is included in Part 4 (b) of the application.   | Yes              | Yes                | Yes              |
| (h) the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects; | Part 5 (c) describes the proposed Environmental Management System for the activities to be licensed, including several subordinate protection programs, which are included as Appendices to this application.<br><br>The EMS is designed to prevent or mitigate these effects. This part also refers to the Environmental Risk Assessment, which describes the effects on the environment and the health and safety of persons that may result from the operation of the facility. The ERA is included as Appendix {16} to the application. | Yes              | Yes                | Yes              |

| Pursuant to Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i> Licence Applications – Licence to Operate  | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT  | Complete? | Sufficient? | Adequate? |
|--|--|-----------|-------------|-----------|
| (i) the proposed location of points of release, the proposed maximum quantities and concentrations, and the anticipated volume and flow rate of releases of nuclear substances and hazardous substances into the environment, including their physical, chemical and radiological characteristics; | Part 5 (c) describes the proposed Environmental Management System for the activities to be licensed, including several subordinate protection and monitoring programs, which are included as Appendices to this application {26-31}. In particular, refer to the Effluent Monitoring Program {28}.                 | Yes       | Yes         | Yes       |
| (j) the proposed measures to control releases of nuclear substances and hazardous substances into the environment;   | Part 5 (c) describes the proposed Environmental Management System for the activities to be licensed, including several subordinate protection and monitoring programs which ensure control over the release of nuclear and hazardous substances, and which are included as Appendices {26-31} to this application. | Yes       | Yes         | Yes       |

| Pursuant to Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i> Licence Applications – Licence to Operate  | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
| <p>(k) the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to</p> <p>(i) assist offsite authorities in planning and preparing to limit the effects of an accidental release,</p> <p>(ii) notify offsite authorities of an accidental release or the imminence of an accidental release,</p> <p>(iii) report information to offsite authorities during and after an accidental release,</p> <p>(iv) assist offsite authorities in dealing with the effects of an accidental release, and</p> <p>(v) test the implementation of the measures to prevent or mitigate the effects of an accidental release;</p> | <p>Part 5 (d) refers to the Emergency Plan and Fire Protection Program management system documents, which represent the proposed measures to prevent or mitigate the effects of accidental releases of such substances on the environment, the health and safety of persons, and the maintenance of national security. These are included as Appendices {32} and {33}, respectively, to this application. SRBT also maintains a Regulatory Reporting Program that describes all required procedures for furnishing required reports to offsite authorities, during routine and emergency operations. This program is included as Appendix {14} to this application.</p> | Yes       | Yes         | Yes       |
| <p>(l) the proposed measures to prevent acts of sabotage or attempted sabotage at the nuclear facility, including measures to alert the licensee to such acts;</p>   | <p>Part 5 (f) describes the measures proposed to ensure compliance with the <i>Nuclear Security Regulations</i>, including preventing acts of sabotage.</p>   | Yes       | Yes         | Yes       |
| <p>(m) the proposed responsibilities of and qualification requirements and training program for workers, including the procedures for the</p>  | <p>Part 3 (b) describes all aspects of the human performance management program proposed for the activity to be licensed, qualification and</p>   | Yes       | Yes         | Yes       |

| <b>Pursuant to Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i> Licence Applications – Licence to Operate</b>   | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>  | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|--|---|------------------|--------------------|------------------|
| requalification of workers; and  | requalification requirements, and the training program for workers. The SRBT Training Program Manual is included as Appendix {8} to the application in support of this information. |                  |                    |                  |
| (n) the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility. | Part 3 (b) includes a description of the results that have been achieved in implementing the noted program.   | Yes              | Yes                | Yes              |

| <b>Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations</i>: Licence Applications – General Requirements</b>   | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b> | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|--|------------------|--------------------|------------------|
| 3. (1) An application for a licence in respect of a nuclear substance or a radiation device, other than a licence to service a radiation device, shall contain the following information in addition to the information required by section 3 of the <u><i>General Nuclear Safety and Control Regulations</i></u> : |  | Yes              | Yes                | Yes              |

| <b>Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements</i></b>   | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>  | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|---|---|------------------|--------------------|------------------|
| (a) the methods, procedures and equipment that will be used to carry on the activity to be licensed;  | Part 3 (c) describes the proposed measures, policies, methods and procedures for operating the nuclear substance processing facility. Relevant procedures to the activity to be licenced are included as Appendix {9} to the application.   | Yes              | Yes                | Yes              |
| (b) the methods, procedures and equipment that will be used while carrying on the activity to be licensed, or during and following an accident, to<br>(i) monitor the release of any radioactive nuclear substance from the site of the activity to be licensed<br>(ii) detect the presence of and record the radiation dose rate and quantity in becquerels of radioactive nuclear substances at the site of the activity to be licensed,<br>(iii) limit the spread of radioactive contamination within and from the site of the activity to be licensed, and<br>(iv) decontaminate any person, site or equipment contaminated as a result of the activity to be licensed; | Part 5 (a) describes the measures proposed to accomplish (ii), (iii) and (iv) in the noted requirement during routine operations. Procedure RSO-001, Facility Contamination Monitoring is included as Appendix {22} to this application.<br>Part 5 (c) describes the measures proposed to accomplish (i) in the noted requirement during routine operations.<br>Part 5 (d) describes the measures | Yes              | Yes                | Yes              |

| Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements</i> | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
|  | proposed to accomplish all aspects of the noted requirement during and following an accident.   |           |             |           |
| (c) a description of the circumstances in which the decontamination referred to in subparagraph (b)(iv) will be carried out;             | Part 5 (a) describes the circumstances in which such decontamination would be carried out.  | Yes       | Yes         | Yes       |
| (d) the proposed location of the activity to be licensed, including a description of the site;   | Part 4 (a) refers to the SRBT Safety Analysis Report, which contains this description. The SAR is included as Appendix {10} to the application.   | Yes       | Yes         | Yes       |
| (e) the roles, responsibilities, duties, qualifications and experience of workers;   | Part 3 (a) describes the organizational management structure, insofar as it may bear on compliance with the act. A full description of the organization and its structure is found in SRBT management system document Organizational Structure and Responsibilities, which is included as Appendix {4}. | Yes       | Yes         | Yes       |

| Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements</i> | Description of How <a href="#">Application</a> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|--|--|-----------|-------------|-----------|
| (f) the proposed training program for workers;   | Part 3 (b) describes all aspects of the human performance management program proposed for the activity to be licensed, qualification and requalification requirements, and the training program for workers. The SRBT Training Program Manual is included as Appendix {8} to the application in support of this information. | Yes       | Yes         | Yes       |
| (g) the proposed instructions for dealing with accidents, including fires and spills, in which the nuclear substance may be involved;    | Part 5 (d) refers to the Emergency Plan and Fire Protection Program management system documents, which represent the proposed measures to prevent or mitigate the effects of accidental releases of such substances on the environment, the health and safety of persons, and the maintenance of national                    | Yes       | Yes         | Yes       |



| Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements</i> | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
|  | security. These are included as Appendices {32} and {33}, respectively, to this application.  |           |             |           |
| (h) the proposed inspection program for the equipment and systems that will be used to carry on the activity to be licensed;             | Part 4 (c) refers to the Maintenance Program, which represents the proposed program for maintaining the nuclear facility, including any inspection of equipment and systems. The Maintenance Program is included as Appendix {20} to the application.                         | Yes       | Yes         | Yes       |
| (i) the methods, procedures and equipment that will be used to calibrate radiation survey meters in accordance with these Regulations;   | Part 5 (a) describes the measures proposed to ensure radiation-detecting equipment, including radiation survey meters, are calibrated in accordance with regulatory requirements. Procedure RSO-011, Instrument Calibration is included as Appendix {23} to this application. | Yes       | Yes         | Yes       |

| Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements</i>                      | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT  | Complete? | Sufficient? | Adequate? |
|---|--|-----------|-------------|-----------|
| (j) the methods, procedures and equipment that will be used to calibrate and verify the calibration of dosimeters referred to in paragraphs 30(3)(d) and (e); | Part 5 (a) notes that due to the nature of the nuclear substance processed, the SRBT Radiation Safety Program does not use dosimeters to determine the effective or equivalent doses to workers.   | Yes       | Yes         | Yes       |
| (k) the methods, procedures and equipment that will be used to conduct the leak tests and surveys required by these Regulations;                              | Part 5 (a) notes that SRBT does not use or own any radiation devices that meet the requirements for leak testing and/or surveys, as defined in the NSRDR. Gaseous tritium light sources do undergo a process of leak assessment as a measure of quality control during manufacturing, in accordance with industry standards and in-house procedures; however, these processes are not implemented for the purposes of the NSRDR. | Yes       | Yes         | Yes       |
| (l) where the application is in respect of a nuclear substance that is an   | Part 5 (a) notes that tritium gas is processed within  | Yes       | Yes         | Yes       |

| Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements</i>   | Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT   | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
| unsealed source and that is to be used in a room, the proposed design of the room;   | sealed, vacuum-based systems under negative ventilation at all times. A description of the areas where tritium is processed in the facility can be found in the SRBT Safety Analysis Report, which is included as Appendix {10} to this application.  |           |             |           |
| (m) if the application is in respect of a nuclear substance that is contained in a radiation device, the brand name and model number of the radiation device, and the quantity of the devices; | Part 5 (a) notes that this application is not in respect to the use of radiation devices, as described in the NSRDR. SRBT manufactures several types of CNSC-certified radiation devices for use both in Canada pursuant to the NSRDR, as well as internationally, with names and models included in said certificates. | Yes       | Yes         | Yes       |

| <b>Pursuant to Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations</i>: Licence Applications – General Requirements</b>  | <b>Description of How <u>Application</u> Meets Regulatory Requirement as Noted by SRBT</b>  | <b>Complete?</b> | <b>Sufficient?</b> | <b>Adequate?</b> |
|--|---|------------------|--------------------|------------------|
| <p>(n) where the application is in respect of Category I, II or III nuclear material, as defined in section 1 of the <a href="#">Nuclear Security Regulations</a>,</p> <p>(i) the measures that will be taken to prevent nuclear criticality, and</p> <p>(ii) the information required by section 3 or 4 of the <a href="#">Nuclear Security Regulations</a>, as applicable;</p> | <p>N/A</p> <p>This application is not in respect to any such materials.</p>   | N/A              | N/A                | N/A              |
| <p>(o) if the applicant will be manufacturing or distributing radiation devices referred to in paragraph 5(1)(c) or section 6 or 7, or check sources mentioned in section 8.1, the proposed procedure for the disposal of each radiation device or check source or for its return to the manufacturer.</p>   | <p>Part 5 (e) describes the proposed procedure for the return of self-luminous tritium-powered devices, for safe disposal processing. Copies of the instruction sheets provided to domestic and international end users is included as Appendix {35} of this application.</p> | Yes              | Yes                | Yes              |

| Pursuant to Part 2 of the Nuclear Security Regulations: PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS  | Description of How <a href="#">Application</a> Meets Regulatory Requirement as Noted by SRBT  | Complete? | Sufficient? | Adequate? |
|--|---|-----------|-------------|-----------|
| 41. An application for a licence in respect of a nuclear facility shall contain, in addition to the information required by sections 3 to 8 of the <a href="#">Class I Nuclear Facilities Regulations</a> , a description of the physical protection measures to be taken to ensure compliance with sections 42 to 48. | Part 5 (f) describes the measures proposed to ensure compliance with the Nuclear Security Regulations, including sections 42 to 48. | Yes       | Yes         | Yes       |

### C.3 Technical Basis

The technical basis for the recommendations presented in this CMD are listed in the table below.

#### SRBT - Applicable Standards and Codes per Safety and Control Area

| SCA                          | Document Title   | Sufficient? | Adequate? |
|------------------------------|--|-------------|-----------|
| Management System            | CSA N286-12 (reaffirmed 2017): <i>Management System Requirements for Nuclear Facilities</i>  | Y           | Y         |
|                              | <a href="#">CNSC REGDOC-2.1.2 (2018): Safety Culture</a>   | Y           | Y         |
| Human Performance Management | <a href="#">CNSC REGDOC-2.2.2 (2016): Personnel Training, Version 2</a>  | Y           | Y         |
| Operating Performance        | <a href="#">CNSC REGDOC-3.1.2 (2018): Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills</a> | Y           | Y         |
| Physical Design              | CSA N393-13 (R2018): <i>Fire Protection for facilities that process, store and handle nuclear substances</i>                                 | Y           | Y         |
|                              | NRCC 56190 (2015): <i>National Building Code of Canada</i>   | Y           | Y         |
|                              | NRCC 56192 (2015): <i>National Fire Code of Canada</i>   | Y           | Y         |

| SCA                                      | Document Title  | Sufficient? | Adequate? |
|--|---|-------------|-----------|
| Fitness for Service                      | CSA N286-12 (reaffirmed 2017): <i>Management System Requirements for Nuclear Facilities</i>   | Y           | Y         |
|  | CSA N393-13 (R2018): <i>Fire Protection for facilities that process, handle or store nuclear substances</i>   | Y           | Y         |
|  | NRCC 56192 (2015): <i>National Fire Code of Canada</i>  | Y           | Y         |
| Radiation Protection                     | <a href="#">CNSC REGDOC-3.1.2 (2018): Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills</a>                                      | Y           | Y         |
| Environmental Protection                 | CSA N288.1 (R2019): <i>Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities</i> | Y           | Y         |
|  | CSA N288.4 (R2015): <i>Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills</i>  | Y           | Y         |
|  | CSA N288.5 (R2016): <i>Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills</i>   | Y           | Y         |
|  | CSA N288.6 (R2017): <i>Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills</i>   | Y           | Y         |
|  | CSA N288.7 (2015): <i>Groundwater protection programs at Class I nuclear facilities and uranium mines and mills</i>   | Y           | Y         |
|  | CSA N288.8 (2017): <i>Establishing and implementing action levels for releases to the environment from nuclear facilities</i>   | Y           | Y         |
|  | <a href="#">CNSC REGDOC-3.1.2 (2018): Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills</a>                                      | Y           | Y         |
|  | <a href="#">CNSC REGDOC-2.9.1 (2017): Environmental Principles, Assessments and Protection Measures</a>   | Y           | Y         |
| Emergency Management and Fire Protection | <a href="#">CNSC REGDOC-2.10.1 (2016): Nuclear Emergency Preparedness and Response</a>  | Y           | Y         |
|  | CSA N393-13 (R2018): <i>Fire Protection for facilities that process, handle or store nuclear substances</i>   | Y           | Y         |
|  | NBCC 56190 (2015): <i>National Building Code of Canada</i>  | Y           | Y         |
|  | NRCC 56192 (2015): <i>National Fire Code of Canada</i>  | Y           | Y         |

| SCA                        | Document Title   | Sufficient? | Adequate? |
|----------------------------|--|-------------|-----------|
| Waste Management           | CSA N292.0-14 (2014): <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i>  | Y           | Y         |
|                            | CSA N292.3-14 (2014): <i>Management of Low- and Intermediate –level Radioactive Waste</i>  | Y           | Y         |
|                            | CSA N294-09 (2019): <i>Decommissioning of Facilities Containing Nuclear Substances</i>   | Y           | Y         |
|                            | <a href="#">CNSC G-219, Decommissioning Planning for Licensed Activities</a>   | Y           | Y         |
| Security                   | <a href="#">CNSC REGDOC-2.12.3 (2020): Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1</a> | Y           | Y         |
| Public Information Program | <a href="#">CNSC REGDOC-3.2.1 (2018): Public Information and Disclosure</a>  | Y           | Y         |
| Financial Guarantee        | <a href="#">CNSC G-206 (2000): Financial Guarantees Guide for the Decommissioning of Licensed Activities</a>                                       | Y           | Y         |

## D. SAFETY AND CONTROL AREA FRAMEWORK

### D.1 Safety and Control Areas Defined

The safety and control areas identified in section 2.2 and discussed in summary in sections 3.1 through 3.14 are comprised of specific areas of regulatory interest which vary between facility types.

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

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



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

## D.2 Specific Areas for this Facility Type

The following table identifies the specific areas that comprise each SCA for a nuclear substance processing facility as applicable for this licence application:

| <b>SPECIFIC AREAS FOR THIS FACILITY TYPE</b> |                                |  |
|--|--------------------------------|--|
| <b>Functional Area</b>                       | <b>Safety and Control Area</b> | <b>Specific Areas</b>  |
| Management                                   | Management System              | <ul style="list-style-type: none"> <li>▪ Management System</li> <li>▪ Organization</li> <li>▪ Performance Assessment, Improvement and Management Review</li> <li>▪ Change Management</li> <li>▪ Safety Culture</li> <li>▪ Records Management</li> <li>▪ Management of Contractors</li> </ul> |
|  | Human Performance Management   | <ul style="list-style-type: none"> <li>▪ Human Performance Programs</li> <li>▪ Personnel Training</li> <li>▪ Work Organization and Job Design</li> <li>▪ Fitness for Duty</li> </ul>   |
|  | Operating Performance          | <ul style="list-style-type: none"> <li>▪ Conduct of Licensed Activity</li> <li>▪ Procedures</li> <li>▪ Reporting and Trending</li> </ul>   |
| Facility and Equipment                       | Safety Analysis                | <ul style="list-style-type: none"> <li>▪ Deterministic Safety Analysis</li> <li>▪ Hazard Analysis</li> </ul>   |
|  | Physical Design                | <ul style="list-style-type: none"> <li>▪ Design Governance</li> <li>▪ Site Characterization</li> <li>▪ Facility Design</li> </ul>  |
|  | Fitness for Service            | <ul style="list-style-type: none"> <li>▪ Maintenance</li> </ul>  |
| Core Control Processes                       | Radiation Protection           | <ul style="list-style-type: none"> <li>▪ Application of ALARA</li> <li>▪ Worker Dose Control</li> <li>▪ Radiation Protection Program Performance</li> <li>▪ Radiological Hazard Control</li> </ul>   |
|  | Conventional Health and Safety | <ul style="list-style-type: none"> <li>▪ Performance</li> <li>▪ Practices</li> <li>▪ Awareness</li> </ul>  |

| <b>SPECIFIC AREAS FOR THIS FACILITY TYPE</b> |  |  |
|--|--|--|
| <b>Functional Area</b>                       | <b>Safety and Control Area</b>           | <b>Specific Areas</b>  |
|  | Environmental Protection                 | <ul style="list-style-type: none"> <li>▪ Effluent and Emissions Control (releases)</li> <li>▪ Protection of People</li> <li>▪ Environmental Management System (EMS)</li> <li>▪ Assessment and Monitoring</li> <li>▪ Environmental Risk Assessment</li> </ul> |
|  | Emergency Management and Fire Protection | <ul style="list-style-type: none"> <li>▪ Conventional Emergency Preparedness and Response</li> <li>▪ Fire Emergency Preparedness and Response</li> </ul>   |
|  | Waste Management                         | <ul style="list-style-type: none"> <li>▪ Waste Characterization</li> <li>▪ Waste Minimization</li> <li>▪ Waste Management Practices</li> <li>▪ Decommissioning Plans</li> </ul>  |
|  | Security                                 | <ul style="list-style-type: none"> <li>▪ Facilities and Equipment</li> <li>▪ Response Arrangements</li> <li>▪ Security Practices</li> </ul>  |
|  | Packaging and Transport                  | <ul style="list-style-type: none"> <li>▪ Package Design and Maintenance</li> <li>▪ Packaging and Transport</li> </ul>  |

## **E. ENVIRONMENTAL PROTECTION REVIEW REPORT**

[CNSC's website](#)

CNSC e-Doc 6549583



# Environmental Protection Review Report: **SRB Technologies (Canada) Inc.**

**January 2022**

**e-Doc: 6549583 (Word)**

**e-Doc: 6621499 (PDF)**



## REVISION HISTORY

The following table identifies the revision history of this document.

| <b>Revision number</b> | <b>Change</b>   | <b>Summary of changes</b> | <b>Date</b>  |
|------------------------|-----------------|---------------------------|--------------|
| 000                    | Initial release | N/A                       | January 2022 |
| 001                    |                 |                           |              |
|                        |                 |                           |              |

## Executive summary

The Canadian Nuclear Safety Commission (CNSC) conducts environmental protection reviews (EPR) for all nuclear facilities with potential project-environmental interactions, in accordance with its mandate under the *Nuclear Safety and Control Act* to ensure the protection of the environment and the health of persons. An EPR is a science-based environmental technical assessment conducted by CNSC staff. The fulfillment of other aspects of the CNSC's mandate, such as regulating safety and security, are met through other oversight activities.

This EPR report was written by CNSC staff as a stand alone document, describing the scientific and evidence-based findings from CNSC staff's review of SRB Technologies (Canada) Inc.'s (SRBT) environmental protection measures. Under SRBT's current Class 1B Nuclear Substance Processing Facility Operating Licence, NSPFOL-13.00/2022, SRBT is permitted to operate the SRBT facility in Pembroke, Ontario.

CNSC staff's EPR report focuses on items that are of Indigenous, public and regulatory interest, such as potential environmental releases from normal operations, as well as risk of radiological and hazardous substances to the receiving environment, valued components, and species at risk.

This EPR report includes CNSC staff's assessment of documents submitted by the licensee from 2010 to 2021, such as, but not limited to, the following:

- the results of SRBT's environmental monitoring, as reported in Annual Compliance and Performance Reports
- SRBT's Environmental Risk Assessment
- SRBT's Preliminary Decommissioning Plan
- SRBT's groundwater modelling studies
- the results of the CNSC's Independent Environmental Monitoring Program
- the results from other environmental monitoring programs and/or health studies completed by other levels of government in proximity to the SRBT facility

This EPR report also details past regulatory actions from the early years of SRBT operations as it relates to concerns of elevated levels of tritium in groundwater and independent verification activities undertaken by CNSC staff. These activities included the Tritium Studies Project and a groundwater modelling assessment in early 2010, whereby CNSC staff determined that elevated tritium concentrations were due to past historical practices and that concentrations have declined and stabilized as CNSC staff predicted.

Based on CNSC staff's assessment and evaluation of SRBT's documentation and data, CNSC staff have found that potential risks from radiological and hazardous releases to the atmospheric, aquatic, terrestrial and human environments from the SRBT facility are negligible, resulting in no significant adverse effects. The potential risks to the environment from the SBRT operations are similar to natural background and the potential risks to human health are indistinguishable to health outcomes in the general public.

CNSC staff have also found that SRBT continues to implement and maintain effective environmental protection measures to adequately protect the environment and the health of persons.

CNSC staff will continue to verify SRBT's environmental protection programs through ongoing licensing and compliance activities.

The information provided in this EPR report summarizes CNSC staff's findings that may inform and support staff recommendations to the Commission in future licensing and regulatory decisions. CNSC staff's findings do not represent the Commission's conclusions. The Commission's decision-making will be informed by submissions from CNSC staff, the licensee, as well as by Indigenous peoples, the public, and any interventions heard during public hearings on licensing matters.

For more information on the SRBT facility, visit the [CNSC's webpage](#) and [SRBT's webpage](#). References used throughout this document are available upon request and requests can be sent to [ea-ee@cnsccsn.gc.ca](mailto:ea-ee@cnsccsn.gc.ca).



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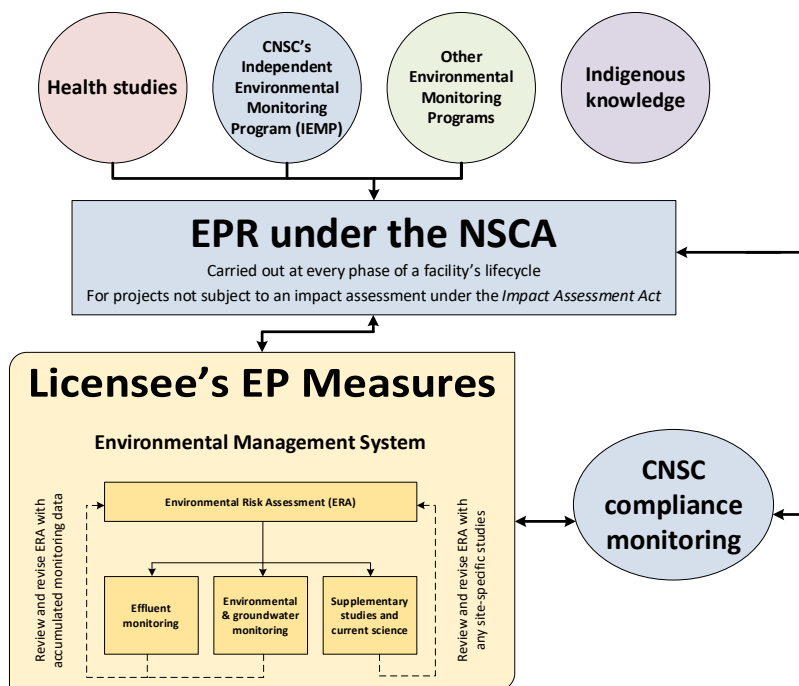
# 1.0 Introduction

## 1.1 Purpose

The Canadian Nuclear Safety Commission (CNSC) conducts environmental protection reviews (EPR) for all nuclear facilities with potential interactions with the environment, in accordance with its mandate under the *Nuclear Safety and Control Act* (NSCA) to ensure that licensees make adequate provision for the protection of the environment. CNSC staff assess the environmental and health effects of nuclear facilities and/or activities at every phase of a facility’s lifecycle. As seen in figure 1.1, an EPR is a science-based environmental technical assessment conducted by CNSC staff to support the CNSC’s mandate for the protection of the environment and human health as set out in the NSCA. The fulfillment of other aspects of the CNSC’s mandate, such as safety and security, are met through other regulatory oversight activities and are outside the scope of this report. EPRs are typically conducted every five years and are based primarily on information that the applicant or licensee is required to submit to the CNSC through the established licensing process. This information includes a licence application and its supporting documentation, updates to a nuclear facility’s environmental risk assessment (ERA), which is reviewed every five years, and regulatory reporting requirements on environmental protection measures.

This EPR report is CNSC staff’s review of SRB Technologies (Canada) Inc.’s (SRBT) environmental protection (EP) and environmental compliance activities conducted under the NSCA. As well, this EPR report details independent verification activities, such as the CNSC’s independent environmental monitoring program (IEMP), groundwater modelling assessment, as well as relevant health and environmental studies conducted through the CNSC’s Tritium Studies Project. This review serves to assess whether SRBT’s environmental protection measures at the SRBT facility adequately protects the environment and health of persons.

**Figure 1.1: EPR framework**



This EPR report presents information pertaining to the protection of the environment and human health. No decision is made on the EPR itself. CNSC staff's findings may inform and support future recommendations to the Commission in future licensing and regulatory decision making, as well as inform CNSC staff's future compliance and verification activities. CNSC staff's findings do not represent the Commission's conclusions. The Commission's conclusions and decisions are informed by information submitted to the Commission by CNSC staff, the licensee, as well as by Indigenous peoples, the public, and any interventions heard during public hearings on licensing matters. The information in this EPR report is intended to inform Indigenous peoples, members of the public and other interested parties.

EPR reports are prepared to thoroughly document CNSC staff's assessment relating to a licensee's EP measures and are posted online for information and transparency. Posting EPR reports online, separately from the documents drafted during the licensing process, allows interested Indigenous peoples and members of the public additional time to review EP related information ahead of any licensing hearings or Commission decisions.

This EPR report is based on information submitted by SRBT, as well as the following:

- regulatory oversight activities (section 2.0)
- CNSC staff review of SRBT's 2019 Preliminary Decommissioning Plan (PDP) [1] (section 2.2)
- CNSC staff review of SRBT's Annual Compliance and Performance Reports [2-12]
- CNSC staff review of SRBT's 2021 Environmental Risk Assessment (ERA) [13] (section 3.2)
- CNSC staff review of SRBT's groundwater modelling studies (sections 2.2 and 3.2.3)
- [Independent Environmental Monitoring Program \(IEMP\)](#) results (section 4.0)
- health studies with relevance to the SRBT facility (section 5.0)
- other environmental monitoring programs in proximity to the SRBT facility (section 6.0)

A review has been conducted for all environmental components related to the licenced facility, however only selected topics related to environmental protection are presented in detail in this report. These topics were selected based on those that have historically been of interest to Indigenous peoples, other members of the public and the Commission.

This EPR report focuses on topics related to the environmental performance of the facility including atmospheric (emission) and liquid (effluent) releases to the environment, the potential transfer of contaminants of potential concern (COPC) through key environmental pathways and associated potential exposures and/or effects on valued components (VCs)<sup>1</sup> including human and non-human biota. The focus is on radiological substances associated with activities undertaken by SBRT. Tritium is the only radiological COPC of significance to human and ecological receptors

---

<sup>1</sup> Valued components (VCs) refer to environmental biophysical or human features that may be impacted by a project. The value of a component relates not only to its role in the ecosystem, but also to the value people place on it. For example, it may have scientific, social, cultural, economic, historical, archaeological or aesthetic importance.

associated with the activities undertaken by SRBT and there are no significant exposures from hazardous substances to these receptors from SRBT's processes. Additional information is provided on other topics of Indigenous, public and/or regulatory interest such as past environmental performance and regulatory actions, and greenhouse gas (GHG) emissions. CNSC staff also present information on relevant regional environmental or health monitoring, including studies conducted by the CNSC (such as the IEMP) or other governmental organizations.

## **1.2 Facility overview**

This section of the report provides general information on the SRBT site. This includes a description of the site location and a basic history of site activities and licensing. This information is intended to provide context for later sections of this report, which discuss completed and ongoing environmental and regulatory oversight activities.

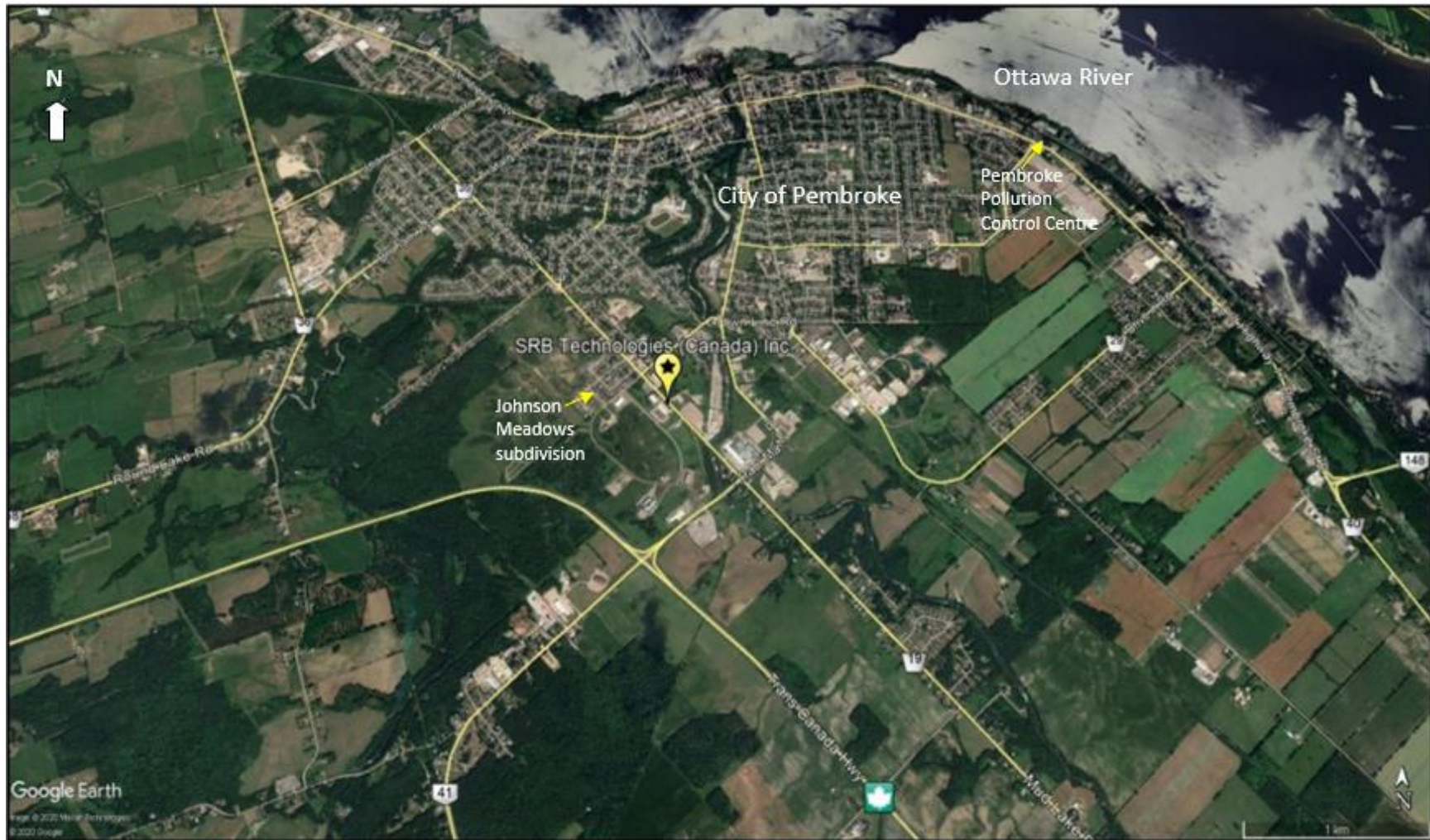
### **1.2.1 Site description**

SRBT owns and operates a gaseous tritium light source (GTLS) manufacturing facility in Pembroke, Ontario (see figure 1.2). The facility is situated close to the traditional homelands and treaty territories of many Indigenous Nations and communities, including the Algonquins of Pikwàkanagàn First Nation, the Algonquins of Ontario, the Métis Nation of Ontario, Kitigan Zibi Anishinabeg, Kebaowek First Nation and the Algonquin Anishinabeg Nation Tribal Council. The facility is also approximately 150 kilometres northwest of Ottawa.

SRBT leases a space in an industrial building of the TransCanada Corporate Park, an industrial park within the boundary of the City of Pembroke. SRBT fully controls approximately 1,400 square metres (m<sup>2</sup>) of the interior floor space of the industrial building, as well as the immediate surrounding grounds outside of the facility. Within the same building as the SRBT facility are two commercial businesses, namely a company that specializes in the manufacture of personal protective equipment and a company that provides industrial gas and equipment to local customers. Figure 1.3 shows an overview of the area surrounding the SRBT facility. Farmland extends to the west of the facility for approximately 300 to 500 metres, alongside two hotels and a local distillery to the southwest. To the northeast of the property is the Pembroke and Area Community Center, and there are commercial buildings and a lumber yard to the south and southeast. The nearest residence is approximately 250 metres to the northwest of the facility.



**Figure 1.2: Overview map of the region where the SRBT facility is located**



Source: SRBT [13]



**Figure 1.3: Aerial photograph of the SRBT facility**



Source: SRBT [13]



## 1.2.2 Facility operations

The SRBT facility was established in 1990 and began commercial operations in 1991. SRBT holds a CNSC licence and is permitted to use tritium to produce self-luminous GTLS and manufacture radiation devices containing the GTLS, such as self-luminous emergency exit signs, various military applications such as landmine markers, watch dials, and other safety products not requiring batteries or other external sources of power. SRBT distributes both the radiation devices and light sources within Canada and internationally. SRBT seals the colourless, odourless tritium gas in small glass tubes coated on the inside with phosphorescent powder. When tiny particles emitted from the decaying radioactive gas come into contact with the powder, light is generated.

The interior of the facility is divided into three separate radiological zones, described below:

- Zone 1: The largest zoned area within the SRBT facility, Zone 1 consists of offices, the lunchroom, the shipping area, the coating room, the glass shop, and a storage area.
- Zone 2: Staff access to Zone 2 within the SRBT facility is controlled, and the area consists of the assembly room and the silk-screening room.
- Zone 3: Tritium processing equipment is located within Zone 3 of the SRBT facility. The rig room, laser room, and tritium lab are all found within Zone 3. Staff access is controlled and the minimum personal protection equipment required for entry into Zone 3 include a lab coat, shoe covers, safety glasses, and gloves.

Due to the tritium processing equipment and activities performed within Zone 3 it is the radiological zone with the greatest potential for exposure to hazards and tritium gas and is discussed below in further detail.

### Tritium processing components

Under their current CNSC licence, SRBT is permitted to operate several processing rigs in order to create the GTLS. The processing rigs, located in Zone 3, are vacuum-based systems of valves, pumps, and tubing, and they are designed with a trap in order to fill the light sources with tritium gas. The traps contain metallic adsorbent which contains pure tritium in a solid form (tritide) at room temperature. The metallic adsorbent releases pure tritium gas when heated to roughly 400 degrees Celsius. The processing rigs function under vacuum in the absence of air or other gaseous contaminants, allowing the tritium gas to effectively fill the light sources. Tritium processing occurs within double-sided ventilated cabinets which house the main filling stations where light sources are filled with tritium.

### Tritium laboratory

The tritium laboratory is also housed within Zone 3 of the SRBT facility and contains equipment known as the bulk splitter, which is a system used to subdivide tritium purchased by SRBT. The bulk splitter will take bulk amounts of tritium in specialized containers and will subdivide it into containers that will interface with the processing rigs. The principles of the bulk splitter are the same as those used on the processing rigs.

**Active ventilation system**

There is a fenced compound maintained on the northwest corner of the SRBT facility which houses the primary active ventilation system components, including fans, motors, and stacks. The active ventilation system at the SRBT site is located within Zone 3 of the facility. The active ventilation system services the tritium processing activities by carrying contaminated air through air handling units, and upwards through the two stacks located at the west corner of the facility. The stacks eject the contaminated gas upwards, dispersing the tritium. The amount of tritium released to the atmosphere is monitored by SRBT and reported to the CNSC to ensure compliance with licensed release limits. More information on airborne emission controls and monitoring is found in section 3.1.2.

## 2.0 Regulatory oversight

The CNSC regulates nuclear facilities and activities in Canada to protect the environment and the health and safety of persons in a manner that is consistent with applicable legislation and regulations, environmental policies and with Canada's international obligations. The CNSC assesses the effects of nuclear facilities and activities to human health and the environment at every phase of a facility's lifecycle. This section of the EPR report discusses the CNSC's regulatory oversight of SRBT's EP measures for the SRBT facility.

To meet the CNSC's regulatory requirements and according to SRBT's licensing basis, SRBT is responsible for implementing and maintaining EP measures that identify, control and (where necessary) monitor releases of radiological and hazardous substances and effects on human health and the environment, from the SRBT facility. These EP measures must comply with the regulatory requirements found in SRBT's licence and licence condition handbook (LCH). The relevant regulatory requirements for SRBT's facility are outlined in this section of the report.

### 2.1 Environmental protection reviews and assessments

EPR reports are produced as part of the CNSC's lifecycle EP framework under the NSCA and its regulations. These reports are posted to inform and provide greater transparency for Indigenous people and the public. The report may be used by CNSC staff to support its recommendations to the Commission for licensing as a reference in CNSC staff's Commission Member Document and other regulatory decision making.

To date, one screening assessment and two EPR reports (including this one) have been carried out for the SRBT site, as indicated below. Subsection 2.1.1 provides a description of the screening assessment conducted under the *Canadian Environmental Assessment Act, 1992* (CEAA 1992) [14], predecessor to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) [15], whereas subsection 2.1.2 provides information on the previous EPR report completed. In 2019, the *Impact Assessment Act of Canada* (IAA) [16] came into force replacing CEAA 2012. Going forward, staff will determine if proposed changes to activities at the SRBT site require an impact assessment under the IAA's *Physical Activities Regulations*. The purpose of any one of these assessments is to identify the possible impacts of a proposed project or activity and to determine whether those effects can be adequately mitigated to protect the environment and the health of persons.

#### 2.1.1 Previous EAs completed under CEAA 1992

##### Screening assessment under the *Canadian Environmental Assessment Act*

In 2000, the NSCA [17] replaced the former *Atomic Energy Control Act* and the CNSC was established, with an expanded mandate that included the protection of the environment. Under the *Atomic Energy Control Act*, SRBT held two radioisotope licences for its licensed activities. Pursuant to the NSCA and its associated regulations, the SRBT facility was classified as a Class IB nuclear substance processing facility.

Numerous expanded regulatory requirements were then applicable to the operation of the SRBT facility, including heightened quality assurance, radiation protection, and environmental protection measures.

During the initial licensing as a Class IB nuclear substance processing facility in 2000, SRBT applied for authorization to continue its tritium light manufacturing and tritium light recovery operations at the SRBT facility. No new construction activities were planned, and no changes to existing approved operations were proposed. Pursuant to the CEAA 1992 [14], CNSC staff conducted a screening assessment and the EA screening report [18] was submitted to the Commission in December 2000. The screening assessment was performed in consultation with Environment Canada, Health Canada, and the Ontario Ministry of the Environment, and the scope of the assessment included the potential environmental effects of the project, including those that might occur from accidents and malfunctions, and the future decommissioning plans for the facility.

In February 2001, the Commission concluded that SRBT's facility operations were unlikely to cause adverse environmental effects, considering the implementation of mitigation measures [20]. The EA screening process identified the requirements for an EA follow-up monitoring program, the requirements of which were incorporated into SRBT's Annual Compliance and Performance Reports [2-12]. The SRBT facility was granted a Nuclear Substance Processing Facility Operating Licence valid from January 1, 2001 until December 31, 2005.

### **2.1.2 Previous EPRs completed under the NSCA**

#### **Environmental assessment review under the *Nuclear Safety and Control Act***

In 2014, SRBT requested a 10-year licence renewal to continue their operations at the SRBT facility under a Class 1B Nuclear Substance Processing Facility Operating Licence NSPFOL-13.00/2015 [20]. An EA review under the NSCA (now referred to as the EPR under the NSCA) was conducted to ensure the protection of the environment and the health of people [21]. The EA review focused on items of public concern and regulatory actions regarding the past operations of the SRBT facility as detailed below in section 2.2. The EA review focused on groundwater monitoring results, tritium releases, public dose calculations, and specific environmental components. CNSC staff's review determined that SRBT had made adequate provision for the protection of the environment and the health and safety of persons. Information considered by the Commission included submissions by SRBT, CNSC staff's findings from the EA review, IEMP results, and concerns raised by the public and Indigenous communities. On June 29, 2015, the Commission renewed SRBT's operating licence valid from July 1, 2015 until June 30, 2022.

## **2.2 Previous regulatory actions**

In 2005, CNSC sampling of ground and surface water in the community surrounding the SRBT facility showed elevated tritium concentrations in groundwater, as well as in the precipitation and runoff (puddles, etc.) near the facility. This discovery prompted CNSC staff to issue, pursuant to paragraph 37(2)(f) of the NSCA, an order to SRBT on November 16, 2005 [22] to conduct a groundwater contamination study. The order required SRBT to define the extent and magnitude of the groundwater contamination on and around the facility and to assess the potential adverse impacts on the environment, persons and land use.

On January 24, 2006, following a 2-day public licence renewal hearing for SRBT held in September and November 2005, the Commission issued SRBT an operating licence for a period of one year [23]. This licence contained several restrictions obligating SRBT to undertake an action plan to correct identified program deficiencies. In addition, the Commission revoked the

order issued in November 2005, as the requirements of the order were added as conditions of the licence.

The groundwater study was completed, and an initial report was submitted to CNSC staff on March 2006 [24]. CNSC staff determined that the groundwater study report did not adequately define the magnitude of tritium contamination underlying the SRBT facility or consider the potential impact that the contaminated groundwater may have on the future land use of the site. In July 2006, CNSC staff therefore requested, pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations* (GNSCR) that SRBT take additional measures and provide additional information respecting the groundwater contamination of the land on which the facility is located [25].

On August 12, 2006, SRBT submitted the additional information on the groundwater contamination respecting the magnitude of the contamination of the land located under the facility, which confirmed the levels of contamination and the fact that mechanisms other than atmospheric dispersion were contributing to this contamination. CNSC staff's review found that SRBT had not taken all reasonable precautions to protect the environment as required under paragraph 12(1)(c) of the GNSCR and had not taken all reasonable precautions to control the release of a radioactive nuclear substance into the environment as required under paragraph 12(1)(f) of the GNSCR. As result, the Designated Officer issued an order to SRBT on August 15, 2006 to prevent further contamination and unreasonable risk to the environment [26]. The Commission reviewed and amended the order to require SRBT to submit a detailed report describing the specific actions and measures that would be taken to: identify all the sources of groundwater contamination; contain those sources of groundwater contamination; prevent or mitigate further direct contamination of the soil and groundwater under the stacks; and remediate the contaminated groundwater. SRBT was also required to submit an implementation plan and schedule to address the actions described in the report. SRBT submitted this information as part of the licence renewal hearings held in 2006.

On January 31, 2007, following a 2-day public licence renewal hearing held in October and November 2006, the Commission decided to issue an 18-month Nuclear Substance Processing Facility Possession Licence to SRBT [27]. The licence permitted the general possession, transfer, management, storage and disposal of nuclear substances that are part of the Class IB facility located in Pembroke, Ontario. The licence did not allow SRBT to process or use tritium for the purposes of manufacturing gaseous tritium light sources. The Commission had decided not to renew the operating licence based on its opinion that SRBT would not make adequate provision for the protection of the environment when carrying out activities that include the processing of tritium. However, the Commission was also of the opinion that the tritium releases resulting from the operation of the facility did not pose a health and safety risk to the public. The possession licence provided regulatory control of the facility and ensured that the conditions of the licence would prevent unreasonable risk to the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. In addition, the Commission revoked the order issued in August 2006, on the basis that it was no longer applicable under the activities authorized by the possession licence.

The Commission also directed CNSC staff to initiate research studies on tritium releases in Canada, and to study and evaluate tritium-processing facilities exercising best practices around

the globe. Detailed information on the CNSC's Tritium Studies Project are found below in section 5.3.1.

In January 2008, SRBT submitted a comprehensive report [28] to CNSC staff that documents more than two years of groundwater studies, including hydrogeologic monitoring and testing, and tritium measurements in soil, groundwater, surface water and precipitation. CNSC staff reviewed this report and noted that the monitoring data compiled in the report indicate that the tritium concentrations in most of the monitoring wells were declining or stable.

On June 26, 2008, following a 2-day public licence renewal hearing held in April and June 2008, the Commission decided to issue a 2-year Nuclear Substance Processing Facility Operating Licence to SRBT [29]. The licence permitted SRBT to resume the operation of the SRBT facility and carry on the activities that include the processing and use of tritium. Following this 2-year licence term SRBT was granted a 5-year licence on June 30, 2010 [30] following a 2-day public licence renewal hearing in February and May 2010. During the hearing concerns were raised regarding the upward trend of tritium in the groundwater around the facility. To address the concerns, CNSC staff conducted an independent modelling assessment in early 2010 and SBRT undertook another groundwater study in 2011. The results of these studies are found below in section 3.2.3. Overall, the Commission was satisfied with the work undertaken by SRBT to correct the environmental protection program deficiencies that had been at the cause of the issues for the past several years. The Commission was of the view that SRBT demonstrated an understanding of and commitment to environmental protection. The Commission was also of the view that SRBT had the ability to meet the requirements of the NSCA and its regulations with respect to the protection of the environment while processing and using tritium at its facility.

## 2.3 Planned end state

The following section provides high-level information with respect to the planned end-state of the SRBT facility and site following decommissioning activities. The decommissioning strategy and end-state objectives for the SRBT facility are documented in the SRBT's 2019 Preliminary Decommissioning Plan (PDP) [1] which CNSC staff have reviewed and accepted. This section is informed by SRBT's PDP.

The CNSC requires that planning for decommissioning take place throughout the lifecycle of a nuclear facility or for the duration of the licensed activity. Planning for decommissioning is an integral part of the lifecycle planning of a facility and it is an ongoing process. A PDP is developed by the licensee and submitted to the CNSC for review and acceptance as early as possible in the lifecycle of the facility or the conduct of the licensed activities. The PDP is progressively updated, where needed, to reflect the appropriate level of detail required for the respective licensed activities. Prior to the commencement of any decommissioning activities and to support an application for a licence to decommission, a detailed decommissioning plan (DDP) is developed by the licensee and submitted to the CNSC for review and acceptance.

The PDP documents the decommissioning strategy and end-state objectives, the major decontamination, dismantling and remediation steps, the approximate quantities and types of waste generated, the principal hazards and protection strategies, and an estimate of costs associated with these activities. The PDP is developed for planning purposes only and the associated cost estimate is used to develop dedicated decommissioning funding in the form of a financial guarantee. The PDP is not meant to be implemented and does not provide sufficient

details for the assessment of environmental impacts during decommissioning. This information is required to be submitted at a later date in support of an application for a licence to decommission. As a full lifecycle regulator, the CNSC will continue to carry out regulatory oversight until the planned end-state is achieved and the facility is released from the CNSC's regulatory control.

SRBT's preliminary decommissioning strategy for the SRBT facility is for the prompt removal of all nuclear substances once regulatory approvals for decommissioning are obtained. Decommissioning is planned to begin immediately after the shutdown of the facility and will continue, without interruption, until the decommissioning is complete. Inventories of radioactive and hazardous materials will be reduced in the three-month period preceding shutdown, and any remaining inventory of these materials will be dispositioned in the first month following the shutdown of the facility. Decontamination processes will be carried out on all equipment that can be decontaminated to regulatory clearance levels, and equipment that cannot be decontaminated to meet regulatory limits for clearance will be dismantled, packaged, and shipped to a licensed waste management facility, location, or site. Decommissioning will continue until the SRBT site is in a condition that will permit its release from any further regulatory control by the CNSC.

## **2.4 Environmental regulatory framework and protection measures**

The CNSC has a comprehensive EP regulatory framework which includes both radiological and hazardous substances, physical stressors (such as noise), the protection of Indigenous peoples, the public, and the environment. In other words, public dose is considered under the EP framework, as well as from a radiation protection standpoint. Human exposure is a result of interactions with the environment, that is, Indigenous peoples and the public are part of the environment. The focus of this section of the EPR report is on the EP regulatory framework and the status of SRBT's environmental protection program (EPP) [31]. Section 3.0 of this report details the results derived from the EPP.

The EPP at SRBT was designed and implemented in accordance with REGDOC-2.9.1, *Environmental Protection: Policies, Programs and Procedures* (2020) [32] as well as the CSA Group standards on environmental protection listed below. The EPP has several components including derived release limits (DRLs), public dose modelling, and a groundwater monitoring program.

**Table 2.1: Status of EP measures to implement regulatory documents and standards**

| Regulatory document or standard   | Status      |
|---|-------------|
| CSA N288.1-14, <i>Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities</i> [33] | Implemented |
| CSA N288.4-10, <i>Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills</i> [34]  | Implemented |
| CSA N288.5-11, <i>Effluent Monitoring Program at Class I Nuclear Facilities and Uranium Mines and Mills</i> [35]  | Implemented |
| CSA N288.6-12, <i>Environmental Risk Assessment at Class I Nuclear Facilities and Uranium Mines and Mills</i> [36]  | Implemented |
| CSA N288.7-15, <i>Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills</i> [37]  | Implemented |
| CSA N288.8-17, <i>Establishing and Implementing Action Levels to Control Releases to the Environment from Nuclear Facilities</i> [38]   | Implemented |
| CNSC REGDOC-2.9.1, <i>Environmental Principles, Assessments and Protection Measures</i> (2020) [32]   | Implemented |

CNSC staff confirm that SRBT has implemented programs according to the relevant EP regulatory documents or standards.

Licensees are also required to regularly report on the results of their EPPs. Reporting requirements are specified within REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills* [39], the *Radiation Protection Regulations* [40] (for action levels (AL) or dose limit exceedances), the licensee's approved programs and manuals, or the LCH [41].

SRBT is required to submit Annual Compliance and Performance Reports. These reports are reviewed by CNSC staff for compliance and verification, as well as trending. SRBT's Annual Compliance and Performance Reports are available on [SRBT's website](#) [42].

CNSC staff regularly report on the licensee performance to the Commission for activities conducted at SRBT. Regulatory Oversight Reports (RORs) [43] are the CNSC's standard mechanism for updating the Commission, Indigenous peoples and the public on the operation and regulatory performance of licensed facilities. RORs are available on the [CNSC's website](#) and [SRBT's website](#).

#### 2.4.1 Environmental protection measures

To meet the CNSC's regulatory requirements under REGDOC-2.9.1 (2020) [32], SRBT is responsible for implementing and maintaining EP measures that identify, control and monitor releases of radiological and hazardous substances, and effects on human health and the environment from the facility. EP measures are an important component of the overall requirement of licensees to make adequate provisions to protect the environment and health of persons.



This, and the following subsections, provide a brief summary of SRBT's EPP for the facility and the status of each specific EP measure, relative to the requirements or guidance outlined in the latest regulatory document or CSA standard. Section 3.0 of this EPR report summarizes the results of these programs or measures against relevant regulatory limits and environmental quality objectives or guidelines, and discusses, where applicable, any changing trends.

SRBT is required to implement an environmental management system that conforms to REGDOC-2.9.1 (2020) [32] and submit an EPP. SRBT's EPP includes the following components to meet the requirements and guidance as outlined in REGDOC-2.9.1 (2020):

- environmental management system (EMS) (subsection 2.3.2)
- environmental risk assessment (ERA) (subsection 2.3.3)
- effluent emissions control and monitoring program (EffMP) (subsection 2.3.4)
- environmental monitoring program (EMP) (subsection 2.3.5)

#### **2.4.2 Environmental management system**

An EMS refers to the management of an organization's environmental policies, programs and procedures in a comprehensive, systematic, planned and documented manner. It includes the organizational structure as well as, planning and resources to develop, implement and maintain a policy for EP. An EMS requires facilities to continuously improve their EPP, including periodic updates to the ERA, which would drive improvements to a facility's effluent and environmental monitoring programs. The EMS serves as a management tool to integrate all of a licensee's EP measures in a documented, managed and auditable process, in order to:

- identify and manage non-compliances and corrective actions within the activities, through internal and external inspections and audits
- summarize and report the performance of these activities both internally (licensee management) and externally (Indigenous peoples, the public, and the Commission)
- train personnel involved in these activities
- ensure the availability of resources (that is, qualified personnel, organizational infrastructure, technology and financial resources)
- define and delegate roles, responsibilities and authorities essential to effective management

SRBT established and implemented an EMS for its facility in accordance with REGDOC-2.9.1 (2020) [32]. SRBT's EMS includes activities such as establishing annual environmental objectives and targets. The EMS is verified through SRBT's safety meetings, during which environmental protection issues are discussed and documented. CNSC staff review SRBT's annual internal audits, management reviews, and environmental goals, targets and objectives to ensure compliance with REGDOC-2.9.1 (2020) during environment-focused compliance inspections. CNSC staff also review the status of SRBT's annual goals, targets and objectives and the implementation of the EMS as part of staff's reviews of SRBT's Annual Compliance and Performance Reports.

The results of these reviews demonstrate that SRBT's EMS for its facility meets the CNSC's requirements as outlined in REGDOC-2.9.1 (2020) [32]. The implementation of the EMS ensures that SRBT continues to improve environmental performance at its facility.

### 2.4.3 Environmental risk assessment

An ERA of nuclear facilities is a systematic process used by licensees to identify, quantify and characterize physical stressors, and radiological and hazardous substances that have the potential to cause an adverse effect to ecological or human receptors. The ERA also includes the magnitude and extent of the potential effects associated with a facility. Through the ERA radiological and hazardous substances that have the potential to cause an adverse effects to ecological or human receptors are identified as COPCs. The ERA serves as the basis for the development of site-specific effluent limits and controls and EMPs. The results of these programs, in turn, inform and refine future revisions of the ERA.

In 2020, SRBT submitted an ERA [45] to the CNSC. The ERA included an ecological risk assessment (EcoRA) and a human health risk assessment (HHRA). A revised ERA was submitted in 2021 to address CNSC staff's comments [13]. CNSC staff reviewed SRBT's revised ERA and found it to be compliant with CSA standard N288.6-12, *Environmental Risk Assessment at Class I Nuclear Facilities and Uranium Mines and Mills* [36].

SRBT's conclusions from the 2021 ERA are summarized in table 2.2. Effects to ecological and human health due to releases of COPCs to the air and water from the SRBT facility were found to be negligible [13]. It is important to note that the only radiological COPC of significance to human and ecological receptors is tritium, through both gaseous emissions and liquid effluent pathways and there are no hazardous COPCs associated with the operation of the SRBT facility.

**Table 2.2: Summary of SRBT's ERA conclusions [13]**

| Type  | Members of the public   | Aquatic and terrestrial biota   |
|---|---|---|
| <b>Radiological</b>   | No adverse impacts expected from radiological COPCs released from the SRBT facility.      | No adverse impacts expected from radiological COPCs released from the SRBT facility.      |
| <b>Hazardous (non-radiological)</b>   | No adverse impacts expected from hazardous COPCs released from the SRBT facility.         | No adverse impacts expected from hazardous COPCs released from the SRBT facility.         |
| <b>Physical stressors (noise was the only physical stressor considered in the assessment)</b> | No adverse impacts expected from physical stressors (such as noise) at the SRBT facility. | No adverse impacts expected from physical stressors (such as noise) at the SRBT facility. |

#### 2.4.4 Effluent and emissions control and monitoring

Controls on environmental releases are established to provide protection to the environment and to respect the principles of sustainable development and pollution prevention. The effluent and emissions prevention and control measures are established based on industry best practice, the application of optimization (such as in design) and *as low as reasonably achievable* (ALARA) principles, the Canadian Council of Ministers of the Environment guidelines, and results of the licensee's ERAs.

SRBT's EPP [32] was reviewed and approved by CNSC staff in August 2021. It contains licence limits, DRLs and site-specific ALs to control radiological effluents. ALs are established to serve as early indicators of potential loss of control or deviation from expected quality of releases. SRBT has also established internal administrative limits to serve as an early warning signal that increased oversight or program improvements may be required to prevent an AL exceedance.

DRLs are calculated to demonstrate that the public dose limit of 1 mSv/year has not been exceeded. DRLs inform licensed release limits for nuclear facilities and typically represent the maximum acceptable level of emitted contaminants from facility operations. SRBT has calculated DRLs for their facility; however SRBT is regulated using more stringent licence release limits. The calculated DRLs for the SRBT facility are much higher than the current licence release limits. The licence release limits were imposed to ensure protection of groundwater resources around the facility. More information on the licence release limits is provided in section 3.1.1.

SRBT's EffMP is in compliance with REGDOC-2.9.1 (2020) [32] and the relevant standards, including CSA N288.5-11, *Effluent Monitoring Program at Class I Nuclear Facilities and Uranium Mines and Mills* [35].

Based on compliance and technical assessment activities, CNSC staff determined that the EffMP currently in place for SRBT continues to protect human health and the environment.

#### 2.4.5 Environmental monitoring program

The CNSC requires licensees to design and implement an EMP specific to the monitoring and assessment requirements associated with the facility, and the environment within which the facility is situated. The program is required to:

- measure contaminants in surrounding environmental media of the facility or site
- determine the effects, if any, of the site or facility operations on people and the environment
- serve as a secondary support to emission monitoring programs to demonstrate the effectiveness of emission controls

More specifically, the program must gather the necessary environmental data to calculate public dose and demonstrate compliance with the regulatory public dose limit (1 mSv/year). The program design must also address the potential environmental interactions identified at the facility or site. SRBT's EMP consists of monitoring tritium in the following environmental media:

- air through passive air monitoring
- precipitation
- surface water
- downspout runoff
- food (local produce, milk, and wine)
- drinking water
- groundwater
- municipal sewage sludge cake

Monitoring frequency is specified in the EMP. Monitoring of air, precipitation, and surface water are conducted monthly, monitoring of drinking water and milk<sup>2</sup> are conducted three times a year, and monitoring of wine<sup>3</sup> and produce are conducted annually. There is no set frequency for monitoring of downspout runoff monitoring because samples are collected after a large precipitation event.

SRBT is required to maintain its EMP to be in compliance with REGDOC-2.9.1(2020) [32] and relevant standards, including CSA N288.4-10, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills* [34].

Based on compliance activities and technical assessments, CNSC staff determined that SRBT is in compliance with REGDOC-2.9.1 (2020) and continues to implement and maintain an effective EMP for their facility that adequately protects the environment and the health of persons.

## 2.5 Reporting of airborne emissions under other Federal or Provincial legislation

A core element of the CNSC's requirement for an EMS is the identification of all regulatory requirements applicable to the facility, whether pursuant to the NSCA or other federal or provincial legislation. The EMS must ensure that programs are in place to respect these requirements.

### 2.5.1 Greenhouse gas emissions

While there are a range of broadly applicable federal environmental regulations (i.e. *Environmental Emergency Regulations*), the management of GHG emissions has been identified as a national priority.

Under the federal [Canadian Environmental Protection Act, 1999 \(CEPA 1999\)](#) [46], SRBT is required to monitor and report on GHG emissions [47]. Nuclear facilities that emit more than the emission reporting threshold (that is, 10,000 tons of CO<sub>2</sub> equivalent) on an annual basis must report its GHG emissions to Environment and Climate Change Canada (ECCC). SRBT has

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<sup>2</sup> In 2021, SRBT began sampling milk twice per year. This change was reviewed and approved by CNSC staff.

<sup>3</sup> In 2020, SRBT stopped sampling wine because the business that provided the product closed permanently.

continually been below the GHG emission threshold and is therefore not required to report. If the GHG emission threshold were exceeded, SRBT would report the exceedance to ECCC.

The CNSC maintains a collaborative working relationship with ECCC through a formal memorandum of understanding (MOU), which includes a notification protocol. An exceedance of the GHG emission threshold would be included under this notification protocol. This ensures a coordinated regulatory approach is achieved to meet all federal requirements associated with EP, including GHGs.

### **3.0 Status of the environment**

This section provides a summary of the status of the environment around the SRBT facility. It first includes a description of the radiological and hazardous releases to the environment (section 3.1), followed by a description of the environment surrounding the SRBT facility and an assessment of any potential effects to the different components of the environment, as a result of exposure to these contaminants (section 3.2).

CNSC staff regularly review the environmental components through annual reporting requirements and compliance verification activities, as detailed in other areas of this report. This information is reported to the Commission in the EP Safety and Control Area of licensing commission member documents (CMDs) and annual RORs. Annual Compliance and Performance Reports submitted by SRBT are made publicly available and can be viewed [on SRBT's website](#) [42].

#### **3.1 Releases to the environment**

Radiological and hazardous substances that have the potential to cause an adverse effect to ecological or human receptors are identified as COPCs. Once COPCs are emitted from a facility or licensed site, they are considered a release to the environment and how they get to the different receptors considered by a licensee's ERA are called pathways. Figure 3.1 below illustrates a conceptual model of the environment around SRBT to show the relationship between releases (airborne emissions or waterborne effluent) and human and ecological receptors or exposure pathways. The movement of the releases through the environment to the receptors are termed exposure pathways. This graphic is meant to provide an overall conceptual model of the releases, exposure pathways and receptors for SRBT, and thus, should not be interpreted as a complete depiction of the site and its surrounding environment. The specific releases and COPCs associated with SRBT are explained in detail in the following subsections.



Figure 3.1: Conceptual model of the environment around the SRBT facility



### 3.1.1 Licensed release limits

As summarized in table 3.1, the SRBT facility has licensed release limits to the atmosphere and to the sewer, in order to control releases to the environment. The licensed release limits were derived based on conservative estimates of tritium concentrations that could potentially develop in groundwater as a result of SRBT's operations.

**Table 3.1: Licensed release limits for SRBT**

| Parameter                                   | Licence limit (GBq/year)* |
|---|---------------------------|
| Airborne - Tritium as tritium oxide (HTO)   | 67,200                    |
| Airborne - Total tritium as HTO + HT        | 448,000                   |
| Waterborne to sewer – Tritium water soluble | 200                       |

\* Releases are measured in gigabecquerels per year (GBq/year). The becquerel is the International System of Units (SI) unit for radioactivity, and one becquerel (Bq) is the activity of a quantity of radioactive material in which one nucleus decays per second, hence the greater the number of Bq, the higher the radioactivity.

### 3.1.2 Airborne emissions

SRBT controls and monitors airborne emissions from the facility to the environment under its EffMP. This program is based on CSA N288.5-11, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills* [35] and includes the monitoring radiological emissions.

Airborne emissions from the SRBT facility are monitored by active ventilation systems that direct contaminated air through two air handling units, before it is released upwards through two stacks located at the west corner of the facility. The only radionuclide released by SRBT is tritium. The radionuclide is released in two forms: elemental tritium gas (HT), and oxidized tritium or tritiated water (HTO). SRBT does not release any hazardous (non-radiological substance) through gaseous effluent pathways in any significant quantity.

HTO is formed when a tritium atom replaces a hydrogen atom in water (H<sub>2</sub>O). HTO has the same chemical properties as water and is also odourless and colourless and can be transferred to humans by inhalation, skin absorption or ingestion of drinking water or food. HTO exposure is generally the most important consideration in assessing radiation dose. HT is formed when a tritium atom replaces a hydrogen atom to form a tritium-hydrogen bond. In its elemental form, HT is an invisible, odourless gas chemically identical to hydrogen gas. HT is relatively inert in biological systems and has a very low uptake into humans. Some of the tritium released into the environment will be naturally incorporated into nutrients such as carbohydrates, fats, or proteins. This is called organically bound tritium (OBT). OBT can enter the body directly by eating tritiated food. OBT poses a slightly greater health risk because as an organic material, the body will retain it longer than tritiated water. This means that there is a greater likelihood that the tritium atom will decay while in the body and possibly cause damage. OBT is generally found in much smaller concentrations in the body than HTO.

SRBT measures gaseous effluent for tritium concentration in real time and does so by obtaining a sample of representative gas being released and monitoring it for tritium concentration using equipment designed to measure tritium-in-air. The point of release for gaseous effluent is monitored, which is the active ventilation systems' common duct in the ceiling space just prior to the stacks. SRBT also measures gaseous effluent using an integrated weekly sample collection method that allows for the distinction between the quantity of tritium released in the elemental form, and the oxide form.

Air emissions from the SRBT facility are provided in table 3.2 and compared against the licenced release limits. In addition to licence limits, the SRBT facility has established air emission ALs and internal administrative limits, which are used to prevent AL exceedances. Exceedances of licence limits and ALs are reported to the CNSC, documented, investigated and appropriate corrective action are taken where warranted. SRBT did not report any AL exceedances during the current licensing period. Air emissions of elemental tritium and tritium oxide have been consistently well below licence limits throughout the current licensing period.

**Table 3.2: Annual airborne releases from SRBT compared to applicable release limits (2016-2020) [2-6]**

| Parameter                                 | Licence limit (GBq/year) | 2016   | 2017   | 2018   | 2019   | 2020   |
|---|--------------------------|--------|--------|--------|--------|--------|
| Tritium as tritium oxide (HTO) (GBq/year) | 67,200                   | 6,293  | 7,198  | 10,741 | 11,858 | 9,755  |
| Total tritium as HTO + HT (GBq/year)      | 448,000                  | 28,945 | 24,822 | 33,180 | 31,769 | 25,186 |

### Conclusions

Based on CNSC staff's review of the results of SRBT's EMP, CNSC staff found that the reported air emissions to the environment from the facility have remained below the CNSC approved licence limits throughout the reported period and continues to provide adequate protection of people and the environment from air emissions.

### 3.1.3 Waterborne effluent

SRBT also controls and monitors liquid (waterborne) effluent from the facility to the environment under its implementation of the EffMP. This program is based on CSA N288.5-11, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills* [35] and includes monitoring of radiological releases.

Liquid effluent from the SRBT facility is not continuously discharged, but is rather released in a controlled manner to the municipal sewer system, and is directed to the Pembroke Pollution Control Center for wastewater treatment.

SRBT monitors liquid effluent for water-soluble tritium using a batch collection strategy, whereby the water is collected in batches and analyzed for tritium concentrations through a method called liquid scintillation counting assays. Based on these assays, calculations are



performed in order to measure the amount of water-soluble tritium per batch that is to be released through the liquid effluent pathway. Once verified that the tritium concentrations in the samples meet all acceptance criteria associated with SRBT's licensing basis (that is, has not exceeded any internal administrative limits, ALs, or regulatory requirements), the batch is authorized for release into the sewer system. Authorized liquid effluent is released from the facility through sinks in Zone 2 and 3, and the sink in the Zone 1 shipping/receiving area.

Table 3.3 summarizes the concentrations of liquid effluent released over a five-year period from 2015 to 2020. In addition to licence limits, the SRBT facility has established liquid effluent ALs and internal administrative limits, which are used to prevent AL exceedances. Exceedances of limits and ALs are reported to the CNSC, documented, investigated and appropriate corrective action are taken where warranted. SRBT did not report any AL exceedances during the current licensing period. Waterborne releases of tritium have been consistently well below licence limits throughout the current licensing period.

**Table 3.3: Annual waterborne releases from SRBT compared with applicable release limits (2015-2020) [2-6]**

| Parameter                        | Licence limit (GBq/year) | 2015 | 2016 | 2017 | 2018  | 2019  | 2020 |
|----------------------------------|--------------------------|------|------|------|-------|-------|------|
| Tritium-water soluble (GBq/year) | 200                      | 6.0  | 5.18 | 6.85 | 10.02 | 13.67 | 5.56 |

### Conclusion

CNSC staff found that SRBT's reported liquid effluent from the facility into the municipal sewer system remained below the CNSC approved licence limits and has met regulatory requirements during the reported period and continues to provide adequate protection of people and the environment from effluent released.

## 3.2 Environmental effects assessment

This section presents an overview of the assessment of predicted effects from licensed activities on the environment and the health of persons. CNSC staff reviewed SRBT's assessment of current and predicted effects on the environment and health of persons due to licensed activities included in the ERA (see subsection 2.3.3 above). The ERA conducted by SRBT confirmed that tritium is the only COPC released from the facility and that operations at the SRBT facility do not pose a risk to the human health and the environment. SRBT completed their ERA in a stepwise manner by performing the following:

- quantifying the releases (COPCs) to the environment from current (section 3.1) and future activities
- identifying the environmental interactions of the current and expected releases of COPCs, and COPC exposure pathways in the environment
- identifying predicted COPC exposure for ecological and human receptors
- identifying potential effects to receptors

- determining whether the environment and health of persons is and will continue to be protected

To inform this section of the report, CNSC staff reviewed SRBT's 2021 ERA submission [13], and the annual reports submitted between 2011 and 2020, inclusively [2-12].

While CNSC staff conducted a review for all environmental components, only a selection of components is presented in detail in the following subsections. The environmental components were selected based on licensing requirements, as well as those that have historically been of interest to the Commission, Indigenous peoples and the public.

### **3.2.1 Atmospheric environment**

An assessment of the atmospheric environment requires SRBT to characterize both the meteorological conditions and the ambient air quality at the SRBT site. Meteorological conditions such as temperature, wind speed, wind direction, and precipitation are monitored in order to assess the extent of the atmospheric dispersion of contaminants emitted to the atmosphere, the rates of contaminant deposition, and to determine predominant wind directions, which are used to identify critical receptor locations from the air pathway. Meteorological data was gathered from the Petawawa Weather Station between 1989 and 2004 and SRBT's own weather station from 2011 to 2019.

The climate of Pembroke is classified as warm-summer humid continental, as with much of southern and eastern Ontario. The prevailing wind direction is typically dominated by West to East patterns with average daily temperatures ranging from -11.8°C to 20.3°C. Average annual precipitation is 795.3 mm rain equivalent precipitation.

#### ***ERA predictions***

Within the ERA [13], SRBT predicted and assessed the potential impacts to ambient air quality as a result of routine airborne emissions of tritium, released to the environment from its facility.

None of the hazardous substances used in facility operations exceeded applicable provincial screening criteria and tritium emissions remained below annual release limits, the ERA therefore did not indicate a requirement for follow-up monitoring of air emissions. However, the emissions monitoring program described below is in place to support the operation of the SRBT facility to ensure environmental risk is managed in a fashion that adheres to the principle of as low as reasonably achievable, validate existing air dispersion models, and support future updates to the ERA.

#### **Airborne tritium monitoring**

As part of SRBT's EffMP, airborne tritium emissions are measured in real-time from the facility's stacks, using tritium-to-air monitors to establish the tritium concentration. A weekly sample of tritium emissions is also assessed using liquid scintillation counting to discriminate between oxide and elemental species of tritium. The annual release limits for tritium were calculated conservatively using airborne dispersion modelling to determine the amount of tritium that could be released from the facility without resulting in a potential risk to public or the environment [48]. See section 3.1.2 for results of annual airborne releases from SRBT over the past five years. Air emissions of tritium have remained well below licence limits throughout the current licensing period.

## **Conclusion**

CNSC staff found, based on their review of the annual EffMP data from the current licensing period and the ERA results for the SRBT facility, that atmospheric emissions of tritium remain significantly below release limits and, therefore, ambient air quality consistently remains at levels protective of human health and the environment.

### **3.2.2 Terrestrial and aquatic environment**

An assessment of potential effects on biota at the SRBT facility and the surrounding area consists of characterizing the local habitat and species (including considering federal and provincial species at risk) and assessing the possibility of their exposure to radiological and hazardous substances, as well as physical stressors that may be disruptive to ecological receptors.

#### **3.2.2.1 Habitat**

Pembroke is located within the Lake Simcoe - Rideau Ecozone of the Mixedwoods Plains Ecozone [49]. The SRBT facility is located in an industrial park in the city's southern outskirts where the immediate surrounding area is varied. There are limited areas of forest, wetland, and other natural cover within 1,000 metres of the facility and the land use in the area is a mix of commercial, business and industrial facilities, and moderately dense urban and suburban development to the north, northeast and northwest of the facility. Despite the amount of urban and suburban development around the facility, the flora and fauna is diverse. Farmland to the west of the facility extends approximately 300-500 metres. To the south, east and west of the facility, there are open fields with grass cover, dispersed housing, a small river, swamps, streams, seasonal creeks, and drainage ditches. The regional climate vegetation consists of mixed hardwoods and some notable terrestrial plants in the area are maple, white pine, poplar, birch, butternut, goldenrod, and various species of mosses.

There are no large water bodies close to the facility. Neither the SRBT facility nor its property directly impact or influence any bodies of water. The closest body of water is the Muskrat River approximately 400 metres east and southeast of the edge of the facility's property line. The Muskrat River is narrow and measures up to approximately 40 metres across with an elevation of approximately 20 metres below the facility. Depending on the rainfall and season, this river has a highly variable volumetric flow rate. There is limited riparian habitat along the banks of the Muskrat River within the City of Pembroke but more wetland habitat is found along its banks outside of the city limits as dwellings and population density decreases. The Indian River is a smaller water body located approximately 1,000 metres northwest of the facility. These two water bodies are used recreationally and not generally used for sport fishing. They combine within the City of Pembroke, meander for 1.5 km north and discharge into the Ottawa River at approximately 2.5 km north of the facility.

#### **3.2.2.2 Non-human biota**

The urban wildlife that may be found in the area around the facility includes the chipmunk, common raccoon, groundhog, muskrat, red squirrel, white-tailed deer, eastern garter snake and the eastern ribbon snake. Some birds that are known or suspected to be in the area include the American crow, barn swallow, bank swallow, bobolink, Canada goose, chimney swift, eastern meadowlark, ring-billed gull, and the snow bunting. Some types of known aquatic species in the

assessment area include the Blanding's turtle, northern leopard frog, rainbow trout, walleye, bulrushes, and various ferns.

Table 3.4 lists the 10 terrestrial and aquatic species that were identified as potentially present around SRBT and that were assessed in SRBT's 2021 ERA [13].

### ***Species at Risk***

In Ontario, the following legislation applies to species at risk: the provincial *Endangered Species Act* (ESA) [50] and the federal *Species at Risk Act* (SARA) [51]. As part of their 2021 ERA, SRBT identified valued components to represent all categories of organisms in the area, including those that may hold Indigenous importance, and to identify the species at risk potentially present on or around the SRBT site (table 3.4).

**Table 3.4: Status of terrestrial and aquatic species potentially present around SRBT [13]**

| Common name                                     | Ontario ESA status [50] | SARA status [51] |
|---|-------------------------|------------------|
| <b>Birds</b>                                    |                         |                  |
| Ring-billed gull ( <i>Larus delawarensis</i> )  | No status               | No status        |
| Barn swallow ( <i>Hirundo rustica</i> )         | No status               | Threatened       |
| <b>Mammals</b>                                  |                         |                  |
| Muskrat ( <i>Ondatra zibethicus</i> )           | No status               | No status        |
| Red squirrel ( <i>Tamiasciurus hudsonicus</i> ) | No status               | No status        |
| <b>Plants</b>                                   |                         |                  |
| Bulrushes ( <i>Typha latifolia</i> )            | Threatened              | Endangered       |
| Butternut tree ( <i>Juglans cinerea</i> )       | Endangered              | Endangered       |
| <b>Fish</b>                                     |                         |                  |
| Lake sturgeon ( <i>Acipenser fulvescens</i> )   | Special concern         | Special concern  |
| <b>Aquatic invertebrate</b>                     |                         |                  |
| Benthic invertebrates                           | No status               | No status        |

| Common name                                       | Ontario ESA status [50] | SARA status [51] |
|---|-------------------------|------------------|
| <b>Terrestrial invertebrate</b>                   |                         |                  |
| Earthworms ( <i>Lumbricus terrestris</i> )        | No status               | No status        |
| <b>Amphibians and reptiles</b>                    |                         |                  |
| Blanding's turtle ( <i>Emydoidea blandingii</i> ) | Threatened              | Endangered       |

### ***ERA predictions***

The most recent assessment of potential effects on terrestrial and aquatic biota near SRBT was provided in the 2021 ERA [13]. As discussed in subsection 2.3.3, the ERA fully complied with requirements of CSA N288.6-12, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills* [36] and incorporated recent environmental monitoring data.

### Exposure to radiological substances

The potential radiological effects to ecological receptors were assessed by comparing the estimated radiation dose received by each ecological receptor from radiological COPC through all applicable pathways. The pathways include external and internal exposure due to radionuclides in air, soil, and water and the exposures were compared to the recommended benchmark values.

SRBT's ERA provides calculated dose rates that include all internal and external doses from all exposure pathways. The values for the most-exposed terrestrial and aquatic receptor are compared to benchmark values in table 3.5 below.

**Table 3.5: Calculated dose rates for the most-exposed ecological receptor compared to dose rate benchmarks [13]**

| Most-Exposed Receptor                        | Calculated Dose Rate ( $\mu\text{Gy/h}$ ) | Radiological Dose Rate Benchmarks ( $\mu\text{Gy/h}$ )* |
|--|---|---|
| Terrestrial earthworm (terrestrial receptor) | 2.73                                      | 100   |
| Lake sturgeon (aquatic receptor)             | 6.96E-03                                  | 400   |

\* Dose rates are measured in micrograys per hour ( $\mu\text{Gy/h}$ ). The Gray (Gy) is the International System of Units (SI) unit of measurement for absorbed dose [52] which is the amount of energy absorbed in the human body from radiation exposure and is equivalent to 1 joule of energy deposited in 1 kilogram of a substance [53].

The overall radiation dose for ecological receptors were significantly lower than the radiological dose benchmarks of 100  $\mu\text{Gy/h}$  for terrestrial receptors and 400  $\mu\text{Gy/h}$  for aquatic receptors recommended in CSA 288.6-12 [36]. These results indicate no potential for adverse effects and no need for further protective measures and no need for a more details assessment.

#### Exposure to hazardous substances

A review of all of SRBT's processes, including the use of radiological and hazardous substances, identified candidate COPCs which were examined through a screening level assessment. The screening level assessment concluded that tritium is the only radiological COPC of significance to human and ecological receptors and there are no significant exposures from hazardous substances to these receptors from SRBT's activities and not considered a COPC.

#### Exposure to physical stressors - noise

From SRBT's screening level assessment with in the ERA, noise was identified as the only physical stressor of possible concern. At the facility, there are very limited and insignificant sources of noise, road management activities, and vehicular traffic. Noise exposure for a 24 hour period was measured at six points around the facility at the boundary of the area controlled by SRBT. The highest noise level recorded at the facility's perimeter was 56 decibels (dB), which is similar to that of normal human conversation at 60 dB. Noise analysis associated with SRBT operations has indicated they are within acceptable levels and the risk to ecological receptors is low.

### **Conclusion**

Based on CNSC staff's review of SRBT's ERA results, CNSC staff found that terrestrial and aquatic receptors remain protected from radiological releases from SRBT as well as from physical stressors associated with the facility. There are no significant exposures to human and ecological receptors from hazardous releases from SRBT processes.

### **3.2.3 Hydrogeological environment**

An assessment of the hydrogeological environment at the SRBT site consists primarily of identifying potential sources of groundwater contamination on the site, determining the extent of contamination, if any, which could lead to an exposure pathway for human and/or non-human receptors, and determining the significance of any exposure from this pathway. Additionally, the hydrogeological assessment confirms whether control measures in place continue to remain effective in protecting the environment.

The groundwater originating at the SRBT is moving easterly towards Muskrat River. The Muskrat River represents the main discharge area for shallow groundwater in the area and is about 420 metres from the SRB property along the shortest pathway. The horizontal velocity in the fractured shallow bedrock in the region is estimated to 4 metres/year.

#### **Groundwater monitoring**

SRBT monitors tritium in groundwater around the site with 29 surrounding wells, which were sampled monthly until 2020 and then sampled on a quarterly basis onwards. CNSC staff reviewed SRBT's request to move to quarterly sampling and determined this change was acceptable, given the stability of tritium concentrations and overall decreasing trends over the last 15 years. CNSC staff stated that, should groundwater behaviour change in the future, a



higher sampling frequency would be reinstated. SRBT's groundwater monitoring program is designed in accordance with CSA N288.7-15, *Groundwater monitoring programs for Class I nuclear facilities and uranium mines and mills* [37] and complies with the standard.

In 2020, concentrations of tritium in samples obtained from all wells were below the Ontario Drinking Water Quality Standard value of 7,000 Bq/L [54] with the exception of one well (MW06-10) with a mean groundwater tritium concentration of 29,513 Bq/L. This well is located at the northwestern corner of the facility (figure 3.2) and is directly beneath the area where the active ventilation stacks are located. These high tritium concentrations are representative of historical contamination from the site in the early 2000's and wet deposition under normal operational conditions. This well is a dedicated, engineered groundwater monitoring well at the facility within a secured area, and is not available to be used as a source of water consumption.

**Figure 3.2: Tritium concentrations around the SRBT facility**



SRBT also samples five nearby residential wells around the site, although none of the residential wells are in the groundwater flow pathway. The closest one, RW-2, is 1,100 metres away from SRBT (figure 3.2). The tritium concentrations among the sampled residential wells monitored

are currently under 60 Bq/L. The tritium concentrations above the limit of detection in the residential wells are a result of deposition of tritium released into the air, not through groundwater movement from SRBT area.

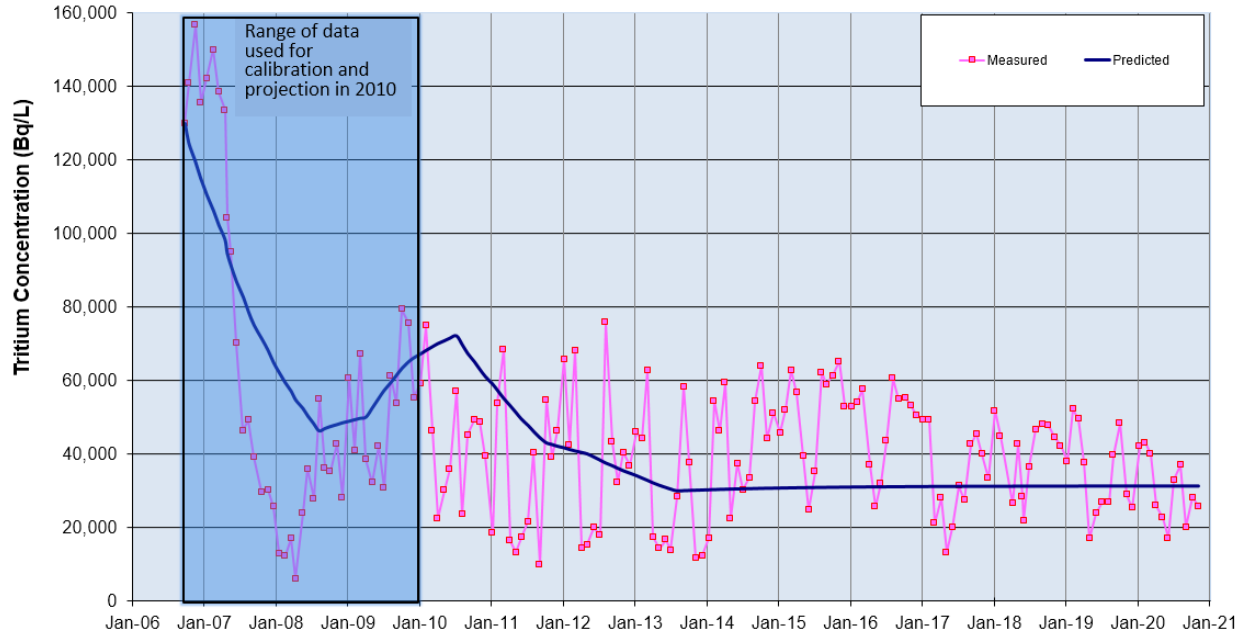
Tritium concentrations decrease significantly at locations farther away from SRBT through natural processes such as radioactive decay, hydrodynamic dispersion and retardation. Over the years tritium concentrations in the Muskrat River (the receiving surface water environment) have been consistently near or below the minimum detectable activity (MDA) (between 5-10 Bq/L).

As discussed above in section 2.2, groundwater contamination from the early operations of SRBT were of a concern and have been addressed through several corrective measures (e.g., stopping historical practices of releasing waste water into the ground, reducing air emissions, conducting a comprehensive hydrogeological study and establishing a groundwater monitoring program) and regulatory oversight. During SRBT's licence renewal hearing in 2010, concerns remained regarding the upward trend of tritium in the groundwater around the facility. To address the concerns, CNSC staff conducted an independent groundwater modelling assessment in early 2010's [55] [56]. As well SRBT completed another groundwater study in 2011 [57]. These studies confirmed that the elevated tritium concentrations in groundwater well MW06-10 was mainly caused by high tritium concentrations in the soil due to historical practices. CNSC staff's modelling [55] [56] also predicted that while some monitoring wells were showing an upward trend, concentrations would decrease as tritium in the soil is gradually flushed out by infiltrated precipitation, and would eventually stabilize (figures 3.3 and 3.4).

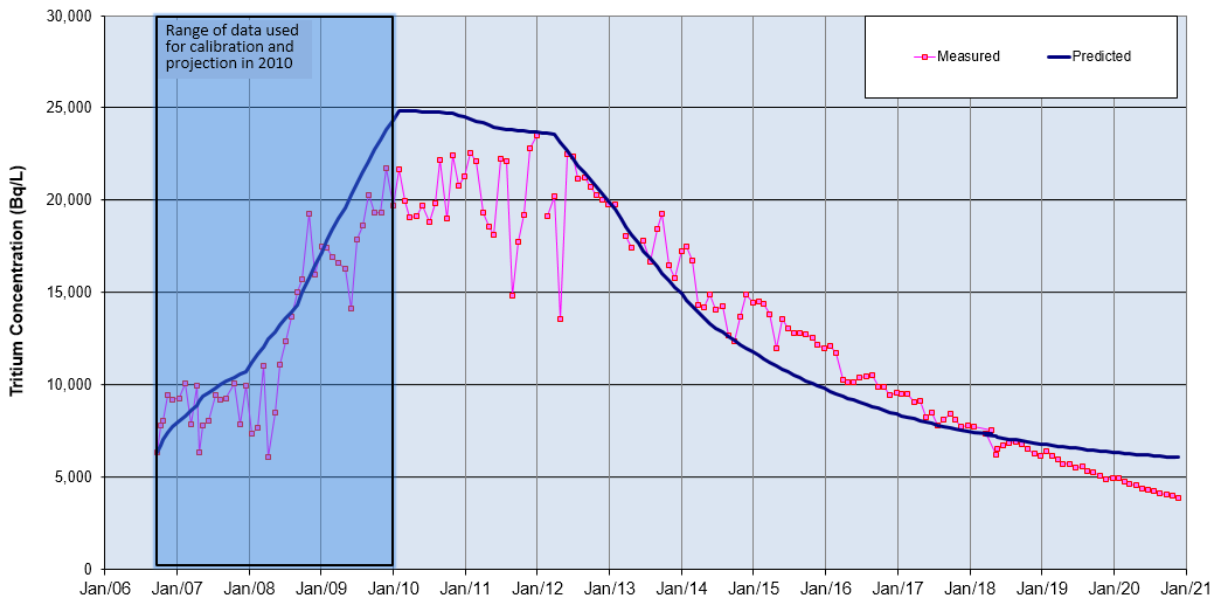
As part of CNSC staff's regulatory oversight, staff continue to assess the groundwater monitoring data collected by SRBT against predicted values using staff's modelling assessment which was initiated in 2010. As shown in figures 3.2 and 3.3, using the two monitoring wells in close proximity to SRBT as an example, the relatively good agreement between the modelling results and measurements provides validation of CNSC staff's 2010 prediction of the behaviors of tritium in the groundwater system around the facility. It also demonstrates that releases of tritium resulting from SRBT's operation are under control and the tritium movement in groundwater around the SRBT facility is well understood. CNSC staff have determined that that tritium concentrations in groundwater have declined and stabilized as predicted.



**Figure 3.3: Predicted vs measured tritium concentrations at MW06-10**



**Figure 3.4: Predicted vs measured tritium concentrations at MW07-13**



The increasing trend of tritium concentrations in the groundwater system around SRBT observed prior to early 2010, mainly caused by historical practices, has stopped and the tritium concentrations have been stabilizing over the years. SRBT’s operation has not adversely impacted the groundwater quality, and the groundwater quality around SRBT continues to improve.

Table 3.6 provides a summary of the average and maximum values of tritium in the monitoring well over the most recent five-year period.

**Table 3.6: Tritium concentrations in groundwater at the SRBT site ([2] and [58])**

| Parameter                      | Units | Data Measured                        | Value     | 2016   | 2017   | 2018   | 2019   | 2020   | Ontario drinking water quality standard [54] |       |
|--------------------------------|-------|--------------------------------------|-----------|--------|--------|--------|--------|--------|--|-------|
| Tritium as tritium oxide (HTO) | Bq/L  | All Monitoring Wells                 | Maximum*  | 60,571 | 49,457 | 51,809 | 52,321 | 43,247 | N/A***                                       |       |
|                                |       |                                      | Average   | 3,814  | 2,837  | 2,883  | 2,510  | 2,063  |  |       |
|                                |       | All Monitoring Wells without MW06-10 | Maximum** | 12,133 | 9,594  | 7,785  | 6,436  | 4,951  |  |       |
|                                |       |                                      | Average   | 2,166  | 1,739  | 1,534  | 1,329  | 1,067  |  |       |
|                                |       | Residential Wells                    | Average   | 59     | 36     | 23     | 21     | 20     |  | 7,000 |

\* The maximum values in the dataset represents the high values at Well MW06-10 and skews the average high.

\*\* The maximum values without MW06-10 corresponds to well MW07-13, the next closest well to the tritium source, after MW06-10.

\*\*\* These wells are used for monitoring purposes only and are not used for drinking water.

## Conclusion

Based on the review of the hydrogeological conditions and monitoring results reported in SRBT supporting documents, CNSC staff found that tritium releases from SRBT present negligible impact to surrounding residential wells and to the nearest receiving surface waterbody of the Muskrat River and at levels that are protective of the environment and human health.

### 3.2.4 Human environment

An assessment of the human environment at the SRBT site consists of identifying representative persons located within or in proximity to the site and determining whether radiological or hazardous COPCs could impact their health by breathing the air, being on the land, drinking and swimming in surface water, and eating plants, fish and wildlife from the area around the SRBT facility. In general, human receptors may be exposed to contaminants through four primary routes: dermal (skin), inhalation, incidental ingestion (soil) and ingestion of food and water. Representative persons are those individuals who, because of their location and habits, are likely to receive the highest exposures to radiological or hazardous substances from a particular source.

SRBT's 2021 ERA [13] included a HHRA to assess the risk to humans from both radioactive and hazardous substances released from activities at the SRBT facility. Tritium was identified as the only radiological COPC of significance to humans and there were no significant exposures from hazardous substance to human from SRBT's processes. The following human receptors were selected for the HHRA:

- Representative persons – closest residents living within 250 metres in the nearby Johnson Meadows subdivision. Assumed to be residing there 100% of the year with a 95<sup>th</sup> percentile breathing rate and conservative consumption of local produce, drinking water, and time spent bathing and swimming, in order to calculate a conservative dose. This represents a member of the public with the highest exposure to a COPC from the SRBT facility living nearest to the facility.
- A full-time worker at the Pembroke Pollution Control Centre (PPCC) – assumed to spend 40 h/week at the PPCC facility with an elevated breathing rate in order to calculate a conservative dose. This human receptor was included to represent someone who may be exposed to a COPC in liquid effluent through releases to the municipal sewer system.
- Members of the Algonquins of Pikwàkanagàn First Nation (AOPFN) – closest Indigenous community residing approximately 25-35 km south-southeast of the facility with unique traditional land uses and dietary habits.

The age classes for the representative persons included the following: a one-year old infant, a ten-year old child, an adult resident, and an adult worker.

### 3.2.4.1 Human Exposure to Radiological Substances

Potential impacts to human health from radiological substances released from a nuclear facility are assessed through a licensee's radiological HHRA. The estimated dose to human receptor(s) from licensed activities at SRBT is calculated using data from the environmental and effluent monitoring programs. SRBT uses the monitoring results in combination with methods described in CSA N288.1-14, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities* [33] to characterize radiological risk for the HHRA, and the final calculation is a summation of the following:

- Tritium uptake from inhalation and absorption through skin
- Tritium uptake due to consumption of well water
- Tritium uptake due to consumption of produce
- Tritium uptake due to consumption of dairy products

Dose from tritium to humans were calculated in SRBT's ERA by taking the maximum measured concentration of tritium in releases from the facility over the last five years and applying it to radiological dose calculations, as outlined in CSA N288.1-14 [33]. The following conservative input values were used in SRBT's 2021 ERA to derive the effective dose to human receptor(s):

**Table 3.7: Input parameters for Human Health Risk Assessment [13]**

| Input Parameter                      | Units             | Max 5-year measurement * | Applied Input Value |
|--------------------------------------|-------------------|--------------------------|---------------------|
| Air concentration, residential, HTO  | Bq/m <sup>3</sup> | 24.4                     | 49                  |
| Air concentration, occupational, HTO | Bq/m <sup>3</sup> | 14.40                    | 29                  |

|  |                   |        |     |
|--|-------------------|--------|-----|
| <b>Air concentration, PPCC, HTO</b>              | Bq/m <sup>3</sup> | 0.82** | 1   |
| <b>Drinking water, HTO</b>                       | Bq/L              | 232    | 464 |
| <b>Residential produce, HTO (cucumber, 2018)</b> | Bq/kg             | 210    | 420 |
| <b>Residential produce, OBT (carrot, 2016)</b>   | Bq/kg             | 13     | 26  |
| <b>Commercial produce, HTO (cucumber, 2019)</b>  | Bq/kg             | 12     | 24  |
| <b>Commercial produce, OBT (tomato, 2017)</b>    | Bq/kg             | 3      | 6   |
| <b>Animal produce, HTO (milk, 2019)</b>          | Bq/kg             | 5      | 10  |

\* These values were conservatively multiplied by 2 for the ERA calculations.

\*\*This value was conservatively rounded up to 1 Bq/m<sup>3</sup> for the ERA calculations.

The evaluation resulted in the following total dose estimates for the selected representative persons:

- 0.023 mSv/year for the adult worker
- 0.020 mSv/year for the infant resident
- 0.022 mSv/year for the child resident
- 0.024 mSv/year for the adult resident

SRBT's 2021 ERA [13] estimated that the dose to the most-exposed human receptor (adult resident) is 0.024 mSv/year, which is far lower than the public dose limit of 1 mSv/year.

SRBT also calculates the effective dose to the public each year as part of its EMP. The 2015 to 2020 calculated annual doses to a member of the public are shown in table 3.8. The results show that the estimated doses to the public remain well below the regulatory dose limit of 1 mSv/year.

**Table 3.8: Calculated annual dose to a member of the public, SRBT (2015-2020) [2]**

| Dose data                    | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   | Regulatory dose limit |
|------------------------------|--------|--------|--------|--------|--------|--------|-----------------------|
| Maximum effective dose (mSv) | 0.0068 | 0.0046 | 0.0033 | 0.0038 | 0.0021 | 0.0024 | 1 mSv/year            |

### 3.2.4.2 Environmental Monitoring Campaign with the Algonquins of Pikwàkanagàn First Nation

In 2020, SRBT undertook a collaborative environmental sampling campaign with the AOPFN, who reside approximately 25-35 km south-southeast of the facility. Air samples, precipitation samples, and plant samples of cultural importance to the community were collected and analyzed for tritium concentration. The plant samples collected included ironwood tree bark, mullein, red cedar, raspberry leaves, and sumac berries. AOPFN members shared knowledge of plants, including their uses and cultural significance, and helped harvest samples for the campaign. Below is a summary of the results (table 3.9).

**Table 3.9: Results of the 2020 monitoring campaign with the AOPFN [13]**

| Input Parameter                              | Minimum Detectable Concentration (MDC) | Measured Result |
|--|--|-----------------|
| Average HTO in air – Oct., Bq/m <sup>3</sup> | 0.70                                   | < MDC           |
| Average HTO in air – Nov., Bq/m <sup>3</sup> | 0.76                                   | < MDC           |
| Average HTO in precipitation – Oct., Bq/L    | 14.32                                  | 15              |
| Average HTO in precipitation – Nov., Bq/L    | 14.38                                  | 15              |
| Ironwood tree bark, Bq/kg (fw)*              | 0.26                                   | 9               |
| Mullein, Bq/kg (fw)                          | 0.58                                   | 12              |
| Red cedar, Bq/kg (fw)                        | 0.32                                   | 12              |
| Raspberry leaves, Bq/kg (fw)                 | 0.51                                   | 42              |
| Sumac berries, Bq/kg (fw)                    | 0.20                                   | 11              |

\*fw = fresh weight

The results in table 3.9 show that the amount of tritium found in air, precipitation, and foods during the campaign with the AOPFN is low and unlikely to pose a health risk to the AOPFN

community. Health effects from tritium ingestion may arise when a person takes in an extraordinarily large quantity of tritium into the body (ie. billions of becquerels of tritium) [59]. For example, using the highest measured results from table 3.9 for raspberry leaves, one would need to ingest approximately 24 million kg<sup>4</sup> of raspberry leaves to potentially see a health effect from tritium. These results and the fact that the AOPFN community is further from the facility than the most exposed human receptor indicate it is highly unlikely that members of the AOPFN residing in their community would be exposed to an unreasonable risk from operations of the SRBT facility.

### 3.2.4.3 Conclusion

Between 2015 and 2020, the estimated radiological doses to a member of the public around SRBT remained well below the annual regulatory public dose limit of 1 mSv/year, indicating that radiological releases from SRBT pose a negligible risk to human health.

Based on CNSC staff's assessments conducted at SRBT, including the review of the 2021 ERA, the results of the 2020 monitoring campaign with the AOPFN and Annual Compliance Performance Reports, CNSC staff found that impacts to the human environment from radiological substances released from SRBT are negligible, and that people living or working near the site remain protected.

### 3.2.5 Additive cumulative effects

CNSC staff considered the additive cumulative effects of site-specific factors in a risk informed manner within the context of its overall assessment of environmental protection. Additive cumulative effects are one type of cumulative effect that the federal guidance document titled [\*Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012\*](#) [60] defines "as the sum of individual effects of two or more physical activities". CNSC staff continually assess additive cumulative effects through the cyclical nature of ERAs, the monitoring data in annual reports, data from regional monitoring programs, the IEMP, and through health studies. For SRBT, based on the data assessed thus far and presented in this EPR report, CNSC staff found that no additive cumulative effects are occurring in the surrounding environment.

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<sup>4</sup> To reach 1 billion Bq (1 billion = 1,000,000,000) of tritium from raspberry leaves analyzed from this study and using the measured value of 42 Bq/kg:  $1,000,000,000 \text{ Bq} \div 42 \text{ Bq/kg} = 23,809,524 \text{ kg}$  (or approximately 24 million kg)

## 4.0 CNSC Independent Environmental Monitoring Program

The CNSC has implemented its IEMP as an additional verification that Indigenous peoples, the public and the environment around licensed nuclear facilities are protected. It is separate from, but complementary to the CNSC's ongoing compliance verification program. The IEMP involves taking samples from public areas around the facilities and measuring and analyzing the amount of radiological and hazardous substances in those samples. CNSC staff collect the samples and send them to the CNSC's laboratory for testing and analysis.

### 4.1 IEMP at the SRBT facility

CNSC staff conducted IEMP sampling around SRBT in 2013, 2014, 2015 and 2018. CNSC staff developed site-specific sampling plans, which focused on radiological substances and were based on SRBT's comprehensive environmental protection program and the CNSC's regulatory knowledge of the site. CNSC staff are conducting its next sampling campaign in the summer 2021 with results available in 2022 on the CNSC's IEMP webpage.

In 2018, the most recent completed campaign, CNSC staff collected the following samples in publicly accessible areas outside the perimeter of SRBT:

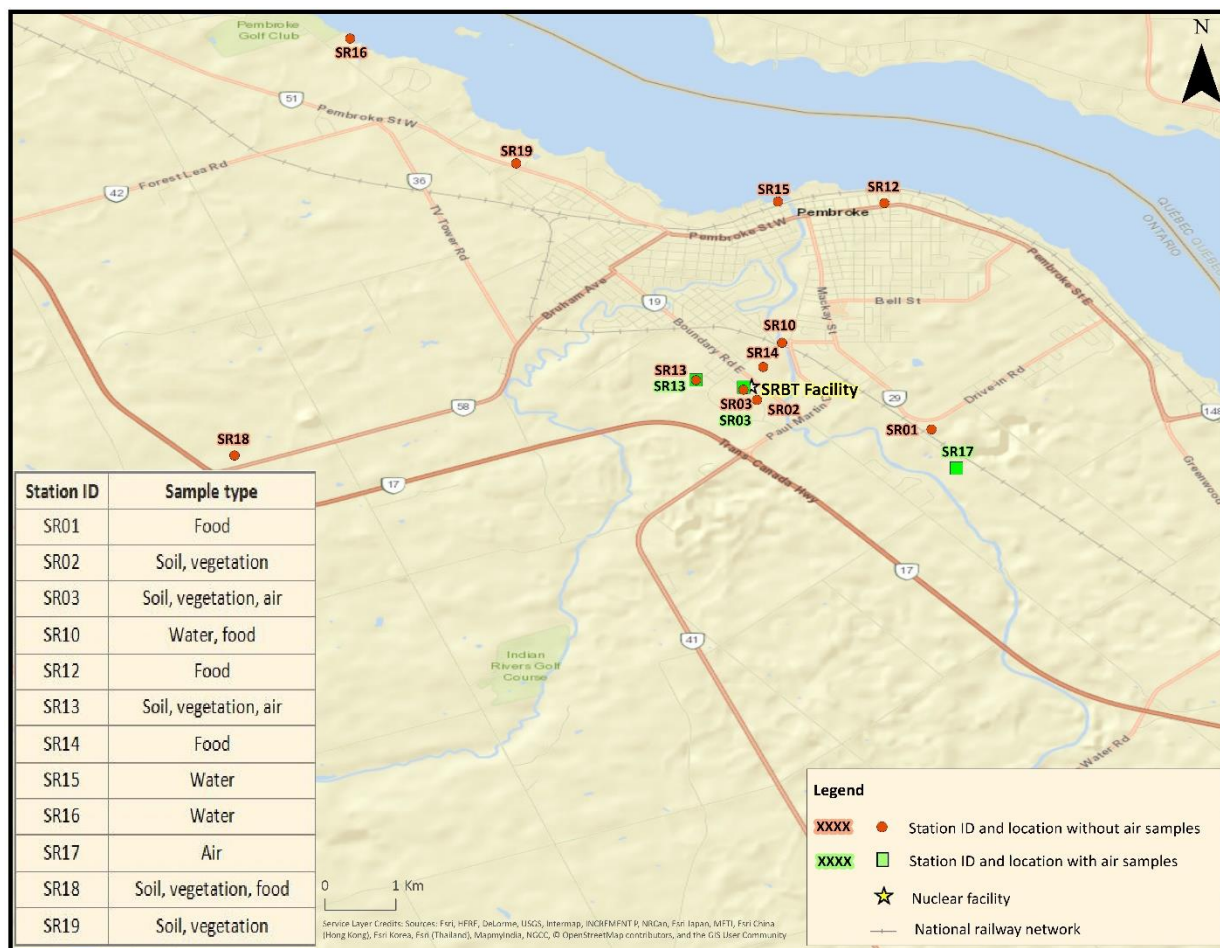
- air (3 locations)
- water (2 locations)
- vegetation (4 locations)
- soil (4 locations)
- food (4 locations)

Collected samples were analyzed by qualified laboratory specialists in the CNSC's laboratory in Ottawa, using best industry practices. Water and soil samples were analysed for tritium. Air samples were analysed for HTO and HT. Food and vegetation samples were analysed for HTO and OBT.

The IEMP results are posted on the [CNSC's IEMP webpage](#) [61]. Figure 4.1 provides an overview of the sampling locations for the 2018 IEMP sampling campaign around SRBT [62].



**Figure 4.1: Overview of the 2018 sampling locations**



## 4.2 Indigenous participation in the IEMP

It is a priority for the CNSC that IEMP sampling reflects Indigenous traditional knowledge and land use and values where possible. In addition to routine IEMP sampling activities, the CNSC seeks input from local Indigenous communities on its IEMP sampling plans.

In 2018, in advance of the IEMP sampling campaigns at SRBT, notification emails were sent to all Indigenous communities near SRBT, inviting suggestions for species of interest, valued components or potential sampling locations where traditional practices and activities may take place.

Letters were sent to the Algonquins of Ontario, William Treaties First Nations, Algonquin Anishinabeg Nation Tribal Council, Algonquin Nation Secretariat and the Métis Nation of Ontario to notify them of the sampling campaign and to seek their input into the sampling plan. The CNSC received no responses from Indigenous communities for input into the 2018 sampling campaign.

For the 2021 sampling campaign CNSC staff reached out to the above mentioned Indigenous communities with the addition of the AOPFN. As of the publishing date of this EPR report, no Indigenous group responded to the CNSC’s invitation to participate in the 2021 IEMP sampling for SRBT. As with all campaigns CNSC staff will continue to engage with Indigenous



communities to ensure that IEMP sampling incorporates Indigenous knowledge in future sampling.

### 4.3 Summary of results

The level of radioactivity measured in water, soil, vegetation, air and food samples were below available guidelines and CNSC screening levels in all of the samples measured during the IEMP sampling campaigns in 2013, 2014, 2015 and 2018. Results for all campaigns are posted on the [CNSC's website](#) [61].

The IEMP results indicate that Indigenous peoples, the public and the environment near SRBT are protected and that there are no expected health impacts from the operations at the SRBT facility. These results are consistent with those submitted by SRBT, in particular SRBT's monitoring results near the community of Pikwakanagan and reviewed by CNSC's environmental protection staff, demonstrate that the licensee's environmental protection program protects the health and safety of people and the environment.

**Figure 4.2: CNSC staff collecting vegetation samples near SRBT in 2021**



## 5.0 Health studies

The following section draws from the results of regional health studies to provide further independent verification that the health of people living near the SRBT facility are protected. Various organizations and institutions in Ontario, such as Cancer Care Ontario, Public Health Ontario, and the Renfrew County and District Health Unit (RCDHU), monitor the health of populations living near the SRBT facility. In addition, they compare disease rates around the SRBT facility to similar populations to detect any potential health outcomes that may be of concern. CNSC staff keep abreast of any new publications and data related to the health of populations living near nuclear facilities.

Various health studies and reports assessed the health of populations living near the SRBT facility. Select publications are discussed and highlighted in subsections below. Additional information on health studies related to nuclear facilities, with a focus on tritium, is available on the [CNSC webpage on Health Studies](#) [64].

### 5.1.1 Community Health Profile Renfrew County and District 2016

The most recent Community Health Profile released in 2016 [65] examines health outcomes and factors that affect the health of people living in areas serviced by the RDCHU, including Pembroke. The report uses data from the Canadian Community Health Survey, the Canadian Census, Canadian Cancer Statistics, National Household Survey, Public Health Ontario Snapshots, and Ontario Population Estimates and Population Projections.

The leading causes of mortality in Renfrew County in 2011 included cancers, circulatory diseases, respiratory diseases and injuries, which accounted for 75% of deaths. Circulatory diseases include ischemic heart diseases, cerebrovascular diseases and stroke. Injuries include both unintentional (motor vehicle crashes, falls, burns, drownings, etc.) and intentional injuries (suicide/self harm and assault). In 2011, age-standardized mortality rates in Renfrew County and District were similar to Ontario, except for circulatory diseases, which was significantly higher for both sexes combined.

In 2013 and 2014, adults in Renfrew County District had significantly higher current smoking and obesity rates compared to Ontario adults overall, but had similar rates to other mainly rural health units.

### 5.1.2 Ontario cancer profiles

Ontario Cancer Profiles [66] provide interactive sets of data that show recent provincial and regional statistics on cancer burden, screening, risk factors, and socio-demographic factors. Regional statistics are available by public health unit and Local Health Integration Network. In 2018, RDCHU had similar incidence for all cancers for both sexes compared to Ontario. RDCHU had significantly higher all cancer mortality rates compared to Ontario for males and for both sexes combined.

In 2018, lung cancer incidence was significantly higher in females, and for both sexes combined in RDCHU compared to Ontario. Lung cancer incidence in males was similar to that of Ontario. Lung cancer mortality was also significantly higher for both sexes combined, compared to Ontario.

From 2015 to 2017, the rates of being overweight and obese in RDCHU were significantly higher for males, females, and both sexes combined compared to Ontario. The percent of current smokers (daily or occasional) in the region were also higher for males, females, and both sexes combined compared to Ontario; however, not significantly so. Alcohol consumption in the region was also higher for both sexes combined compared to Ontario. Obesity, smoking and alcohol consumption are major risk factors for cancer incidence and mortality. Smoking is also a major risk factor for lung cancer incidence and mortality.

### **5.1.3 Conclusions – Population and community health studies and reports**

The review of health reports is an important component to ensure the health of people living near nuclear facilities is protected. The population and community health studies and reports indicate that common causes of death among the population of Renfrew County and District are cancers, circulatory diseases, respiratory diseases and injuries. Causes of death among the population of Renfrew County and District are similar to the rest of Canada, where heart disease and cancers are the two leading causes of death [67]. Cancer mortality is higher in Renfrew County and District compared to Ontario, however risk factors for cancer mortality such as smoking, overweight and obesity and alcohol consumption are also higher within the region compared to Ontario.

## **5.2 Broader scientific understanding of radiation health effects**

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) is composed of international experts who review and publish consensus reports on the best current scientific information on the sources and health effects of ionizing radiation. This information in turn informs the recommendations of the International Commission on Radiological Protection (ICRP), which are focuses on the protection of human health. The epidemiological evidence of radiation-related health effects comes largely from several main research populations. These include patients who received medical treatment using radiation, people occupationally exposed to radiation (that is, radon-exposed miners, nuclear energy workers) and most importantly, the survivors of the atomic bombings. These studies build the foundation of the knowledge about the relationship between cancer and radiation exposure [68].

Two major conclusions of these studies are:

- 1) The probability (likelihood) of the occurrence of cancer increases as the radiation dose increases, and
- 2) Statistically significant population effects are only observed at doses above 100 mSv, which are much higher than the natural background.

To put these findings into perspective, the average Canadian's exposure to natural background radiation is about 1.8 mSv each year, which varies between 1 and 4 mSv/year [69]. Similarly, the average radiation doses of workers at SRBT is less than 1 mSv/year (0.077 mSv for 2020) and the environmental exposures to the public living near SRBT are less than about 0.01 mSv/year (0.0024 mSv for 2020).

In conclusion, experts worldwide study radiation health effects to ensure protection of workers and members of the public. The international understanding is that low doses of radiation are associated with low risks to health.

## 5.3 Studies of radiation effects on the environment and the health of people living near or working at tritium processing facilities

### 5.3.1 CNSC's tritium studies project

SRBT uses tritium, to make self-luminous emergency exit signs, various military applications such as landmine markers and other safety products not requiring batteries or other external sources of power. CNSC inspectors identified environmental tritium exposures from SRBT, which led to the January 2007 Commission proceeding, in which the Commission directed CNSC staff to initiate research studies on tritium releases in Canada, and to study and evaluate tritium-processing facilities exercising best practices around the globe. In June 2007, CNSC staff initiated the Tritium Studies Project (the Project) [70], intended to enhance the information used in the regulatory oversight of tritium processing and tritium releases in Canada. Staff provided the Commission with the conclusions of the Project in 2010. Certain follow-up activities were recommended and these were reported to the Commission in 2013 while still in progress. All follow-up activities are now complete and a final summary of the work, along with relevant information on related strategic research concerning tritium, was presented to the Commission in November 2017. Details can be found in staff's presentation to the Commission [71] and the Commission meeting minutes [72]. In January 2019, the CNSC published *the Implementation of Recommendations from the Tritium Studies Project Synthesis Report* [73] to summarize the activities staff have been involved in to address the recommendations from the Project.

A number of studies are highlighted below. More information on the Project is available on the CNSC [website](#).

#### 5.3.1.1 Environmental fate studies

##### **Tritium activity in garden produce from Pembroke in 2007 and dose the public [74]**

This report provides results of CNSC-funded research by the University of Ottawa on tritium activity in garden vegetables and fruits, and soil samples collected in late summer of 2007. The research found expected levels of tritium in local garden vegetables and fruits grown in Pembroke in 2005 and 2007. There was no evidence of significant accumulation of tritium in surface soils after 16 years of tritium releases from the SRBT facility. The dose resulting from the consumption of tritium in fruits and vegetables grown in Pembroke declines considerably with increasing distance of gardens from the SRBT facility. The highest annual dose in 2007 from consumption of tritium in fruits and vegetables grown in Pembroke was about 0.004 mSv. This is well below the annual dose limit of 1 mSv/year and orders of magnitude below doses known to cause health effects.

##### **Environmental fate of tritium in soil and vegetation [75]**

This report provides results of CNSC-funded research by the University of Ottawa on the amount of tritium in soil, garden produce, animal fodder and animal products near four tritium-releasing facilities during the 2008 and 2009 growing seasons. The four facilities studied were: SRBT, Shield Source Incorporated<sup>5</sup>, Darlington Nuclear Generating Station and Gentilly-2 Nuclear

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<sup>5</sup> Shield Source Incorporated no longer operates and in 2014 was released from regulatory oversight.

Generating Station.<sup>6</sup> The study found that in general, tritium levels decreased in samples collected further away from the facility with the trend being more pronounced in samples obtained near nuclear processing facilities such as SRBT. The study concluded that levels of organically bound tritium and tritiated water in soil and vegetation near nuclear facilities were low and pose no health risks and public doses are extremely low and well below regulatory limits.

### **Measurements and dose consequences of tritium in municipal sewage sludge report [76]**

In 2013, the Commission requested CNSC staff to measure the concentrations of tritium in sewage sludge in various municipalities in Ontario (11 in total). This request was in response to concerns raised in 2011 by members of the public during the Commission meeting for SRB Technologies (Canada) Incorporated's (SRB) *Annual Status Report on the Safety Performance of the Facility*.

The tritium concentrations in sewage sludge and liquid effluent were below the analytical detection limit (i.e., the minimum concentration that can be detected by instrumentation) for all the wastewater treatment plants (WWTPs) sampled, except those in Peterborough and Pembroke.

Using the findings from the Pembroke WWTP, the doses of radiation from the measured concentration of tritium in sewage sludge were calculated for two representative persons – a worker at a WWTP involved in sewage sludge loading, and a worker at a municipal landfill who is involved in applying landfill cover to waste. The estimated annual effective doses were well below both the annual public dose limit of 1 mSv and the doses known to cause health effects. The dose from tritium in sewage sludge also represents a small fraction of the natural background radiation. As a result, the report concludes that there is no impact on public health.

#### **5.3.1.2 Laboratory and epidemiological studies**

Another objective of the Project was to conduct an independent staff review of the scientific literature, to assess the health risk to workers and the public from tritium exposures. The review looked at both laboratory and epidemiological studies.

##### **Laboratory studies**

Laboratory studies with animals demonstrate that tritium, like other sources of radiation, can induce genetic and reproductive effects and cell death, but only if delivered at doses millions of times higher than those to which the public is exposed. Tritium does induce and promote cancer in animals under some experimental conditions, but only at similarly high doses. The quantity of tritium required to induce these severe effects in animals is about several gigabecquerels (that is, billions of tritium atoms decaying and emitting a beta particle per second). This equates to doses above 500 mSv.

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<sup>6</sup> The Gentilly-2 nuclear facility was permanently shutdown in 2012.



## Epidemiological studies

Epidemiological studies based on good-quality radiation exposure data provide the best source of evidence for estimating human health risks from radiation exposure. This is because such studies assess actual health outcomes in humans from radiation exposure.

Tritium exposures are highly unlikely to cause adverse health effects in the public or in workers. The doses to which these groups are exposed are far below doses where we observe radiation effects.

In Canada, doses to the public from tritium releases from nuclear facilities are far below the public dose limit of 1 mSv/year. Doses from tritium exposures among people living near Canadian nuclear facilities are in the range of 0.0001 to 0.1 mSv/year. These doses are well below not only the limit, but also are negligible compared to natural background radiation, (an average of about 1.8 mSv each year, which varies between 1-4 mSv/year depending upon geographic location).

The worker dose limit is 50 mSv/year or 100 mSv over a 5-year period. Workers in tritium handling facilities receive an average effective dose of under 1 mSv/year. We do not expect to observe adverse health effects at such low doses. The average annual dose workers at SRBT received in 2020 was 0.077 mSv and the maximum annual dose to a worker was 0.43 mSv.

Based on the extensive epidemiological research and the lack of excess risk found from total radiation exposures, there is little evidence to suggest that increased cancer incidence or mortality occurs in populations exposed to tritium at current environmental or occupational levels. The lack of current evidence of an excess risk among these populations suggests that any tritium specific risk is small and not distinguishable from the risk of similar health outcomes in the general population.

### 5.3.1.3 Implementation of recommendations from the Tritium Studies Synthesis Report

The CNSC's current regulatory oversight of tritium-releasing facilities in Canada demonstrates that doses to members of public living near these facilities are low and below levels known to cause health effects. In January 2019, the CNSC published *the Implementation of Recommendations from the Tritium Studies Project Synthesis Report* [73] to summarize the activities staff have been involved in to address the recommendations from the Project.

CNSC staff have engaged in several research projects to expand the body of knowledge on tritium releases and to enhance the regulatory oversight of tritium-related activities. Project findings have been communicated to the Commission and the public through Commission meetings, open houses, eight CNSC information documents, papers in peer-reviewed scientific literature, and a chapter in the Encyclopedia of Sustainability Science and Technology [77].

Research conducted as part of the project resulted in the CNSC laboratory expanding its capability to analyze tritium in environmental samples. This has allowed the laboratory to support CNSC-funded research projects, participate in national and international inter-comparisons and analyze samples as part of the CNSC's IEMP. Staff at the CNSC's laboratory remain up-to-date with the latest techniques by participating in working groups and field research.

The results of the CNSC's IEMP data collected around facilities that emit tritium were used to estimate dose to a member of the public. Conservative assumptions were used in the dose

calculation. The results support the conclusion that the dose to a member of the public due to exposure from tritium releases is a small fraction of the regulatory dose limit and levels known to cause health effects.

As a result of the follow-up work that CNSC staff have now completed, staff are of the opinion that the recommendations from the Tritium Studies Project Synthesis Report have been met. Overall, the project met its objective of increasing the information available regarding tritium releases and enhancing the regulatory oversight of tritium-releasing facilities. Based on the research that has been previously presented to the Commission and staff's subsequent work, CNSC staff have found that adequate provisions have been made through existing regulatory mechanisms for the protection of all Canadians from exposure to tritium releases.

### **5.3.2 UNSCEAR 2016 – Biological effects of selected internal emitters – tritium**

The UNSCEAR 2016 Report [78] summarizes their comprehensive review of the scientific literature on tritium. This section will focus on the epidemiological studies reviewed in this report. While researchers conducted a number of epidemiological studies of workers and members of the public potentially exposed to tritium, the majority of these studies do not calculate tritium-specific doses for use in the analyses. Consequently, little information on tritium-specific risk can be derived from epidemiological studies of tritium workers or members of the public potentially exposed to tritium beyond the conclusion that tritium-specific risks have not been seriously underestimated. However, because doses are so low, they are unlikely to have measureable impacts on the existing risk of radiation exposure because overall doses from radiation exposure are low.

Large quantities of tritium were released into the environment by atmospheric nuclear weapon testing in the early 1960's and there is no evidence of an increase in childhood leukaemia rates following exposure to tritium fallout. It is therefore unlikely that risk of childhood leukemia from exposure to tritium is majorly underestimated. Suggestions that reports of excesses of childhood leukaemia incidence near certain nuclear facilities could actually be due to releases of tritium because of a serious underestimation of risk are implausible.

### **5.3.3 A reanalysis of cancer mortality in Canadian nuclear workers (1956-1994) based on revised exposure and cohort data**

In 2014, Zablotska et al, conducted an analysis of Canadian nuclear power industry workers exposed to chronic low-doses of radiation [79]. Approximately 45,500 Canadian nuclear power industry workers were studied, including the contribution of tritium to the total whole-body dose (mean tritium dose = 3.02 mSv). Tritium doses were generally low and analyses of all outcomes showed that risks were due solely to gamma doses and that tritium exposures did not contribute to any adverse health effects.

## **5.4 Summary of health studies**

Reviewing and conducting health studies and reports is an important component of ensuring that the health of people living near or working in nuclear facilities is protected. CNSC staff have considered the most recent international radiation epidemiology reports, our own information and scientific publications, as well as various community, provincial, and national level studies and reports for their evaluation of the health of population living near or working at SRBT.

Workers and the public are protected from current radiation exposures, including tritium exposures, from the operation of SRBT. Major health risk factors, such as smoking, overweight/obesity, and alcohol consumption, may account for increases in certain disease rates within Renfrew County.

These health studies and reports provide a snapshot of the health of a population living near the SRBT facility. Based on exposure and health data, CNSC staff have not observed and do not expect to observe any adverse health outcomes attributable to the operation of the SRBT facility.

## 6.0 Other environmental monitoring programs

Several monitoring programs are carried out by other levels or bodies of government, and are reviewed by CNSC staff to confirm that the environment and the health of persons around the facility in question are protected. A summary of the findings of these programs is provided below.

### 6.1 National Pollutant Release Inventory

ECCC operates the [National Pollutant Release Inventory](#) (NPRI) [80], which is Canada's public inventory of pollutant releases, disposals and transfers, tracking over 320 pollutants from over 7,000 facilities across the country. Reporting facilities include factories that manufacture a variety of goods, mines, oil and gas operations, power plants and sewage treatment plants. Information that is collected includes:

- releases from facilities to air, water or land
- disposals at facilities or other locations
- transfers to other locations for treatment and recycling
- facilities' activities, location and contacts
- pollution prevention plans and activities

SRBT is not required to report to the NPRI because they do not meet the reporting thresholds of any of the NPRI reportable substances.

CNSC staff conducted a search of the NPRI database for the Pembroke region and found that only one facility in the region reports to the NPRI. This facility reports releases of manganese and its compounds and these are not released from SRBT. It is also worth noting that radionuclides are not included in the inventory of pollutants in the NPRI database. The CNSC receives radionuclide release data from annual reports. This information has been used in this report, but the complete dataset is available for download on the CNSC's [Open Government Portal](#) [81].

### 6.2 Health Canada's Canadian radiological monitoring network and fixed point surveillance program

The Radiation Protection Bureau of Health Canada manages the [Canadian Radiological Monitoring Network \(CRMN\)](#) [82]. The CRMN routinely collects drinking water, precipitation, atmospheric water vapour, air particulate, and external gamma dose for radioactivity analysis at



26 monitoring locations. The closest CRMN monitoring location to SRBT is in Ottawa. The results at the Ottawa station for 2020 are consistent with data from previous years and are well below the public dose limit of 1 mSv/year.

In addition, Health Canada has complemented the CRMN with a fixed point surveillance (FPS) system. The FPS functions as a real-time radiation detection system designed to monitor public dose from radioactive materials in the air, including atmospheric emissions associated with nuclear facilities and activities both nationally and internationally. Monitoring stations continuously measure gamma radioactivity levels from ground-deposited (ground-shine) and airborne contaminants.

Health Canada measures the radiation dose rate as Air KERMA (kinetic energy released in unit mass of material) reported as nanogray per hour (nGy/h) of absorbed dose. These measurements are conducted every 15 minutes at 79 sites of its FPS network across the country. Air KERMA is also measured for three radioactive noble gases associated with nuclear fission, which may escape into the atmosphere during normal operation of nuclear facilities. These three noble gases are argon-41, xenon-133 and xenon-135. CNSC staff converted the absorbed dose rate to an effective dose, reported in mSv/year, which allows for comparison to annual background dose estimates and the regulatory public dose limit.

The 2020 total external gamma dose reported at the FPS network nearest SRBT, which is located in Petawawa, are similar to the Canadian average for natural background from gamma (the range is 0.007 to 0.027 mSv/year). These results indicate that total external gamma dose at these stations is not significantly influenced by activities at SRBT. Further evidence of this is provided by the fact that the monitored noble gases were all below the minimum detectable dose, as outlined in table 6.1. It should be noted that SRBT releases only tritium to the environment and therefore, does not contribute to these external gamma dose measurements and all results are significantly below the public dose limit of 1 mSv/year.

**Table 6.1: Annual external gamma dose (mSv/year) for 2020 at the FPS network monitoring station near SRBT [82]**

| Monitoring station near SRBT | External gamma dose (mSv/year) |  |           |           |
|------------------------------|--------------------------------|--|-----------|-----------|
|                              | All gamma sources              | Monitored noble gases (fission products) |           |           |
|                              |                                | Argon-41                                 | Xenon-133 | Xenon-135 |
| Petawawa                     | 0.018                          | *  | *         | *         |

\* No data is reported when results were below the minimum detectable dose.

(a) Assumptions: Adult located at monitoring station for 24 hours a day, 365 days per year. Air KERMA in nanoGray corrected. Total Dose: 0.69 Sv for every Gray of absorbed dose measured. Argon-41: 0.74; Xenon-133: 0.75; Xenon-135: 0.67.

## 7.0 Conclusions

This EPR report focused on items of current Indigenous, public and regulatory interest, including groundwater monitoring, physical stressors, airborne and waterborne releases from ongoing operations at the SRBT facility. CNSC staff conclude that the potential risks from physical stressors, as well as from radiological releases from the SRBT facility to the atmospheric, hydrogeologic, aquatic, terrestrial and human environments are negligible.

### 7.1 CNSC staff follow-up

CNSC staff currently have no follow-up comments regarding the EP measures implemented by SRBT.

### 7.2 CNSC staff conclusions

CNSC staff's finding from this EPR report may inform and support staff recommendations to the Commission in future licensing and regulatory decision making that pertain to the SRBT facility. These findings are based on CNSC staff's reviews of documents associated with the SRBT facility, such as the submitted ERA documentation and the conduct of compliance verification activities, including the review of annual and quarterly reports, and onsite inspections. CNSC staff conclusions do not represent the Commission's conclusions. CNSC staff also reviewed the results from various relevant or comparable health studies, and other environmental monitoring programs conducted by other levels of government, to substantiate CNSC staff's conclusions. CNSC staff also conducted IEMP sampling around the SRBT facility in 2013, 2014, 2015, and 2018, and returned in the summer of 2021, with results available in 2022.

Based on CNSC staff's assessment of SRBT's EP documentation, CNSC staff have found that the potential risks from physical stressors, as well as from radiological and hazardous releases to the atmospheric, hydrogeological, aquatic, terrestrial and human environments from the SRBT facility are negligible, resulting in no significant adverse effects. The potential risks to the environment from these releases are similar to natural background and the potential risks to human health are indistinguishable to health outcomes in the general public. Therefore, CNSC staff have found that SRBT implements and maintains effective EP measures to adequately protect the environment and the health of persons. CNSC staff will continue to verify and ensure that, through ongoing licensing and compliance activities and reviews, the environment and the health of persons are protected.

CNSC staff's findings in this EPR report do not represent the Commission's conclusions. The Commission's decision-making will be informed by submissions from CNSC staff, the licensee, as well as by Indigenous peoples, the public, and any interventions heard during public hearings on licensing matters.

## ABBREVIATIONS

### Units

|              |                |
|--------------|----------------|
| Becquerel    | Bq             |
| Cubic metre  | m <sup>3</sup> |
| Decibel      | dB             |
| Fresh weight | fw             |
| Kilogram     | kg             |
| Litre        | L              |
| Metre        | m              |
| Microgray    | μGy            |
| Microsievert | μSv            |
| Milligray    | mGy            |
| Millisievert | mSv            |
| Nanogray     | nGy            |

## ACRONYMS

|           |  |
|-----------|--|
| AL        | Action levels                                      |
| ALARA     | As low as reasonable achievable                    |
| AOPFN     | Algonquins of Pikwàkanagàn First Nation            |
| CEAA      | <i>Canadian Environmental Assessment Act, 1992</i> |
| CEAA 2012 | <i>Canadian Environmental Assessment Act, 2012</i> |
| CMD       | Commission member document                         |
| CNSC      | Canadian Nuclear Safety Commission                 |
| COPC      | Contaminants of potential concern                  |
| CRMN      | Canadian Radiological Monitoring Network           |
| DDP       | Detailed decommissioning plan                      |
| DRL       | Derived release limits                             |
| EA        | Environmental assessment                           |
| ECCC      | Environment and Climate Change Canada              |
| EMS       | Environmental management system                    |
| EP        | Environmental protection                           |

|       |   |
|-------|---|
| EPP   | Environmental protection program                    |
| EPR   | Environmental protection review                     |
| ERA   | Environmental risk assessment                       |
| ESA   | <i>Endangered Species Act</i>                       |
| FPS   | Fixed point surveillance                            |
| GHG   | Greenhouse gas                                      |
| GTLS  | Gaseous tritium light source                        |
| HHRA  | Human health risk assessment                        |
| HT    | Elemental tritium gas                               |
| HTO   | Oxidized tritium                                    |
| IAA   | <i>Impact Assessment Act</i>                        |
| ICRP  | International Commission on Radiological Protection |
| IEMP  | Independent Environmental Monitoring Program        |
| KERMA | Kinetic energy releases in unit mass of material    |
| LCH   | Licence condition handbook                          |
| MOU   | Memorandum of understanding                         |
| NPRI  | National Pollutant Release Inventory                |
| NSCA  | <i>Nuclear Safety and Control Act</i>               |
| OBT   | Organically bound tritium                           |
| PDP   | Preliminary decommissioning plan                    |
| PPCC  | Pembroke Pollution Control Center                   |
| RDCHU | Renfrew County and Health District Health Unit      |
| ROR   | Regulatory oversight report                         |
| SARA  | <i>Species at Risk Act</i>                          |
| SRBT  | SRB Technologies (Canada) Inc.                      |
| VC    | Valued component                                    |

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## PART TWO

Part Two provides all relevant information pertaining directly to the licence, including:

- [1] Any proposed changes to the conditions, licensing period, or formatting of an existing licence;
- [2] The proposed draft licence;
- [3] The proposed draft licence conditions handbook; and
- [4] The current licence.

## PROPOSED LICENCE CHANGES

### Overview

SRBT currently operates the SRBT facility under a Nuclear Substance Processing Facility Operating Licence, NSPFOL-13.00/2022. The proposed licence incorporates standardized licence conditions in a standard format.

### Licence Conditions

The proposed licence incorporates the standardized licence conditions applicable to SRBT as a nuclear substance processing facility as developed by CNSC staff. One notable change to the proposed Nuclear Substance Processing Facility Licence for SRBT is described below:

| PROPOSED LICENCE CHANGES   |  |  |
|--|--|--|
| Current Licence Condition  | Proposed Licence Condition   | Rationale for change   |
| <p><b>12. WASTE MANAGEMENT</b></p> <p><b>12.2</b> The licensee shall <b>implement and maintain a decommissioning strategy.</b></p> | <p><b>11. WASTE MANAGEMENT</b></p> <p><b>11.2</b> The licensee shall <b>maintain a decommissioning plan.</b></p> | <p>Licence condition is modified to align with the standardized licence condition wording.</p> |

### Licence Format

The existing licence, produced in 2015, is written in a different format than the current CNSC standard licences. The proposed licence for SRBT is written in the current standardized format.

### Licence Period

SRBT has requested a renewal of its licence for a period of 15 years. As noted in section 5.6, based on CNSC staff's review of SRBT's application, performance history, and supporting information, CNSC staff recommend SRBT's request for a licence period of 15 years to the Commission. Over the proposed 15-year period, CNSC staff would provide regular reporting on regulatory oversight conducted at the SRBT facility in public Commission proceedings.

## **PROPOSED DRAFT LICENCE**

e-Doc 6639800 (WORD)

e-Doc 6668491 (PDF)



**DRAFT**

Word Ref: e-Doc 6639800

PDF Ref: e-Doc 6668491

File / Dossier: 2.02

**CLASS IB NUCLEAR SUBSTANCE PROCESSING FACILITY  
LICENCE**

**SRB TECHNOLOGIES (CANADA) INCORPORATED**

---

**I) LICENCE NUMBER: NSPFL-13.00/2037**

**II) LICENSEE:** Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to:

**SRB Technologies (Canada) Incorporated  
320-140 Boundary Road  
Pembroke, Ontario  
K8A 6W5**

**III) LICENCE PERIOD:** This licence is valid from **July 1, 2022**, to **June 30, 2037**, unless otherwise suspended, amended, revoked or replaced.

**IV) LICENSED ACTIVITIES:**

This licence authorizes the licensee to:

- (a) operate a Class IB Facility, comprising of a tritium processing facility, at the location referred to in Section II of this licence (hereinafter “the facility”) for the purposes of manufacturing radiation devices;
- (b) produce, possess, transfer, service and use, radiation devices arising from the activities described in (a);

- (c) possess, transfer, use, process, manage, store and dispose of nuclear substances that are required for, associated with, or arise from the activities described in (a);
- (d) the possession of tritium up to a limit of 6000 terabecquerels of tritium in any form;
- (e) possess, and use prescribed information that is required for, associated with, or arise from the activities described in (a).

**V) EXPLANATORY NOTES:**

- (a) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the [Nuclear Safety and Control Act](#) and associated Regulations.
- (b) The “SRB TECHNOLOGIES (CANADA) INC. LICENCE CONDITIONS HANDBOOK (LCH)” provides:
  - (i) compliance verification criteria against which Canadian Nuclear Safety Commission staff will assess compliance with the conditions listed in the licence;
  - (ii) information regarding delegation of authority to Canadian Nuclear Safety Commission staff; and
  - (iii) applicable versions of documents and a process for version control of codes, standards or other documents that are used as compliance verification criteria in order to meet the conditions listed in the licence.

**VI) CONDITIONS:**

**G. GENERAL**

- G.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:
- (i) the regulatory requirements set out in the applicable laws and regulations
  - (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence
  - (iii) the safety and control measures described in the licence application and the documents needed to support that licence application

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

- G.2 The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.
- G.3 The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.
- G.4 The licensee shall implement and maintain a public information and disclosure program

**1. Management System**

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

**2. Human Performance Management**

- 2.1 The licensee shall implement and maintain a training program.

**3. Operating Performance**

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

**4. Safety Analysis**

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

**5. Physical Design**

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

**6. Fitness For Service**

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

**7. Radiation Protection**

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



**8. Conventional Health And Safety**

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

**9. Environmental Protection**

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

**10. Emergency Management And Fire Protection**

10.1 The licensee shall implement and maintain an emergency preparedness program.

10.2 The licensee shall implement and maintain a fire protection program.

**11. Waste Management**

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

11.2 The licensee shall maintain a decommissioning plan.

**12. Security**

12.1 The licensee shall implement and maintain a security program.

**13. Packaging and Transport**

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

SIGNED at OTTAWA, this \_\_\_\_\_ day of \_\_\_\_\_, 2022

---

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

## **PROPOSED DRAFT LICENCE CONDITIONS HANDBOOK**

e-Doc 6639827 (WORD)

e-Doc 6668496 (PDF)

**DRAFT**

Canada's Nuclear Regulator



e-Doc 6639827 (Word)  
e-Doc 6668496 (PDF)

## **Licence Conditions Handbook**

**SRB TECHNOLOGIES (CANADA) INC.**

**Nuclear Substance Processing Facility Licence  
(NSPFL)**

**NSPFL-13.00/2037**

**Revision 0**



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

**Canada**

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DRAFT

**Licence Conditions Handbook**

**Effective: Month day, 2022**

**LCH-NSPFL-13.00/2037**

**SRB Technologies (Canada) Inc.**

**Nuclear Substance Processing Facility  
Licence**

**NSPFL-13.00/2037**

SIGNED at OTTAWA this      day of month 2022

---

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

**Revision History:**

| <b>Effective Date</b> | <b>Rev. #</b> | <b>LCH e-Doc #</b> | <b>Section(s) changed</b> | <b>Description of the Changes</b>                  | <b>DCR List e-Doc #</b> |
|-----------------------|---------------|--------------------|---------------------------|--|-------------------------|
| 2021-xx-xx            | 0             | 6639827            | All                       | Document prepared for SRB licence NSPFL-13.00/2037 | N/A                     |
|                       |               |                    |                           |  |                         |
|                       |               |                    |                           |  |                         |
|                       |               |                    |                           |  |                         |

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## Introduction

The general purpose of the Licence Conditions Handbook (LCH) is to identify and clarify the relevant parts of the licensing basis for each licence condition (LC). This will help ensure that SRB Technologies (Canada) Inc. (SRBT) will maintain facility operations in accordance with the licensing basis for the SRBT facility and the intent of the licence. The LCH should be read in conjunction with the licence.

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

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

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

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

Current versions of the licensing basis publications, licensee documents that require notification of change and guidance documents referenced in the LCH are tracked in the document *SRBT Written Notification Document Tracking Sheet (Licence NSPFL-13.00/2037)* (e-Doc 4472953), which is controlled by the Nuclear Processing Facilities Division (NPF) and is available to the licensee upon request.

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

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

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

This LCH has the two appendices:

- Appendix A, which provides definitions of terms and a list of acronyms used throughout this LCH.
- Appendix B, which provides a list of version controlled documents referenced in this LCH.

This licence authorizes the licensee to:

- (a) operate a Class IB Facility, comprising of a tritium processing facility, at the location referred to in Section II of this licence (hereinafter “the facility”) for the purposes of manufacturing radiation devices;
- (b) produce, possess, transfer, service and use, radiation devices arising from the activities described in (a);
- (c) possess, transfer, use, process, manage, store and dispose nuclear substances that are required for, associated with, or arise from the activities described in (a);
- (d) the possession of tritium up to a limit of 6000 terabecquerels of tritium in any form;
- (e) possess, and use prescribed information that is required for, associated with, or arise from the activities described in (a).

The SRB Technologies (SRBT) facility is located at 320 Boundary Road, Suite 140, Pembroke, Ontario, further defined in drawing “SRBT Building Floor Plan – September 2017” (e-Doc 5337989).

## GENERAL

### Licence Condition G.1: Licensing Basis for Licensed Activities

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

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

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

#### **Preamble:**

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

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

#### **Compliance Verification Criteria:**

##### **Regulatory Role of the Licensing Basis**

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

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

## Part (i) of the Licensing Basis

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

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

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

## Part (ii) of the Licensing Basis

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

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

## Part (iii) of the Licensing Basis

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

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

Applicable licensee documents are listed in the LCH under the heading “Licensee Documents that Require Notification of Change”. Applicable CNSC regulatory documents, CSA standards and other documents are listed in the LCH under the heading “Licensing Basis Publications”. The documents listed in the LCH could cite other documents that also contain safety and control measures. Applicable licensing basis publications are listed in tables in this LCH under the most relevant LC. All “shall” or normative statements in licensing basis publications are considered CVC unless stated otherwise. If any “should” or informative statements in licensing basis publications are also considered CVC, this is also explained under the most relevant LC.

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

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

### **CNSC Staff’s Approach to Assessing the Licensing Basis for SRBT**

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

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

### **Licence Application Documents and Supporting Documents**

| <b>Submission Date</b> | <b>Document Title</b>  | <b>e-Doc</b> |
|------------------------|--|--------------|
| June 30, 2021          | Cover Letter – SRBT NSPFOL-13.00 2022 Renewal Application            | 6596831      |
| June 30, 2021          | NSPFOL-13.00/2022 – SRBT Licence Renewal Application (June 30, 2021) | 6596805      |

## **Guidance:**

### **Guidance Documents**

| <b>Document Number</b> | <b>Document Title</b>   | <b>Version</b> |
|------------------------|-------------------------|----------------|
| REGDOC-3.5.3           | Regulatory Fundamentals | 2018           |

When the licensee becomes aware that a proposed change or activity might not be in accordance with the licensing basis, it should first seek direction from CNSC staff regarding the potential acceptability of this change or activity. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them. Guidance for notifications to CNSC related to licensee changes are discussed under LC G.2.

### **Licence Condition G.2: Notification of Changes**

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

### **Preamble:**

CNSC staff track the version history of licensee documents that require notification of change in document *SRBT Written Notification Document Tracking Sheet (Licence NSPFL-13.00/2037)* (e-Doc 4472953) (with the exception of security-related documents).

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

### **Compliance Verification Criteria:**

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

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



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

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

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

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

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

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

**Guidance:**

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

**GENERAL**

## Licence Condition G.3: Financial Guarantee

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

### **Preamble:**

The [General Nuclear Safety and Control Regulations](#) requires that a licence application contain a description of any proposed financial guarantee relating to the activity to be licensed. The licensee is responsible for all costs of decommissioning at the facility. All such costs are included in the licensee's decommissioning cost estimates and are covered by the licensee's financial guarantee for decommissioning.

The licensee's cost estimate for decommissioning should be based on the facility's most up-to-date preliminary decommissioning plans. The facility's current financial guarantee is covered by an irrevocable letter of credit for the full value of the estimated decommissioning cost.

### **Compliance Verification Criteria:**

#### **Licensing Basis Publication**

| Document Number | Document Title  | Version | Implementation Date |
|-----------------|---|---------|---------------------|
| REGDOC-3.3.1    | Financial Guarantees for Decommissioning of Licensed Activities | 2021    | November 2024       |

#### **Licence Documents that Require Notification of Change**

| Document Number | Document Title  | Notification |
|-----------------|---|--------------|
| N/A             | Preliminary Decommissioning Plan – SRBT (November 29, 2019) | PN           |

The licensee shall report annually to confirm that their financial guarantee for decommissioning remains, valid, in effect and sufficient to meet the decommissioning needs according to the current PDP. The licensee shall submit this report as part of the Annual Compliance Report, or at any time as the Commission may request.

### **Guidance:**

None provided.

## Licence Condition G.4: Public Information and Disclosure

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



## **Preamble:**

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

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

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

## **Compliance Verification Criteria:**

### **Licensing Basis Publication**

| <b>Document Number</b> | <b>Document Title</b>             | <b>Version</b> | <b>Implementation Date</b> |
|------------------------|-----------------------------------|----------------|----------------------------|
| REGDOC-3.2.1           | Public Information and Disclosure | 2018           | Implemented                |

### **Licensee Documents that Require Notification of Change**

| <b>Document Number</b> | <b>Document Title</b>      | <b>Notification</b> |
|------------------------|----------------------------|---------------------|
| N/A                    | Public Information Program | NT                  |

## **Guidance:**

None provided.

# SCA – MANAGEMENT SYSTEM

## Licence Condition 1.1: Management System

The licensee shall implement and maintain a management system.

### **Preamble:**

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

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

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

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

### **Compliance Verification Criteria:**

#### **Licensing Basis Publication**

| Document Number | Document Title   | Version      | Implementation Date |
|-----------------|--|--------------|---------------------|
| CSA N286        | Management System Requirements for Nuclear Facilities* | 2012 (R2017) | Implemented         |
| REGDOC-2.1.2    | Safety Culture   | 2018         | Implemented         |

\*This document is applicable to all LC's.

#### **Licence Documents that Require Notification of Change**

| Document Number | Document Title  | Notification |
|-----------------|-----------------|--------------|
| N/A             | Quality Manual* | PN           |

\*This document is applicable to all LCs.

**Guidance:**

**Guidance Documents**

| <b>Document Number</b> | <b>Document Title</b>  | <b>Version</b> |
|------------------------|--|----------------|
| REGDOC-2.1.1           | Management System  | 2019           |
| CSA N286.0.1           | Commentary on N286-12, Management System Requirements for Nuclear Facilities | 2021           |

DRAFT

# SCA – HUMAN PERFORMANCE MANAGEMENT

## Licence Condition 2.1: Training Program

The licensee shall implement and maintain a training program.

### **Preamble:**

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

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

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

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

### **Compliance Verification Criteria:**

#### **Licensing Basis Publication**

| Document Number | Document Title                | Version | Implementation Date |
|-----------------|-------------------------------|---------|---------------------|
| REGDOC-2.2.2    | Personnel Training, Version 2 | 2016    | Implemented         |

#### **Licencee Documents that Require Notification of Change**

| Document Number | Document Title               | Notification |
|-----------------|------------------------------|--------------|
| N/A             | SRBT Training Program Manual | NT           |

**Guidance:**

**Guidance Documents**

| <b>Document Number</b> | <b>Document Title</b>    | <b>Version</b> |
|------------------------|--------------------------|----------------|
| REGDOC-2.2.5           | Minimum Staff Complement | 2019           |

DRAFT

# SCA – OPERATING PERFORMANCE

## Licence Condition 3.1: Operating Program

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

### **Preamble:**

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

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

### **Compliance Verification Criteria:**

#### **Licence Documents that Require Notification of Change**

| <b>Document Number</b> | <b>Document Title</b>                   | <b>Notification</b> |
|------------------------|---|---------------------|
| RSO-009                | Tritium Inventory Management            | NT                  |
| RSO-029                | Nuclear Substances Inventory Management | NT                  |

### **Operating Limits and Conditions (OLCs)**

The licensee shall operate its facility in accordance with the OLCs specified in the SRBT Safety Analysis Report.

### **Guidance:**

None provided.

## Licence Condition 3.2: Reporting Requirements

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

### Preamble:

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

The [Nuclear Safety and Control Act](#) and its applicable regulations describe reporting to the Commission or a person authorized by the Commission. Reporting requirements are found in sections 29-32 of the [General Nuclear Safety and Control Regulations](#) and section 27 of the NSCA.

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

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

### Compliance Verification Criteria:

#### Licensing Basis Publication

| Document Number | Document Title   | Version | Implementation Date |
|-----------------|--|---------|---------------------|
| REGDOC-3.1.2    | Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills | 2018    | Implemented         |

#### Licence Documents that Require Notification of Change

| Document Number | Document Title               | Notification |
|-----------------|------------------------------|--------------|
| N/A             | Regulatory Reporting Program | PN           |

## **Annual Reporting**

The licensee shall submit an annual compliance report by March 31 of each year, covering the operation for the 12-month period from January 1 to December 31 of the previous year that meets the requirements of section 3 of REGDOC-3.1.2.

### **Guidance:**

Appendix B of REGDOC-3.1.2 provides a sample structure for an annual compliance monitoring report.

DRAFT



# SCA – SAFETY ANALYSIS

## Licence Condition 4.1: Safety Analysis Program

**The licensee shall implement and maintain a safety analysis program.**

### **Preamble:**

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

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

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

### **Compliance Verification Criteria:**

#### **Licence Documents that Require Notification of Change**

| <b>Document Number</b> | <b>Document Title</b>  | <b>Notification</b> |
|------------------------|------------------------|---------------------|
| N/A                    | Safety Analysis Report | PN                  |
| N/A                    | Fire Hazard Assessment | PN                  |

The licensee shall maintain the safety analysis report to ensure they adequately consider the hazards associated with the facility. The safety analysis shall be a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and consider the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

The licensee shall establish and maintain a process to periodically review and revise existing risk assessments to ensure, at a minimum of every 5 years, new risks and lessons learned are incorporated into an updated safety analysis report. This report shall be provided to CNSC staff for review.

**Guidance:**

The licensee should establish and maintain 1 or more safety committees at the facility to periodically assess safety issues related to the operation and modification of the facility. These committees should have among their membership the necessary breadth of knowledge and experience to conduct these assessments. The results of these assessments should feed into the safety analysis report.

**Guidance Documents**

| Document Number | Document Title                          | Version |
|-----------------|---|---------|
| IAEA SSR-4      | Safety of Nuclear Fuel Cycle Facilities | 2017    |

DRAFT

# SCA – PHYSICAL DESIGN

## Licence Condition 5.1: Design Program

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

### **Preamble:**

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

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

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

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

The *National Fire Code of Canada 2015* sets out technical provisions regulating:

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

The *National Building Code of Canada 2015* sets out technical provisions for the design and construction of new buildings. It also applies to the alteration, change of use and demolition of existing buildings.

## **Compliance Verification Criteria:**

### **Licensing Basis Publications**

| <b>Document Number</b> | <b>Document Title</b>   | <b>Version</b> | <b>Implementation Date</b> |
|------------------------|---|----------------|----------------------------|
| NRCC 56190             | National Building Code of Canada 2015   | 2015           | Implemented                |
| NFCC 56192             | National Fire Code of Canada 2015   | 2015           | Implemented                |
| CSA N393               | Fire Protection for Facilities that Process, Handle or Store Nuclear Substances | 2013 (R2018)   | Implemented                |

## **Guidance:**

### **Guidance Documents**

| <b>Document Number</b> | <b>Document Title</b>                        | <b>Version</b> |
|------------------------|--|----------------|
| REGDOC-2.5.1           | General Design Considerations: Human Factors | 2019           |

# SCA – FITNESS FOR SERVICE

## Licence Condition 6.1: Fitness for Service Program

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

### **Preamble:**

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

### **Compliance Verification Criteria:**

#### Licensing Basis Publications

| Document Number | Document Title  | Version      | Implementation Date |
|-----------------|---|--------------|---------------------|
| NFCC 56192      | National Fire Code of Canada  | 2015         | Implemented         |
| CSA N393        | Fire Protection for Facilities that Process, Handle or Store Nuclear Substances | 2013 (R2018) | Implemented         |

#### Licence Documents that Require Notification of Change

| Document Number | Document Title      | Notification |
|-----------------|---------------------|--------------|
| N/A             | Maintenance Program | NT           |

The maintenance program shall include testing and inspection and shall be performed in such a manner that the availability, reliability, and effectiveness of the facility remain consistent with the design and safety analysis documents submitted in support of the licence application.

The program shall document the frequency that the various maintenance, inspection, and testing are performed.

### **Guidance:**

None provided.

# SCA – RADIATION PROTECTION

## Licence Condition 7.1: Radiation Protection Program

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

### Preamble:

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

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

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

### Compliance Verification Criteria:

#### Licensing Basis Publication

| Document Number | Document Title   | Version | Implementation Date |
|-----------------|--|---------|---------------------|
| REGDOC-3.1.2    | Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills | 2018    | Implemented         |

#### Licence Documents that Require Notification of Change

| Document Number | Document Title  | Notification |
|-----------------|---|--------------|
| N/A             | Radiation Safety Program                                | PN           |
| N/A             | Licence Limits, Action Levels and Administrative Limits | PN           |

ALs for radiation protection are shown in the table below. In the event of a discrepancy between the tables and the licensee documentation upon which they are based, the licensee documentation shall be considered the authoritative source considering that the licensee has followed its own change control process.

**Radiation Protection Action Levels**

| Parameter                         | Action Level                        |
|-----------------------------------|-------------------------------------|
| Effective Dose to Worker          | 1.0 mSv / quarter                   |
|                                   | 3.0 mSv / year                      |
|                                   | 10 mSv / 5 year period              |
| Effective Dose to Pregnant Worker | 0.5 mSv for balance of pregnancy    |
| Bioassay Result                   | 1,000 Bq/ml for any sampling period |

Following the exceedance of an action level the licensee shall file a final report to the Commission as found in the licensee’s document “*Regulatory Reporting Program*”.

The licensee shall review and, if necessary, revise the ALs specified above at least once every 5 years in order to validate their effectiveness. The results of such reviews shall be provided to CNSC staff.

**Guidance:**

**Guidance Documents**

| Document Number | Document Title                                      | Version |
|-----------------|---|---------|
| REGDOC-2.7.1    | Radiation Protection                                | 2021    |
| REGDOC-2.7.2    | Dosimetry, Volume I: Ascertaining Occupational Dose | 2021    |

## SCA – CONVENTIONAL HEALTH AND SAFETY

### Licence Condition 8.1: Conventional Health and Safety Program

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

#### **Preamble:**

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

#### **Compliance Verification Criteria:**

##### **Licence Documents that Require Notification of Change**

| Document Number | Document Title            | Notification |
|-----------------|---------------------------|--------------|
| N/A             | Health and Safety Policy  | PN           |
| N/A             | Hazard Prevention Program | PN           |

Employment and Social Development Canada is mandated with overseeing and enforcing compliance with the [Canada Labour Code](#) and its underlying regulations. CNSC staff monitor licensee compliance with its conventional health and safety program, and will take regulatory actions for any potential unsafe work practice situations.

#### **Guidance:**

##### **Guidance Documents**

| Document Number | Document Title                 | Version |
|-----------------|--------------------------------|---------|
| REGDOC-2.8.1    | Conventional Health and Safety | 2019    |



## SCA – ENVIRONMENTAL PROTECTION

### Licence Condition 9.1: Environmental Protection Program

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

#### **Preamble:**

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

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

CSA N288.1, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities*, provides guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities.

CSA N288.4, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*, provides requirements for the design and implementation of an environmental monitoring program at nuclear facilities.

CSA N288.5, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*, provides requirements for the design and implementation of an effluent monitoring program at nuclear facilities.

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

CSA N288.7, *Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills* provides requirements and guidance, which facilitate groundwater protection at nuclear facilities.

CSA N288.8, *Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities*, provides requirements for establishing and implementing action levels at nuclear facilities.

## **Compliance Verification Criteria:**

### **Licensing Basis Publications**

| <b>Document Number</b> | <b>Document Title</b>  | <b>Version</b>  | <b>Implementation Date</b> |
|------------------------|--|-----------------|----------------------------|
| CSA N288.1             | Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities | 2014<br>(R2019) | Implemented                |
| CSA N288.4             | Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills  | 2010<br>(R2015) | Implemented                |
| CSA N288.5             | Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills   | 2011<br>(R2016) | Implemented                |
| CSA N288.6             | Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills   | 2012<br>(R2017) | Implemented                |
| CSA N288.7             | Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines And Mills  | 2015            | Implemented                |
| CSA N288.8             | Establishing And Implementing Action Levels for Releases to the Environment From Nuclear Facilities  | 2017            | Implemented                |
| REGDOC-3.1.2           | Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills   | 2018            | Implemented                |
| REGDOC-2.9.1           | Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2   | 2020            | Implemented                |

### Licensee Documents that Require Notification of Change

| Document Number | Document Title  | Notification |
|-----------------|---|--------------|
| N/A             | Environmental Protection Program                        | PN           |
| N/A             | Environmental Management System                         | PN           |
| N/A             | Environmental Monitoring Program                        | PN           |
| N/A             | Effluent Monitoring Program                             | PN           |
| N/A             | Groundwater Protection Program                          | PN           |
| N/A             | Groundwater Monitoring Program                          | PN           |
| N/A             | Derived Release Limits                                  | PN           |
| N/A             | Environmental Risk Assessment                           | PN           |
| N/A             | Licence Limits, Action Levels and Administrative Limits | PN           |

The licensee shall review and revise the ERA in accordance with CSA N288.6. The results of such reviews shall be provided to CNSC staff.

The licensee's environmental protection program shall ensure control, monitoring and recording of environmental emissions from the SRBT such that the releases do not exceed licence limits as defined below.

#### Licence Limits – Air Releases

| Nuclear Substances and Form                    | Limits (Bq/year) |
|--|------------------|
| Tritium as Tritium Oxide                       | 6.72 E + 13      |
| Total Tritium as Tritium Oxide and Tritium Gas | 4.48E+ 14        |

#### Licence Limits – Sewer Releases

| Nuclear Substance and Form | Limits (Bq/year) |
|----------------------------|------------------|
| Tritium-Water Soluble      | 2.0E+11          |

**Action Levels – Air Releases**

| NUCLEAR SUBSTANCE AND FORM                                | WEEKLY ACTION LEVEL (GBq) |
|---|---------------------------|
| Tritium as tritium oxide (HTO)                            | 840                       |
| Total tritium as tritium oxide (HTO) and tritium gas (HT) | 7,753                     |

| REAL-TIME STACK MONITORING MEASUREMENT                     |
|--|
| $\geq 0.74 \text{ GBq/m}^3$ for a duration of ten minutes* |

\* Equivalent to  $\geq 20,000 \mu\text{Ci/m}^3$  for a duration of ten minutes

**Action Levels – Sewer Releases**

| NUCLEAR SUBSTANCE AND FORM | DAILY ACTION LEVEL (GBq) |
|----------------------------|--------------------------|
| Tritium water soluble      | 0.15                     |

Following the exceedance of an action level the licensee shall file a final report to the Commission as found in the licensee’s document “*Regulatory Reporting Program*”.

The licensee shall review and, if necessary, revise the action levels specified above at least once every 5 years in order to validate their effectiveness. The results of such reviews shall be provided to CNSC staff.

**Guidance:**

None provided.

# SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION

## Licence Condition 10.1: Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

### Preamble:

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

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

### Compliance Verification Criteria:

#### Licensing Basis Publication

| Document Number | Document Title   | Version | Implementation Date |
|-----------------|--|---------|---------------------|
| REGDOC-2.10.1   | Nuclear Emergency Preparedness and Response, Version 2 | 2016    | Implemented         |

#### Licence Documents that Require Notification of Change

| Document Number | Document Title | Notification |
|-----------------|----------------|--------------|
| N/A             | Emergency Plan | PN           |

### Guidance:

None provided.

## Licence Condition 10.2: Fire Protection Program

The licensee shall implement and maintain a fire protection program.

### **Preamble:**

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

### **Compliance Verification Criteria:**

#### **Licensing Basis Publications**

| Document Number | Document Title   | Version      | Implementation Date |
|-----------------|--|--------------|---------------------|
| NFCC 56192      | National Fire Code of Canada 2015  | 2015         | Implemented         |
| NRCC 56190      | National Building Code of Canada 2015  | 2015         | Implemented         |
| CSA N393        | Fire Protection for Facilities That Process, Handle, or Store Nuclear Substances | 2013 (R2018) | Implemented         |

#### **Licencee Documents that Require Notification of Change**

| Document Number | Document Title          | Notification |
|-----------------|-------------------------|--------------|
| N/A             | Fire Safety Plan        | PN           |
| N/A             | Fire Protection Program | PN           |

### **Guidance:**

None provided.

# SCA – WASTE MANAGEMENT

## Licence Condition 11.1: Waste Management Program

The licensee shall implement and maintain a waste management program.

### **Preamble:**

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

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

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

### **Compliance Verification Criteria:**

#### **Licensing Basis Publications**

| Document Number | Document Title   | Version | Implementation Date |
|-----------------|--|---------|---------------------|
| CSA N292.0-14   | General Principles for the Management of Radioactive Waste and Irradiated Fuel | 2014    | Implemented         |
| CSA N292.0-19   | General Principles for the Management of Radioactive Waste and Irradiated Fuel | 2019    | December 2022       |
| CSA N292.3-14   | Management of Low- and Intermediate-Level Radioactive Waste                    | 2014    | Implemented         |
| CSA N292.8-21   | Characterization of radioactive waste and irradiated fuel                      | 2021    | December 2022       |
| REGDOC-2.11.1   | Waste Management, Volume I: Management of Radioactive Waste                    | 2021    | December 2022       |

## Licensee Documents that Require Notification of Change

| Document Number | Document Title           | Notification |
|-----------------|--------------------------|--------------|
| N/A             | Waste Management Program | PN           |

### Transition

The licensee shall perform a gap analysis and submit an implementation plan for the following documents by September 30, 2022:

- CSA N292.0-19, *General Principles for the Management of Radioactive Waste and Irradiated Fuel*
- CSA N292.8-21, *Characterization of radioactive waste and irradiated fuel*
- REGDOC-2.11, *Framework for Radioactive Waste Management and Decommissioning In Canada*
- REGDOC-2.11.1, *Waste Management, Volume I: Management of Radioactive Waste*

### Guidance:

#### Guidance Documents

| Document Number | Document Title   | Version |
|-----------------|--|---------|
| CSA N292.5      | Guideline for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances | 2021    |



## Licence Condition 11.2: Decommissioning Plan

The licensee shall maintain a decommissioning plan.

### **Preamble:**

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

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

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

### **Compliance Verification Criteria:**

#### **Licensing Basis Publication**

| Document Number | Document Title  | Version         | Implementation Date |
|-----------------|---|-----------------|---------------------|
| CSA N294-09     | Decommissioning of Facilities Containing Nuclear Substances | 2009<br>(R2014) | Implemented         |
| CSA N294-19     | Decommissioning of Facilities Containing Nuclear Substances | 2019            | November 2024       |
| REGDOC-2.11.2   | Decommissioning   | 2021            | November 2024       |

The planning for decommissioning of the SRBT facility is documented in the SRBT Preliminary Decommissioning Plan (PDP) and the associated cost estimate. The licensee shall revise the PDP at a minimum every 5 years, or if there are any changes to the facility operations or design that affect the estimated cost of decommissioning. When the PDP is revised, the cost of decommissioning shall be reviewed.

### Licensee Documents that Require Notification of Change

| Document Number | Document Title   | Notification |
|-----------------|--|--------------|
| N/A             | Preliminary Decommissioning Plan – SRBT<br>(November 29, 2019) | PN           |

**Guidance:**

None provided.

DRAFT

# SCA – SECURITY

## Licence Condition 12.1: Security Program

The licensee shall implement and maintain a security program.

### Preamble:

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

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

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

### Compliance Verification Criteria:

#### Licence Documents that Require Notification of Change

| Document Number | Document Title            | Notification |
|-----------------|---------------------------|--------------|
| N/A             | Facility Security Program | PN           |

The licensee shall implement and maintain a facility security plan, and ensure it is designated as prescribed information. The facility security plan shall be reviewed by the licensee at least once a year and be updated based on any changes to the facility operational security measures or to address any changes within the licensed facility that may impact on facility security.

### Guidance:

#### Guidance Documents

| Document Number | Document Title  | Version |
|-----------------|---|---------|
| REGDOC-2.12.3   | Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1 | 2020    |

# SCA – PACKAGING AND TRANSPORT

## Licence Condition 13.1: Packaging and Transport Program

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

### **Preamble:**

The [Class I Nuclear Facilities Regulations](#) requires that a licence application contain information on the proposed procedures for transporting nuclear substances and hazardous substances.

The transport of nuclear substances or hazardous substances shall be done in accordance with the requirements of the [Packaging and Transport of Nuclear Substances Regulations, 2015](#), (PTNSR) and [Transportation of Dangerous Goods Regulations](#) (TDGR) set out by Transport Canada.

### **Compliance Verification Criteria:**

#### Licence Documents that Require Notification of Change

| Document Number | Document Title                                | Notification |
|-----------------|---|--------------|
| SHP-001         | Packaging and Shipping – General Requirements | NT           |

The licensee shall implement and maintain a packaging and transport program that will be in compliance with all the regulatory requirements set out in the PTNSR and in the TDGR.

Every person who transports or causes to be transported nuclear substances (included in Class 7 of the Schedule to the [Transportation of Dangerous Goods Act](#)) shall act in accordance with the requirements of the TDGR set out by Transport Canada.

The PTNSR provides specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

### **Guidance:**

None provided.

# APPENDIX A – DEFINITIONS AND ACRONYMS

## 1. Definitions

The following is a list of definitions of words or expressions used in the LCH that may need clarification; they are defined for the purpose of the LCH only. All other terms and expressions used in the LCH are consistent with the definitions provided in the NSCA, the regulations made pursuant to the NSCA, or in the CNSC regulatory document [REGDOC-3.6, Glossary of CNSC Terminology](#).

**Accept/ed/able/ance** – meets regulatory requirements, which mean it is in compliance with the documents referenced in the LCH.

**Approval** – Commission’s permission to proceed, for situations or changes where the licensee would be:

- (a) Not compliant with a regulatory requirements set out in applicable laws and regulations;
- (b) not compliant with a licence condition; and
- (c) not in the safe direction but the objective of the licensing basis is met.

**Boundary Conditions** – procedural, administrative rules and operating limits for ensuring safe operation of the facility based on safety analyses and any applicable regulatory requirements.

**Compliance Verification Criteria** – regulatory criteria used by CNSC staff to verify compliance with the licence conditions.

**Design Basis** – the entire range of conditions for which the nuclear facility is designed, in accordance with established design criteria, and for which damage to the fuel and/or the release of radioactive material is kept within authorized limits.

**Guidance** – non-mandatory information on how the licensee may comply with a LC.

**Implementation Date** – the date that a given document is implemented by the licensee. If the licensee implements the document before or at the issuance of the licence then “implemented” will be stated.

**Notification Document** – a document which is submitted to the CNSC at the time of implementing the change.

**Prior Notification Document** – a document which is submitted to the CNSC prior to implementing the change.

**Program(s)** – a documented group of planned activities, procedures, processes, standards and instructions coordinated to meet a specific purpose.

**Qualified Staff** – trained licensee staff, deemed competent and qualified to carry out tasks associated with their respective positions.

**Safe Direction** – changes in facility safety levels that would not result in:

- (a) a reduction in safety margins;
- (b) a breakdown of barrier;
- (c) an increase (in certain parameters) above accepted limits;
- (d) an increase in risk;
- (e) impairment(s) of safety systems;
- (f) an increase in the risk of radioactive releases or spills of hazardous substances;
- (g) injuries to workers or members of the public;
- (h) introduction of a new hazard;
- (i) reduction of the defence-in-depth provisions; or
- (j) causing hazards or risks different in nature or greater in probability or magnitude than those stated in the safety analysis of the nuclear facility.

**Safety and Control Measures** – measures or provisions which demonstrate that the applicant:

- (a) Is qualified to carry on the licensed activities; and
- (b) has made adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and any measures required to implement international obligations to which Canada has agreed.

**Written Notification** – a physical or electronic communication between CNSC staff and a person authorized to act on behalf of the licensee

## 2. Acronyms List

| Acronym        | Definition   |
|----------------|--|
| ALARA          | As Low As Reasonably Achievable                                  |
| AL             | Action Level   |
| Bq             | Becquerel  |
| CNSC           | Canadian Nuclear Safety Commission                               |
| CSA            | Canadian Standards Association (now CSA Group)                   |
| CVC            | Compliance Verification Criteria                                 |
| GBq            | Gigabecquerel  |
| GNSCR          | <i>General Nuclear Safety and Control Regulations</i>            |
| HT             | Tritium gas  |
| HTO            | Tritium Oxide  |
| IAEA           | International Atomic Energy Agency                               |
| LC             | Licence Condition  |
| LCH            | Licence Conditions Handbook                                      |
| m <sup>3</sup> | Cubic metre  |
| mSv            | Millisievert   |
| N/A            | Not Applicable   |
| NEW            | Nuclear Energy Worker  |
| NPFD           | Nuclear Processing Facilities Division                           |
| NSCA           | <i>Nuclear Safety and Control Act</i>                            |
| NSPFL          | Nuclear Substance Processing Facility Licence                    |
| NSPFOL         | Nuclear Substance Processing Facility Operating Licence          |
| NT             | Notification   |
| OLC            | Operating Limits and Conditions                                  |
| PDP            | Preliminary Decommissioning Plan                                 |
| PN             | Prior Notification   |
| PTNSR          | <i>Packaging and Transport of Nuclear Substances Regulations</i> |
| SCA            | Safety and Control Area  |
| SRBT           | SRB Technologies (Canada) Inc.                                   |
| SSCs           | Systems, Structures and Components                               |
| TDGR           | Transportation of Dangerous Goods Regulations                    |

## APPENDIX B – LIST OF VERSION CONTROLLED DOCUMENTS

### 1. Codes, Standards and Regulatory Documents

| Document Number | Document Title   | Revision        |
|-----------------|--|-----------------|
| CSA N286        | Management Systems Requirements for Nuclear Facilities   | 2012<br>(R2017) |
| CSA N286.0.1    | Commentary on N286-12, Management Systems Requirements for Nuclear Facilities  | 2021            |
| CSA N288.1      | Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities | 2014<br>(R2019) |
| CSA N288.4      | Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills  | 2010<br>(R2015) |
| CSA N288.5      | Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills   | 2011<br>(R2016) |
| CSA N288.6      | Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills   | 2012<br>(R2017) |
| CSA N288.7      | Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills  | 2015            |
| CSA N288.8      | Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities  | 2017            |
| CSA N292.0      | General Principles for the Management of Radioactive Waste and Irradiated Fuel   | 2014            |
| CSA N292.3      | Management of Low- and Intermediate-Level Radioactive Waste  | 2014            |
| CSA N292.5      | Guideline for the exemption or clearance from regulatory control of materials that contain, or potentially contain, nuclear substances                 | 2021            |
| CSA N292.8      | Characterization of Radioactive Waste and Irradiated Fuel  | 2021            |

## APPENDIX B – LIST OF VERSION CONTROLLED DOCUMENTS



| Document Number | Document Title   | Revision        |
|-----------------|--|-----------------|
| CSA N294        | Decommissioning of Facilities Containing Nuclear Substances  | 2009<br>(R2014) |
| CSA N393        | Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances                           | 2013<br>(R2018) |
| IAEA SSR-4      | Safety of Nuclear Fuel Cycle Facilities  | 2017            |
| NRCC 56190      | National Building Code of Canada 2015  | 2015            |
| NRCC 56192      | National Fire Code of Canada 2015  | 2015            |
| REGDOC-2.1.1    | Management System  | 2019            |
| REGDOC-2.1.2    | Safety Culture   | 2018            |
| REGDOC-2.2.2    | Personnel Training, Version 2  | 2016            |
| REGDOC-2.2.5    | Minimum Staff Complement   | 2019            |
| REGDOC-2.5.1    | General Design Considerations: Human Factors   | 2019            |
| REGDOC-2.7.1    | Radiation Protection   | 2021            |
| REGDOC-2.7.2    | Dosimetry, Volume I: Ascertaining Occupational Dose  | 2021            |
| REGDOC-2.8.1    | Conventional Health and Safety   | 2019            |
| REGDOC-2.9.1    | Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2       | 2020            |
| REGDOC-2.10.1   | Nuclear Emergency Preparedness and Response, Version 2   | 2016            |
| REGDOC-2.12.3   | Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1    | 2020            |
| REGDOC-3.1.2    | Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills | 2018            |
| REGDOC-3.2.1    | Public Information and Disclosure  | 2018            |
| REGDOC-3.5.3    | Regulatory Fundamentals  | 2018            |
| REGDOC-3.6      | Glossary of CNSC Terminology   | 2016            |

## APPENDIX B – LIST OF VERSION CONTROLLED DOCUMENTS

## 2. Licensee Documents

| Document Number | Document Title   | Notification |
|-----------------|--|--------------|
| N/A             | Derived Release Limits   | PN           |
| N/A             | Effluent Monitoring Program                                    | PN           |
| N/A             | Emergency Plan   | PN           |
| N/A             | Environmental Management System                                | PN           |
| N/A             | Environmental Monitoring Program                               | PN           |
| N/A             | Environmental Protection Program                               | PN           |
| N/A             | Environmental Risk Assessment                                  | PN           |
| N/A             | Facility Security Program                                      | PN           |
| N/A             | Fire Hazard Assessment   | PN           |
| N/A             | Fire Protection Program  | PN           |
| N/A             | Fire Safety Plan   | PN           |
| N/A             | Groundwater Monitoring Program                                 | PN           |
| N/A             | Groundwater Protection Program                                 | PN           |
| N/A             | Hazard Prevention Program                                      | PN           |
| N/A             | Health and Safety Policy                                       | PN           |
| N/A             | Licence Limits, Action Levels and Administrative Limits        | PN           |
| N/A             | Maintenance Program  | NT           |
| N/A             | Preliminary Decommissioning Plan – SRBT<br>(November 29, 2019) | PN           |
| N/A             | Public Information Program                                     | NT           |
| N/A             | Quality Manual   | PN           |
| N/A             | Radiation Safety Program                                       | PN           |

### APPENDIX B – LIST OF VERSION CONTROLLED DOCUMENTS

| <b>Document Number</b> | <b>Document Title</b>                         | <b>Notification</b> |
|------------------------|---|---------------------|
| N/A                    | Regulatory Reporting Program                  | PN                  |
| N/A                    | Safety Analysis Report                        | PN                  |
| N/A                    | SRBT Training Program Manual                  | NT                  |
| N/A                    | Waste Management Program                      | PN                  |
| RSO-009                | Tritium Inventory Management                  | NT                  |
| RSO-029                | Nuclear Substances Inventory Management       | NT                  |
| SHP-001                | Packaging and Shipping – General Requirements | NT                  |

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**APPENDIX B – LIST OF VERSION CONTROLLED DOCUMENTS**

## **CURRENT LICENCE**

e-Doc 4624670 (PDF)



**CLASS 1B NUCLEAR SUBSTANCE PROCESSING FACILITY  
OPERATING LICENCE**

**SRB TECHNOLOGIES (CANADA) INCORPORATED**

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**I) LICENCE NUMBER:** NSPFOL-13.00/2022

**II) LICENSEE:** Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to:

**SRB Technologies (Canada) Incorporated  
320-140 Boundary Road  
Pembroke, Ontario  
K8A 6W5**

**III) LICENCE PERIOD:** This licence is valid from **July 1, 2015**, to **June 30, 2022**, unless otherwise suspended, amended, revoked or replaced.

**IV) LICENSED ACTIVITIES:**

This licence authorizes the licensee to:

- (a) operate a Class 1B Facility, comprising of a tritium processing facility , at the location referred to in Section II of this licence (hereinafter “the facility”) for the purposes of manufacturing radiation devices;
- (b) produce, possess, transfer, service and use, radiation devices arising from the activities described in (a);

- (c) possess, transfer, use, process, manage, store and dispose of nuclear substances are required for, associated with, or arise from the activities described in (a);
- (d) the possession of tritium up to a limit of 6000 terabecquerels of tritium in any form;
- (e) possess, and use prescribed information that is required for, associated with, or arise from the activities described in (a).

**V) EXPLANATORY NOTES:**

- (a) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the [\*Nuclear Safety and Control Act\*](#) and associated Regulations.
- (b) The “SRB TECHNOLOGIES (CANADA) INC. LICENCE CONDITION HANDBOOK (LCH)” provides:
  - (i) compliance verification criteria in order to meet the conditions listed in the licence;
  - (ii) information regarding delegation of authority to CNSC staff; and
  - (iii) applicable versions of documents and a process for version control of codes, standards or other documents that are used as compliance verification criteria in order to meet the conditions listed in the licence.

**VI) CONDITIONS:**

**1. GENERAL**

- 1.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:
- (i) the regulatory requirements set out in the applicable laws and regulations
  - (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence
  - (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the CNSC (hereinafter “the Commission”).

- 1.2 The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.
- 1.3 The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.
- 1.4 The licensee shall implement and maintain a public information and disclosure program

## **2. MANAGEMENT SYSTEM**

- 2.1 The licensee shall implement and maintain a management system.

## **3. HUMAN PERFORMANCE MANAGEMENT**

- 3.1 The licensee shall implement and maintain a training program.

## **4. OPERATING PERFORMANCE**

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

## **5. SAFETY ANALYSIS**

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

## **6. PHYSICAL DESIGN**

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

## **7. FITNESS FOR SERVICE**

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

**8. RADIATION PROTECTION**

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

**9. CONVENTIONAL HEALTH AND SAFETY**

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

**10. ENVIRONMENTAL PROTECTION**

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

**11. EMERGENCY MANAGEMENT AND FIRE PROTECTION**

- 11.1 The licensee shall implement and maintain an emergency preparedness program.  
11.2 The licensee shall implement and maintain a fire protection program.

**12. WASTE MANAGEMENT**

- 12.1 The licensee shall implement and maintain a waste management program.  
12.2 The licensee shall implement and maintain a decommissioning strategy.


**13. SECURITY**

- 13.1 The licensee shall implement and maintain a security program.

**14. PACKAGING AND TRANSPORT**

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

SIGNED at OTTAWA, this 29<sup>th</sup> day of June, 2015



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