Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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ORIGINAL/ORIGINAL

CMD: 15-H5

Date signed/Signé le : 12 MARCH 2015

A Licence Renewal

SRB Technologies (Canada) Inc.

Commission Public Hearing

Scheduled for:

13 May 2015

Submitted by:

CNSC Staff

Un renouvellement de permis

SRB Technologies (Canada) Inc.

Audience publique de la Commission

Prévue pour :

13 mai 2015

Soumise par :

Le personnel de la CCSN

e-Doc 4577134 (WORD)
e-Doc 4621186 (PDF)

Summary

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

- Renewal of the Nuclear Substance Processing Facility Operating Licence for SRB Technologies (Canada) Inc. for a ten-year period
- Compliance with the safety and control areas for the safe operation of the facility

The following actions are requested of the Commission:

- Renew the Nuclear Substance Processing Facility Operating Licence for SRB Technologies (Canada) Inc.
- Accept the delegation of authority to CNSC staff as outlined in the proposed licence conditions handbook
- Accept the revised financial guarantee as set out in section 1.3 of the proposed licence conditions handbook

The following items are attached:

- Environmental Assessment Information Report
- Proposed licence
- Proposed licence conditions handbook
- Current licence

Résumé

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

- Le renouvellement du permis d'exploitation d'une installation de traitement de substances nucléaires délivré à SRB Technologies (Canada) Inc., pour une période de dix ans
- La conformité aux domaines de sûreté et de réglementation pour assurer l'exploitation sûre de l'installation

La Commission pourrait considérer prendre les mesures suivantes :

- Renouveler le permis d'exploitation d'une installation de traitement de substances nucléaires délivré à SRB Technologies (Canada) Inc.
- Accepter la délégation de pouvoir au personnel de la CCSN, tel qu'indiqué dans le manuel des conditions de permis proposé
- Accepter la garantie financière révisée établie dans la section 1.3 du manuel des conditions de permis qui est proposé.

Les pièces suivantes sont jointes :

- Rapport d'information sur l'évaluation environnementale
- Permis proposé
- Manuel des conditions de permis proposé
- Permis en vigueur

Signed/signé le

12 March, 2015

David Newland, PhD

Director General (Acting)

Directorate of Nuclear Cycle and Facilities Regulation

Directeur général (Intérimaire) de la

Direction de la réglementation du cycle et des installations nucléaires

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EXECUTIVE SUMMARY

SRB Technologies (Canada) Incorporated (SRB) is a gaseous tritium light source manufacturing facility located in Pembroke, Ontario. The facility processes tritium gas to produce light sources and manufactures radiation devices for containing the sources. SRB has been in operation since 1990 and currently employs 43 people.

The current Nuclear Substance Processing Facility Operating Licence, NSPFOL-13.00/2015, was issued on July 1, 2010 and expires on June 30, 2015. SRB has applied in September 2014 for renewal of its operating licence for a period of 10 years (Ref. 1).

During the licensing period, no workers at SRB received an effective dose exceeding the regulatory dose limits pursuant to the *Radiation*s *Protection Regulations*. Similarly, no members of the public received a dose that approached the regulatory limit for that group (1 mSv per year). No exceedances of release licence limits were reported during the licensing period.

SRB has continued to improve the management and operation of its facility. The releases of tritium to the air relative to the amount of tritium processed by SRB decreased between 2011 and 2014. This decrease indicates that SRB's operational controls for the protection of the environment are robust and that SRB's emission reduction initiatives have been effective.

In Part One of this Commission Member Document (CMD), CNSC staff present the conclusion of their review of the licence application and assessment of SRB's performance during the licensing period. Compliance with regulatory requirements was verified through regular CNSC compliance inspections at the facility and several desktop reviews.

CNSC staff rate SRB's performance as "satisfactory" in all the safety and control areas (SCAs), except for two: Fitness for Service and Conventional Health and Safety rated as "fully satisfactory" in 2014. SRB has demonstrated compliance within these areas that exceeds CNSC expectations by:

- proactively incorporating best industry practice in its maintenance program and implementing several improvements to its manufacturing processes and equipment
- its continued ability to keep SRB's workers safe from occupational injuries

The performance ratings for SRB for the current licensing period are provided in the following table.

Safety and control areas	2010 rating	2011 rating	2012 rating	2013 rating	2014 rating
Management System	SA	SA	SA	SA	SA
Human Performance Management	SA	SA	SA	SA	SA
Operating Performance	SA	SA	SA	SA	SA
Safety Analysis	SA	SA	SA	SA	SA
Physical Design	SA	SA	SA	SA	SA
Fitness for Service	SA	SA	SA	SA	FS
Radiation Protection	SA	SA	SA	SA	SA
Conventional Health and Safety	SA	SA	FS	FS	FS
Environmental Protection	SA	SA	SA	SA	SA
Emergency Management and Fire Protection	SA	SA	SA	SA	SA
Waste Management	SA	SA	SA	SA	SA
Security	SA	SA	SA	SA	SA
Safeguards*	N/A	N/A	N/A	N/A	N/A
Packaging and Transport	SA	SA	SA	SA	SA

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

CNSC staff conclude, in accordance with subsection 24(4) of the *Nuclear Safety and Control Act* (NSCA), that SRB is qualified to carry out the licensed activities, and will, in carrying out those activities, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security.

CNSC staff recommend that the Commission accepts CNSC staff's assessment and conclusions in this CMD and that:

- The Commission renews SRB's operating licence for a period of 10 years, with an expiry date of June 30, 2025.
- The Commission accepts the delegation of authority as set out in the licence conditions handbook.
- The Commission accepts the revised financial guarantee as described in the licence conditions handbook.

CNSC staff have prepared a licence conditions handbook to accompany the proposed licence. The licence conditions handbook provides information for each licence condition to clarify the regulatory requirements by identifying compliance verification criteria and guidance documents.

Part Two of this CMD provides all available information pertaining directly to the current and proposed licence and the proposed licence conditions handbook.

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
5. addenda material that complements items 1 through 4

Part Two provides all available information pertaining directly to the current and proposed licence and the Licence Conditions Handbook (LCH).

1. OVERVIEW

1.1 Background

SRB Technologies (Canada) Incorporated (SRB) is a gaseous tritium light source manufacturing facility located in Pembroke, Ontario, approximately 150 km northwest of Ottawa. 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. As of March 1, 2015, the total staffing complement at SRB stands at 43 employees.

Figure 1-1: Example of a GTLS produced by SRB

SRB is located in an industrial park in the southern part of the city of Pembroke. The area surrounding SRB 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 (Figure 1-2).

The facility is leased space in an industrial building, occupying approximately 1,100 m^2 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.

The current Nuclear Substance Processing Facility Operating Licence, NSPFOL-13.00/2015, expires on June 30, 2015. SRB has applied (Ref.1) for the renewal of this licence, for a period of ten years.

Figure 1-2: Aerial view of SRB Technologies

1.2 Highlights

In 2006, information on tritium releases from SRB and groundwater contamination around the facility led the Commission to issue SRB a possession licence that did not allow tritium processing activities (Ref. 2). After making a number of program and process improvements to reduce the impact of the facility's activities on the environment, SRB applied for an operating licence in December 2007. The Commission issued SRB a two-year operating licence following a two-day public hearing held on April 3 and June 12, 2008 (Ref. 3).

Since resuming operation in July 2008, and throughout the current licensing period (2010-2014), SRB has continued to improve the management and performance of the facility. CNSC staff rate SRB's performance as satisfactory in all the safety and control areas (SCAs), except for two: Fitness for Service and Conventional Health and Safety rated as fully satisfactory in 2014. SRB has demonstrated compliance within these areas that exceeds CNSC staff's expectations by:

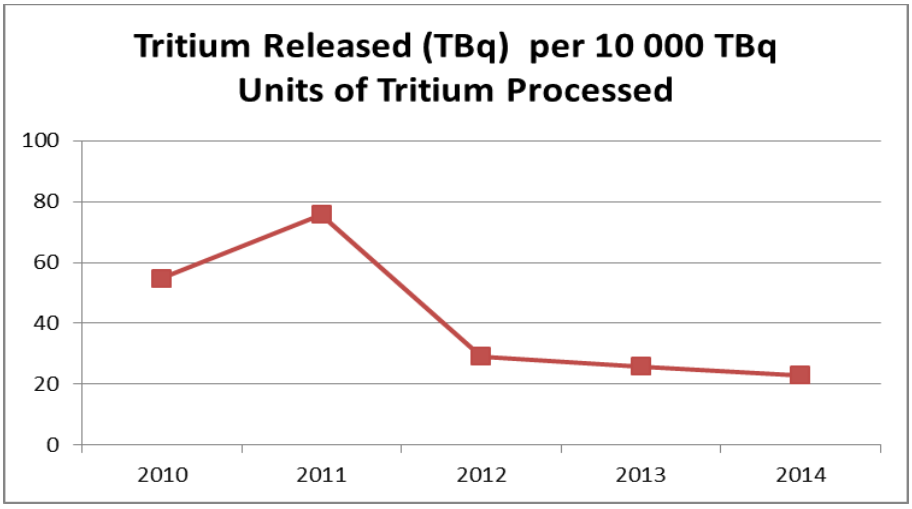
- proactively incorporating best industry practice in its maintenance program and implementing several improvements to its manufacturing processes and equipment
- its continued ability to keep workers safe from occupational injuries while increasing its staff from 15 to 43 employees to meet production demands

As previously reported in CNSC staff's annual reports to the Commission on the performance of SRB (Ref. 4 - 7), SRB maintains an acceptable environmental monitoring program that collects site-specific environmental data at and around the facility. The samples are collected and analyzed by an independent and qualified third party contracted by SRB.

In 2013 and 2014, CNSC staff collected and analyzed a number of environmental samples in publicly accessible areas outside the perimeter of the facility. The results for air and water samples confirm that the public and the environment in the vicinity of SRB are protected from the releases from the facility. Additional information on the CNSC independent environmental monitoring is provided in the *Environmental Assessment Information Report* (attached to this CMD as Addendum E).

During the licensing period, tritium processing at SRB increased from 6,644 TBq in 2010 to a maximum of 30,545 TBq in 2013. However, as shown in Figure 1-3, releases of tritium to the air relative to the amount of tritium processed reached their lowest point in 2014, after three consecutive annual reductions. CNSC staff attribute this decrease in relative emissions to the tritium reduction initiatives undertaken by SRB during the licensing period.

Figure 1-3: Total Tritium (HTO + Tritium Gas) Released per 10,000 TBq of Tritium Processed



CNSC staff have verified through their compliance activities that SRB has adequate operational controls to provide assurance that the release limits stipulated in the operating licence are not exceeded.

As part of licence renewal in 2010, the Commission exempted SRB from subsection 24(2) of the NSCA and Part 2 of the *CNSC Cost Recovery Fees Regulations* to the extent to which the requirements apply to the timing of the payments of the prescribed fee arrears or adjustments (Ref. 8). This exemption was temporary and the conditions related to the exemption are stipulated under licence condition 16.1 of the current operating licence (NSPFOL-13.00/2015).

The final payment and total cost adjustments were paid in September 2013 as per the schedule stipulated in the current licence conditions handbook (LCH).

SRB is now in good standing, and no exemption or additional conditions, with respect to the *Cost Recovery Fees Regulations*, are being recommended by CNSC staff in the proposed licence.

1.3 Overall Conclusions

CNSC staff have concluded the following with respect to paragraphs 24(4)(*a*) and (*b*) of the *Nuclear Safety and Control Act* (NSCA), in that SRB Technologies (Canada) Inc.:

1. Is qualified to carry on the activity authorized by the licence.
2. Will, in carrying out that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

1.4 Overall Recommendations

The licensing recommendations are based on the overall assessment of the licensee's compliance with the NSCA and its regulations, and the adequacy of the measures in place 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 period that the proposed licence covers. CNSC staff recommend the following:

1. The Commission accepts CNSC staff's assessment and conclusions identified in section 1.3.
2. Pursuant to section 24 of the NSCA, the Commission renews the Nuclear Substance Processing Facility Operating Licence NSPFOL-13.00/2025 for a 10-year period.
3. The Commission accepts the delegation of authority to CNSC staff as outlined in Part I section 1.2 of the LCH.
4. Pursuant to section 24 of the NSCA, the Commission accepts the revised financial guarantee as set out in Part II section 1.3 of the proposed LCH.

2. MATTERS FOR CONSIDERATION

2.1 Environmental Assessment

An Environmental Assessment (EA) under the NSCA and its regulations was conducted for this application. More information can be found in Addendum E of the CMD.

CNSC staff conclude that SRB will make adequate provision for the protection of the environment.

2.2 Relevant Safety and Control Areas (SCAs)

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

In the following table:

1. The risk ranking column indicates the overall level of risk associated with each SCA at SRB from 2010 to 2014 (refer to 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 (refer to Addendum B, "Rating Levels") in 2014.

Functional Area	Safety and Control Area	Risk Ranking	Relevant to this CMD?	Rating Level
Management	Management System	M	YES	SA
	Human Performance Management	L	YES	SA
	Operating Performance	M	YES	SA
Facility and Equipment	Safety Analysis	L	YES	SA
	Physical Design	L	YES	SA
	Fitness for Service	M	YES	FS
Core Control Processes	Radiation Protection	M	YES	SA
	Conventional Health and Safety	L	YES	FS
	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

The following table identifies other matters that are relevant to this CMD.

OTHER MATTERS OF REGULATORY INTEREST	
Area	**Relevant to this CMD?**
Aboriginal Consultation	YES
Other Consultation	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 4 of this CMD.

2.4 Regulatory and Technical Bases

The regulatory and technical bases for each Safety and Control Area and the other matters are provided in Addendum C to this CMD.

As this is a Class IB facility, the key requirements come directly from the *Class I Nuclear Facilities Regulations* and the *General Nuclear Safety and Control Regulations* as well as other applicable requirements from the *Nuclear Safety and Control Act*.

3. GENERAL ASSESSMENT OF SCAS

CNSC staff's assessment of SRB's performance for current operations is contained in this section. The specific areas that comprise the SCAs for this facility or activity type are identified in Addendum D, section D.2.

3.1 Management System

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

The specific areas that comprise this SCA for SRB are:

- management system
- organization
- performance assessment, improvement and management review

3.1.1 Trends

The following table provides the annual ratings for Management System over the current licensing period:

MANAGEMENT SYSTEM				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
The compliance rating for this area is satisfactory. SRB has a quality assurance program that complies with CNSC requirements. During the current licensing period, SRB has continued to improve its processes and their implementation. SRB is currently revising its program to become compliant with CSA N286-12, *Management system requirements for nuclear facilities*. SRB has committed to meet the requirements of the standard by December 31, 2016.				

3.1.2 Discussion

Management System

SRB has an acceptable quality assurance program that complies with CNSC requirements for quality assurance outlined in the LCH. During the licensing period, CNSC staff verified the implementation of SRB's program through routine compliance inspections, which cover quality assurance elements, such as: organization, maintenance, calibration, and records. In addition, a focused inspection on management system was conducted in 2012. The scope of the inspection included the following elements of SRB's quality assurance program:

- organization and responsibilities
- non-conformances and corrective actions
- engineering change control
- procurement
- maintenance

Based on the results of their compliance activities, CNSC staff conclude that SRB has improved its processes and their implementation. In 2014, CNSC staff noted some opportunities for improvement related to engineering change control. Results for engineering change control and maintenance are further discussed under the relevant SCAs, sections 3.5 and 3.6 of this document.

In June 2014, CNSC staff informed SRB of their intention to adopt CSA N286-12, *Management system requirements for nuclear facilities*, as compliance verification criteria for the Management System SCA. This new revision of CSA N286 will replace the CNSC quality assurance requirements currently listed in the LCH. CSA N286-12 integrates sound management practices and controls for quality, health, safety and the environment.

The standard contains requirements that were previously included in the CNSC quality assurance requirements, and introduces new requirements related to safety culture, business planning, resources and safety analysis.

SRB carried out a review of its program documentation and processes against the requirements of CSA N286-12 as requested by CNSC staff. SRB developed a comprehensive project plan to meet the requirements of the standard by December 31, 2016. CNSC staff reviewed the transition plan and found it acceptable. SRB has committed to provide CNSC staff with periodic update on the status of its transition activities during this period.

Aspects of the transition and timetable are included as compliance verification criteria in the proposed LCH.

Organization

SRB reports annually to the CNSC on changes to its organization, current staffing level and training program (refer to section 3.2 for additional information on personnel training). During the licensing period, SRB increased its staff from 15 to 43 employees to meet production demands. The modifications to the organizational structure and the role and responsibilities of the new positions are documented in the *Quality Manual*. CNSC staff confirm that SRB's performance in this area is satisfactory through compliance inspections and reviews of SRB's reports and submissions.

Performance assessment, improvement and management review

SRB continues to implement an annual program review to measure the effectiveness of its quality assurance program and safety programs. SRB also conducts self-assessments to critically evaluate its performance and to identify opportunities for improvement.

CNSC staff confirm through their assessments and inspections that SRB's performance with respect to management reviews, assessments and continuous improvement is satisfactory

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

Through review of SRB's documentation and CNSC routine compliance inspections, CNSC staff conclude that the performance of SRB for this area meets requirements. CNSC staff have rated SRB's performance for the Management System SCA as satisfactory over the last 5 years.

3.1.3.2 Regulatory Focus

CNSC staff's regulatory focus will be on the transition to CSA N286-12. Staff will monitor SRB's performance for this SCA through compliance inspections and documentation reviews.

3.1.3.3 Proposed Improvements

SRB submitted its project plan for the transition to CSA N286-12. SRB has committed to be fully compliant with the requirements of the standard by December 31, 2016. The adoption of CSA N286-12 establishes a management system standard that integrates requirements for quality, health, safety and the environment. CNSC staff have incorporated specific compliance verification criteria for the transition under section 2 of the LCH.

3.1.4 Conclusion

CNSC staff have assessed SRB's program and processes under the Management System SCA and conclude that SRB's performance in this area is satisfactory. SRB is currently revising its program and processes to become compliant with CSA N286-12 by December 31, 2016.

3.1.5 Recommendation

One licence condition pertaining to Management System is included in the proposed licence, section VI, condition 2.1. Detailed compliance verification criteria are included under section 2 of the LCH.

3.2 Human Performance Management

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

The specific area that comprises this SCA for SRB is:

- Personnel Training

3.2.1 Trends

The following table provides the annual ratings for the Human Performance Management over the current licensing period:

HUMAN PERFORMANCE MANAGEMENT				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
The compliance rating for this area is satisfactory. SRB is currently implementing a Systematic Approach to Training that will meet the requirements of CNSC Regulatory Document 2.2.2, *Human Performance Management-Personnel Training*. The training system is on schedule to be fully implemented by April 30, 2015.				

3.2.2 Discussion

During the licensing period, SRB has continued to maintain and implement an acceptable training program. SRB trains its staff using a combination of theory and practical training modules. SRB's training addresses areas, such as:

- facility operation and processes (indoctrination)
- radiation protection
- fire protection
- occupational health and safety
- transport of dangerous goods

SRB reports annually on improvements to its training program and training provided to staff. CNSC staff review SRB's adherence to its training plan and maintenance of training records through periodic routine compliance inspections at the facility.

In August 2014, the CNSC published REGDOC 2.2.2 *Human Performance Management-Personnel Training* which defines the requirements for the development and implementation of a training system in a nuclear facility. It requires licensees to develop and implement a training system to systematically analyze, design, develop, implement, evaluate, document and manage training for persons working in a nuclear facility.

Following the publication of CNSC REGDOC 2.2.2, CNSC staff requested that SRB review its training documentation against the CNSC requirements. SRB submitted a comprehensive project plan for the implementation of its revised training program, to be developed in accordance with a Systematic Approach to Training, by April 30, 2015. CNSC staff will provide an update to the Commission on SRB's transition to REGDOC 2.2.2 at the time of the hearing.

CNSC staff are satisfied with SRB's transition plan and steps taken to meet the requirements of REGDOC 2.2.2. Inspections of the training program are planned for the second half of 2015.

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

Through review of SRB's annual reports and CNSC routine compliance inspections, CNSC staff conclude that the performance of SRB for this area meets CNSC requirements. CNSC staff have rated SRB's performance for the Human Performance SCA as satisfactory over the last 5 years.

3.2.3.2 Regulatory Focus

CNSC staff's regulatory focus will be on SRB's transition to a Systematic Approach to Training. Staff will monitor SRB's performance for this SCA through compliance inspections and documentation reviews.

3.2.3.3 Proposed Improvements

SRB submitted a comprehensive project plan and is committed to having the training program fully documented and implemented by April 30, 2015. SRB is periodically updating CNSC staff on its progress against the plan.

3.2.4 Conclusion

Based on the results of CNSC routine inspections and review of SRB's submissions, CNSC staff conclude that SRB's performance under the Human Performance SCA is satisfactory. SRB is currently revising its program and documentation to become compliant with REGDOC 2.2.2, Human Performance Management-Personnel Training.

3.2.5 Recommendation

One licence condition pertaining to Human Performance Management is included in the proposed licence, section VI, condition 3.1. Detailed compliance verification criteria are included under section 3 of the LCH.

3.3 Operating Performance

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

The specific areas that comprise this SCA for SRB are:

- conduct of licensed activity
- reporting and trending

3.3.1 Trends

The following table provides the annual ratings for the Operating Performance over the current licensing period:

OPERATING PERFORMANCE				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
The compliance rating for this area is satisfactory. The facility operated safely, in accordance with the Safety Analysis Report, procedures and the requirements of the licence.				

3.3.2 Discussion

Conduct of licensed activity

The CNSC uses a risk-informed regulatory approach in the monitoring of nuclear facilities and activities. CNSC staff performs annual compliance inspections at SRB that include standard checks, such as: radiation protection, environmental monitoring and protection, storage of radioactive material and waste, fire protection, equipment condition (including calibration), and several elements of the management system.

During the licensing period, CNSC staff also completed several focused inspections to assess the following SCAs: Radiation Protection and Waste Management, Security, Management System, Transport, Environmental Protection and Emergency Response. The compliance inspections resulted in no major findings. Based on the results of the compliance activities, CNSC staff conclude that SRB continues to operate the facility in a safe and compliant manner.

As noted in section 1.2 of the CMD, tritium processing at SRB increased from 6,644 TBq in 2010 to a maximum value of 30,545 TBq in 2013. However the releases of tritium to the air per unit of tritium processed decreased during the same period, as shown in Figure 1-3. CNSC staff attribute this decrease to the tritium emission reduction initiatives undertaken by SRB.

SRB continues to identify and implement improvements to manufacturing processes, equipment and programs as part of continuous improvement. SRB sets Safety Performance Objectives annually to track these improvement initiatives and reports to the CNSC on performance against these objectives.

Reporting and Trending

SRB submits Annual Compliance Reports and Quarterly Reports as per CNSC requirements. CNSC staff review the facility's reports and discuss the results with the facility management. No issues with safe operations were identified during the licensing period.

SRB reported one event during the licensing period in which a weekly action level for tritium released from the facility was exceeded. This occurrence is further discussed under the Environmental Protection SCA in section 3.9 of the CMD.

3.3.3 Summary

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

3.3.3.1 Past Performance

SRB continues to operate the facility in a compliant manner. Compliance inspections resulted in no major findings. CNSC staff have rated SRB's performance for the Operating Performance SCA as satisfactory over the last 5 years.

3.3.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through routine CNSC compliance inspections and documentation reviews.

3.3.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA. Improvements to operation, equipment and programs are identified and implemented as part of continuous improvement.

3.3.4 Conclusion

CNSC staff have assessed SRB's program and processes under the Operating Performance SCA and have found SRB's performance to be satisfactory. The facility operated safely, in accordance with the Safety Analysis Report, procedures and the requirements of the licence. Compliance inspections resulted in no major findings. SRB implements improvements to manufacturing processes, equipment and programs as part of continuous improvement.

3.3.5 Recommendation

Two licence conditions pertaining to Operating Performance are included in the proposed licence, section VI, conditions 4.1 and 4.2. Detailed compliance verification criteria are included under sections 4 of the LCH.

3.4 Safety Analysis

The SCA Safety Analysis covers the 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.

The specific area that comprises this SCA for SRB is:

- hazard analysis

3.4.1 Trends

The following table provides the annual ratings for Safety Analysis over the current licensing period:

SAFETY ANALYSIS				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
CNSC staff have reviewed the safety documentation for SRB, the *Safety Analysis Report* and additional analyses, and have found them to be acceptable.				

3.4.2 Discussion

The *Safety Analysis Report* (Ref. 9) 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. SRB reviews its *Safety Analysis Report* on an annual basis for accuracy and validity.

In support of the return to service in 2008, SRB provided the CNSC with additional analyses:

- Release Limit Rationale documents (Ref. 10-11)
- Review of Hypothetical Incident Scenarios (Ref. 12)

Following the March 11, 2011 earthquake and tsunami event in Japan, which led to a nuclear accident at TEPCO's Fukushima Daiichi nuclear power plant, CNSC staff directed all licensees of Class I nuclear facilities, including SRB, to review their safety case and the lessons learned from the event, and to submit their responses under subsection 12(2) of the *General Nuclear Safety and Control Regulations*. SRB reviewed its safety documentation and analysis of worst-case conditions and confirmed that the overall safety case for the facility remains valid and effective (Ref. 13).

The facility and its processes have not been modified to require further analysis during this licensing period.

CNSC staff have reviewed the safety documentation for SRB, the *Safety Analysis Report* and additional analyses, and conclude the performance of SRB for this SCA meets requirements.

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

Through review of SRB's safety documentation, CNSC staff conclude that the performance of SRB for this area meets requirements. CNSC staff have rated SRB's performance for the Safety Analysis SCA as satisfactory over the last 5 years.

3.4.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through documentation reviews.

3.4.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA.

3.4.4 Conclusion

CNSC staff have assessed SRB's documentation and analyses under the Safety Analysis SCA and have found them to be acceptable. The facility has not been modified to require further analysis during the licensing period.

3.4.5 Recommendation

One licence condition pertaining to Safety Analysis is included in the proposed licence, section VI, condition 5.1. Detailed compliance verification criteria are included under section 5 of the LCH.

3.5 Physical Design

The SCA 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.

The specific areas that comprise this SCA for SRB are:

- design governance
- facility design

3.5.1 Trends

The following table provides the annual ratings for Physical Design over the current licensing period:

PHYSICAL DESIGN				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
SRB's performance in this area is satisfactory. No significant changes were made to the design of the facility. SRB has taken appropriate steps to address CNSC findings related to the implementation of its engineering change control process.				

3.5.2 Discussion

During the licensing period, SRB 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 SRB's engineering change control process.

SRB's *Engineering Change* procedure was updated during the licensing period to address CNSC staff's comments. CNSC staff confirmed through their review that this process ensures the facility design is maintained, and the potential impact of changes on the safety of personnel, the public and the environment is assessed.

During a CNSC compliance inspection in 2014, CNSC staff noted a lack of adherence with some aspects of SRB's documented process for one recent modification to the processing rig piping. Although the actual equipment modification was acceptable to CNSC staff, staff considered that the change had not been fully documented as per SRB's *Engineering Change* procedure.

CNSC staff requested SRB to review and document any changes to its systems, structures and components as per SRB's *Engineering Change* procedure. SRB submitted the revised change control documentation. The documentation included risk assessment of the changes, qualification requirements, installation and commissioning requirements. CNSC staff's review confirmed that the revised change control documentation met CNSC requirements.

SRB also confirmed that training had been delivered to staff to ensure the revised *Engineering Chang*e procedure was understood.

CNSC staff will continue to monitor the performance of SRB in this area through their routine compliance inspection.

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

Based on their review of SRB's submissions and the results of compliance inspections, CNSC staff have rated SRB's performance for the Physical Design SCA as satisfactory over the last 5 years. SRB has taken appropriate steps to address CNSC findings related to the implementation of its engineering change control process.

3.5.3.2 Regulatory Focus

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

3.5.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA. Improvements to the facility equipment and processes are identified and implemented as part of continuous improvement.

3.5.4 Conclusion

CNSC staff have assessed SRB's performance in this area as satisfactory. No significant changes were made to the design of the facility during the licensing period. SRB's documented process for engineering change control meets requirements. SRB has taken appropriate corrective actions to address CNSC findings related to the implementation of its *Engineering Change* procedure.

3.5.5 Recommendation

One licence condition pertaining to Physical Design is included in the proposed licence, section VI, condition 6.1. Detailed compliance verification criteria are included under section 6 of the LCH.

3.6 Fitness for Service

The SCA 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.

The specific areas that comprise this SCA for SRB are:

- equipment fitness for service/equipment performance
- maintenance

3.6.1 Trends

The following table provides the annual ratings for Fitness for Service over the current licensing period:

FITNESS FOR SERVICE				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	FS
Comments				
SRB has in place the programs to ensure the facility is maintained appropriately and that it remains fit for service. There were no major equipment failures reported during the licensing period. During the licensing period, SRB implemented several improvements to its manufacturing processes and equipment and revised its maintenance program in 2014, proactively incorporating best industry practice. CNSC staff have rated the SCA Fitness for Service as fully satisfactory for 2014 based on these initiatives and SRB's continued performance.				

3.6.2 Discussion

Equipment Fitness for Service/Equipment Performance

SRB continues to maintain the facility to ensure that its systems, structures and components remain effective over time. SRB's Annual Compliance Report summarizes work performed on systems and equipment to maintain the facility fitness for service during the year.

During the licensing period, SRB implemented several upgrades to the facility and its equipment, including: real time stack monitors, a stack release data recorder, tritium in air monitors (portable and stationary), and two new liquid scintillation counters.

There were no major equipment failures reported during the licensing period.

CNSC staff confirmed during their compliance inspections that maintenance is performed as required, and that required records for maintenance and calibration are maintained. CNSC staff also verified that SRB continues to ensure that the ventilation system functions as designed. SRB performs regular checks to confirm the effective operation of the ventilation system. As well, SRB continues to hire the services of an independent third party on an annual basis to verify stack flowrates and to confirm the stacks are performing to design requirements.

In addition, once every two years, SRB contracts a third party to install independent monitoring equipment to perform a validation of the tritium-in-air sample collection system (bubblers). Results during the licensing period show that SRB's tritium-in-air sample collection system is effective in measuring emissions from the facility. For the next licensing period, SRB has committed to annual third party validation as a result of operating experience from industry peers.

Maintenance

SRB's revised *Maintenance Program* was submitted to CNSC staff for review in July 2014. The program was revised to align with applicable nuclear industry guidance and best practice for maintenance. CNSC staff reviewed SRB's *Maintenance Program* and found it to be acceptable. Although SRB is not required to meet the requirements of RD/GD-210, *Maintenance Programs for Nuclear Power Plants*, CNSC staff note that SRB has proactively incorporated elements from RD/DG-210 in its program, such as: critical spare parts, master equipment list and prioritization of preventive maintenance tasks.

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

During the licensing period, SRB implemented several improvements to its manufacturing processes and equipment and revised its maintenance program in 2014, proactively incorporating best industry practice. There were no major equipment failures reported during the licensing period. CNSC staff have rated SRB's performance for the Fitness for Service SCA as satisfactory between 2010-2013, and fully satisfactory for 2014, based on its review of SRB's Annual Compliance Report, the results of routine compliance inspections, and SRB's recent improvement initiatives.

3.6.3.2 Regulatory Focus

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

3.6.3.3 Proposed Improvements

There are no changes anticipated in this SCA in the near future for this SCA. Improvements to the facility equipment and processes are identified and implemented as part of continuous improvement.

3.6.4 Conclusion

SRB continues to maintain the facility to ensure that its systems, structures and components remain effective over time. There were no major equipment failures reported during the period. Compliance inspections resulted in no major findings.

During the licensing period, SRB implemented several improvements to its manufacturing processes and equipment. In 2014, SRB revised its *Maintenance Program* to align with industry best practice for maintenance.

CNSC staff have rated the SCA Fitness for Service as fully satisfactory for 2014 based on these recent initiatives and SRB's continued performance in this area.

3.6.5 Recommendation

One licence condition pertaining to Fitness for Service is included in the proposed licence, section VI, condition 7.1. Detailed compliance verification criteria are included under section 7 of the LCH.

3.7 Radiation Protection

The SCA Radiation Protection 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 SCA encompasses the following specific areas:

- application of ALARA
- worker dose control
- radiation protection program performance
- radiological hazard control
- estimated dose to the public

3.7.1 Trends

The following table provides the annual ratings for Radiation Protection over the current licensing period:

RADIATION PROTECTION				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Performance levels for this SCA have been consistent from year to year, with satisfactory ratings given from 2010 to 2014. SRB has implemented and maintained an effective radiation protection program as required by the *Radiation Protection Regulations*.				

Effective Doses to Workers

The following table shows doses to workers over the current licensing period:

	AVERAGE AND MAXIMUM EFFECTIVE DOSES TO WORKERS					
Dose Statistic	**2010**	**2011**	**2012**	**2013**	**2014**	**Regulatory Limit**
Total Persons Monitored	17	18	24	38	48	
Average Effective Dose (mSv)	0.11 mSv	0.25 mSv	0.11 mSv	0.21 mSv	0.10 mSv	
Maximum Individual Effective Dose (mSv)	0.88 mSv	1.15 mSv	0.80 mSv	1.93 mSv	1.29 mSv	50 mSv/year

Maximum Effective Dose to a Member of the Public

The following table describes doses to the public at SRB over the current licensing period:

	MAXIMUM EFFECTIVE DOSE TO A MEMBER OF THE PUBLIC					
Dose Statistic	**2010**	**2011**	**2012**	**2013**	**2014**	**Regulatory Limit**
Maximum Effective Dose (mSv)	0.0050 mSv	0.0050 mSv	0.0049 mSv	0.0068 mSv	0.0067 mSv	1 mSv/year

3.7.2 Discussion

The *Radiation Protection Regulations* require licensees to establish a radiation protection program to keep exposures ALARA, through the implementation of a number of controls, including: 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 workers and members of the public.

Application of ALARA

As required by the *Radiation Protection Regulations*, SRB continues to implement radiation protection measures throughout the current licensing period to keep radiation exposures and doses to persons ALARA. SRB establishes radiation protection objectives and ALARA targets, such as worker dose reduction initiatives, to track radiation protection and improve program performance.

Worker Dose Control

All workers at SRB have been designated as Nuclear Energy Workers (NEWs) in accordance with the *Radiation Protection Regulations*.

Radiation exposures are monitored to ensure compliance with the CNSC's regulatory dose limits and with keeping radiation doses ALARA. Throughout the current licensing period, no worker's radiation exposure reported by SRB exceeded the CNSC regulatory dose limits. The maximum effective dose received by a worker in the current licensing period was 1.9 mSv, or approximately 4 percent of the regulatory limit of 50 mSv in a one-year dosimetry period. Annual average and maximum effective dose results from 2010 to 2014 are provided in section 3.7.1.

During the current licensing period, average doses to workers have remained relatively consistent between 0.1 mSv and 0.2 mSv. The maximum dose over these years has fluctuated between 0.8 mSv to 1.9 mSv.

The yearly variation in SRB staff's radiation exposure is directly correlated with three primary factors: the level of tritium processing, the types of light sources being manufactured, and the results of ALARA-driven improvements to manufacturing processes, equipment and programs. CNSC staff are satisfied that doses to workers are being controlled well below the regulatory limits and are maintained ALARA.

Radiation Protection Program Performance

Action levels for radiological exposures and contamination control are established as part of SRB's *Radiation Protection Program* in accordance with the *Radiation Protection Regulations*. If reached, these levels trigger SRB staff to determine the cause and, if applicable, restore the effectiveness of the program.

SRB undertook a complete review of their action levels in 2012 to ensure that they are adequately set to detect the emergence of a potential loss of control of the radiation protection program. In 2013, SRB implemented revised action levels set lower than those used in the previous years. These revised action levels were reviewed and accepted by CNSC staff.

During the current licensing period, 2010 to 2014, there were no action level exceedances at SRB.

In 2014, SRB increased the number of radiation protection personnel at the facility by hiring a Health Physics Manager whose primary role includes managing and overseeing the radiation protection program. SRB also undertook a formal review of the program to ensure that appropriate radiation protection measures are being implemented commensurate with the current operating state of the facility. The revised *Radiation Protection Program* was reviewed and accepted by CNSC staff.

Radiological Hazard Control

Radiological contamination controls have been established at SRB 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 verified and maintained by assessment of non-fixed tritium contamination levels throughout the facility by means of the swipe method and liquid scintillation counting of the swipe material.

During the current licensing period, SRB undertook a formal review of the routine contamination measurement locations to ensure that appropriate contamination control measures are effective. Administrative surface contamination limits have been established for each of the radiation zones. Prompt action is taken to remove any activity that is detected above an administrative limit. SRB has committed to formally reviewing the measurement locations on a routine basis at a set frequency in order to continue improving their contamination control program.

Airborne tritium levels are also continuously monitored in work areas where there is a possibility of a tritium release into the work environment. Alarm thresholds are set to alert workers of changing conditions. In the event of an alarm, workers must evacuate the area until the cause of the alarm is identified and resolved.

CNSC staff are satisfied that radiological hazards at SRB are being controlled for the protection of persons in accordance with regulatory and licensing requirements.

Estimated Dose to the Public

Maximum effective doses to members of the public are provided in section 3.7.1.

During the current licensing period, no member of the public received a dose that approached or exceeded the regulatory dose limit of 1 mSv per year. The maximum annual effective dose calculated during the licensing period was 0.0068 mSv, 0.7% of the annual public dose limit.

The increase in maximum annual effective dose to member of the public (0.0043 mSv to 0.00668 mSv), observed between 2012 and 2013, is attributed to an approximate three-fold increase in tritium processing during the same period (from 10,224 TBq in 2012 to 30,544 TBq in 2013).

Based on the review of dose data, CNSC staff are satisfied that SRB is adequately controlling radiation doses to members of the public to levels well below regulatory limits.

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

During the current licensing period, there have been no issues related to this SCA requiring regulatory action or additional oversight. Based on their review of SRB's reports and submissions, and CNSC routine compliance inspections, CNSC staff have rated SRB's performance for the Radiation Protection SCA as satisfactory over the last 5 years.

3.7.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through routine CNSC inspections and annual documentation reviews.

3.7.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA. SRB continues to implement ALARA-driven improvements to the facility and its processes.

3.7.4 Conclusion

CNSC staff conclude that the program for radiation protection and its implementation at SRB satisfies regulatory requirements and is keeping radiation doses ALARA. Although tritium processing has increased, SRB radiation doses to the workers and members of the public continue to remain very low and well below regulatory dose limits.

3.7.5 Recommendation

One licence condition pertaining to Radiation Protection is included in the proposed licence, section VI, condition 8.1. Detailed compliance verification criteria are included under section 8 of the LCH.

3.8 Conventional Health and Safety

The SCA Conventional Health and Safety covers the implementation of a program to manage workplace hazards and to protect personnel and equipment.

This SCA encompasses the following specific areas:

- performance
- practices
- awareness

3.8.1 Trends

The following table provides the annual ratings for Conventional Health and Safety over the current licensing period:

CONVENTIONAL HEALTH AND SAFETY				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	FS	FS	FS
Comments				
CNSC staff have rated Conventional Health and Safety at SRB as fully satisfactory based on the effective implementation of its conventional health and safety program. SRB has continued to demonstrate its ability to keep the workers safe from occupational injuries while it increased its staff from 15 to 43 employees. No lost-time injuries have occurred since 2011.				

3.8.2 Discussion

Performance

A key performance measure for this SCA is the number of lost-time injuries (LTIs) that occur per year. An LTI is an injury that takes place at work and results in the worker being unable to return to work to carry out their duties for a period of time. The following table shows that the number of LTIs was zero from 2012 through 2014.

Lost-time injuries (LTI) at SRB Technologies Inc. 2010-2014					
	2010	**2011**	**2012**	**2013**	**2014**
Lost-Time Injuries	0	1	0	0	0

During the licensing period, SRB continues to demonstrate its ability to keep the workers safe from occupational injuries while tritium processing increased from 6,644 TBq in 2010 to maximum of 30,545 TBq in 2013. During the same period, SRB increased its staff from 15 to 43 employees to meet production demands.

Routine CNSC compliance inspections resulted in no major findings in this area.

Practices

In addition to the NSCA and its regulations, SRB's activities and operations must comply with Part II of the *Canada Labour Code*. As such, SRB is required to report incidents resulting in an injury to Human Resources and Skills Development Canada.

In accordance with Part II of the *Canada Labour Code*, SRB maintains a workplace health and safety committee, comprised of two representatives. The committee is required to meet a minimum of 9 times a year. During the licensing period, this committee met monthly.

Awareness

SRB continues to maintain a comprehensive conventional health and safety program. CNSC staff will continue to monitor the effectiveness of this program through future inspections.

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

Based on their review of SRB's reports and CNSC routine compliance inspections, CNSC staff have rated SRB's performance for the Conventional Health and Safety SCA as full satisfactory in 2012, 2013 and 2014. No LTIs have occurred since 2011, despite a large increase in the number of workers at the facility.

3.8.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through routine CNSC inspections and annual documentation reviews.

3.8.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA.

3.8.4 Conclusion

The compliance verification activities conducted at the facility confirm that SRB continues to view conventional health and safety as an important consideration. SRB has demonstrated the implementation of an effective occupational health and safety management program, which has resulted in the ability to keep their workers safe from occupational injuries. No LTIs have occurred since 2011.

3.8.5 Recommendation

One licence condition pertaining to Conventional Health and Safety is included in the proposed licence, section VI, condition 9.1. Detailed compliance verification criteria are included under section 9 of the LCH.

3.9 Environmental Protection

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

For SRB, this SCA encompasses the following specific areas:

- effluent and emissions control (releases)
- environmental management system (EMS)
- assessment and monitoring
- protection of the public

3.9.1 Trends

The following table provides the annual ratings for Environmental Protection over the current licensing period:

ENVIRONMENTAL PROTECTION				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
CNSC staff continue to rate the Environmental Protection SCA at SRB as satisfactory. Regular environmental inspections of the facility have resulted in no major findings. SRB's radioactive releases continue to be effectively controlled and consistently well below the release limits prescribed in its operating licence. There were no releases of hazardous substances (non-radiological) to the environment from SRB that would pose a risk to the public or environment. SRB continues to maintain an environmental monitoring program. The principal monitoring activities focus on monitoring the air and groundwater around the facility. The program provides data for estimates of annual dose to the public. The calculated maximum dose to a member of the public from licensed activities remains very low, approximately 0.7% of the public dose limit of 1 mSv/yr.				

3.9.2 Discussion

During the licensing period, CNSC staff verified SRB's performance with respect to environmental protection through review of SRB's reports, submissions and annual routine compliance inspections. In addition, two focused CNSC environmental protection inspections were conducted at SRB, in 2011 and 2014.

Based on CNSC compliance activities, CNSC staff conclude that the implementation of the environmental protection program at SRB meets all applicable regulatory requirements. Details of CNSC staff's assessment are presented in the following sections.

Effluent and Emissions Control (releases)

Atmospheric Emissions

As demonstrated in the following table, SRB's releases to the atmosphere continue to be effectively controlled and are consistently well below the release limits prescribed in its operating licence.

Atmospheric emissions monitoring results, 2010–2014						
Parameter	**2010**	**2011**	**2012**	**2013**	**2014**	**Licence limit (TBq/yr)**
Tritium as tritium oxide (HTO), TBq/yr	9.17	12.50	8.36	17.82	10.71	67
Total tritium as HTO + tritium gas (HT), TBq/yr	36.43	55.68	29.90	78.88	66.16	448

The relative increase in total tritium released to air between 2012 and 2013 is due to a three-fold increase in tritium processing at SRB (10,224 TBq/year and 30,544 TBq/year) during the same period. Nevertheless, calculated maximum dose to a member of the public from licensed activities remains very low, approximately 0.7% of the public dose limit of 1 mSv/yr as discussed in the Radiation Protection SCA, section 3.7.

With respect to the action levels, there were no exceedances at any time from 2010 to 2013. However, during the period of October 28 to November 4, 2014, there was a gaseous tritium action level exceedance of the weekly action level for total tritium of 7.75 TBq. The release represents 3.7% of the annual release limit for total tritium. SRB conducted an investigation into this exceedance to identify contributing causes and root causes. SRB's investigation concluded that the higher tritium emissions were related to a gaseous tritium light source leakage and a manifold gauge leak. CNSC staff reviewed SRB's investigation report and proposed corrective actions and found both to be acceptable.

Liquid Effluent

SRB continues to monitor tritium released as liquid effluent from the facility. The monitoring data for 2010 through 2014, provided in the following table, demonstrate that liquid effluent from the facility continues to be effectively controlled and that tritium releases are consistently well below the licence limit.

Liquid effluent monitoring results, 2010–2014						
Parameter	**2010**	**2011**	**2012**	**2013**	**2014**	**Licence limit (TBq/yr)**
Tritium-water soluble, TBq/yr	0.007	0.008	0.012	0.009	0.013	0.200

Environmental Management System (EMS)

SRB continues to maintain an EMS which describes the integrated activities associated with the protection of the environment at the facility. SRB's EMS includes activities such as establishing annual environmental objectives and targets which are reviewed and assessed by CNSC staff through compliance verification activities. SRB staff holds an annual safety meeting in which environmental protection issues are discussed. CNSC staff, as part of their compliance verification activities, review the minutes of these meetings and follow up on any outstanding issues with SRB's staff.

Assessment and Monitoring

SRBs radiological environmental monitoring program serves to demonstrate that the site emissions of nuclear materials are properly controlled. The program provides data for estimates of annual dose to the public, and that public dose is in compliance with the regulatory dose limit and ALARA. The principal monitoring activities, as described in the following paragraphs, are focused on monitoring the air and groundwater around the facility.

Monitoring and assessment activities are further detailed in the *Environmental Assessment Information Report* (attached to this CMD as Addendum E).

Air Monitoring

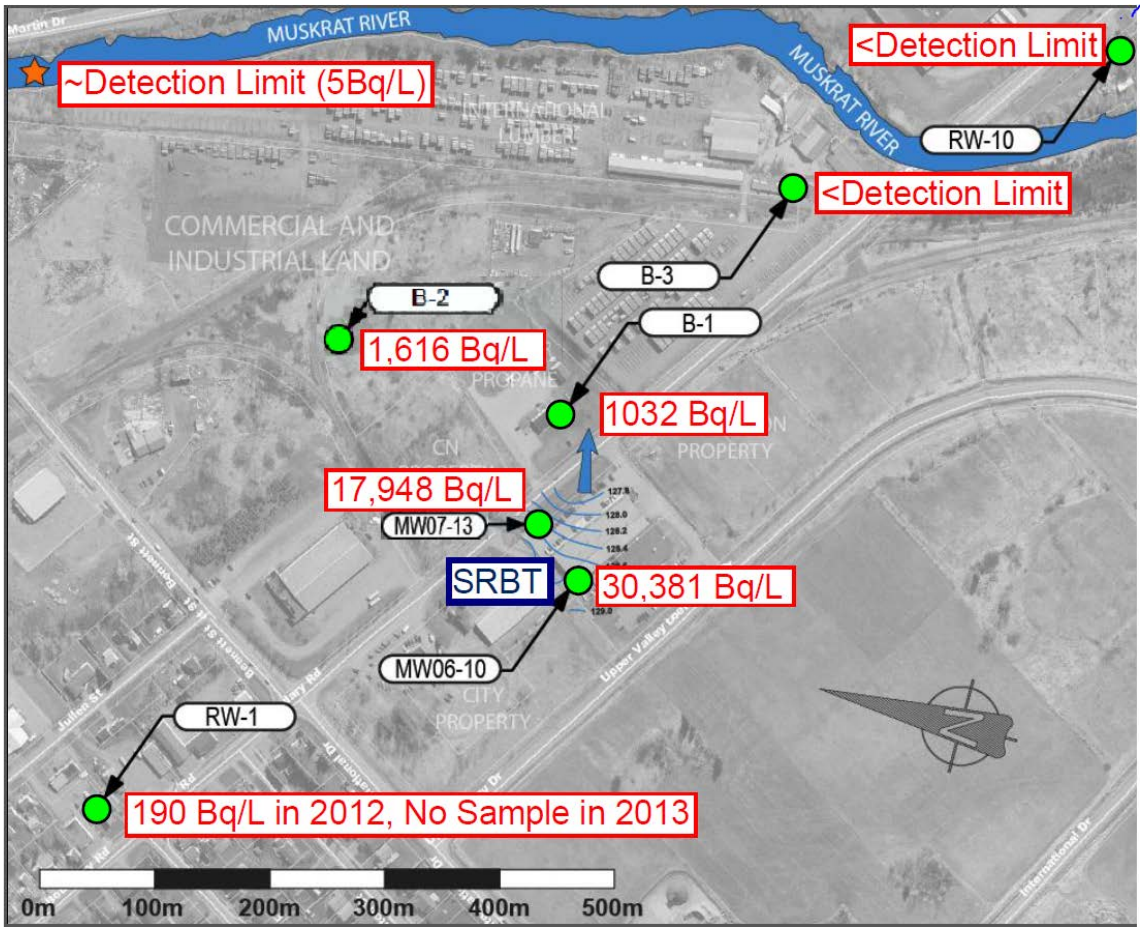
SRB has a total of 40 passive air samplers located within a two-kilometer radius of the facility. The passive air samplers represent tritium exposure pathways for inhalation and skin absorption and are used in the calculations to determine public dose. The samples are collected and analyzed by a qualified third-party laboratory. The results from these samplers during the licensing period demonstrate that tritium levels in air are low which is consistent with the atmospheric emissions that are well below SRB's licence limits. Air monitoring confirms that public exposure to tritium is very low.

Groundwater Monitoring

Groundwater is sampled in 46 monitoring wells. The highest tritium concentration was found in well MW06-10, which is located near the SRB stacks, averaging 33,402 Bq/L in 2011, 39,492 Bq/L in 2012 and 30,380 Bq/L in 2013. These values are restricted to a small area adjacent to the SRB building and represent past releases from the facility. Tritium concentrations decrease significantly at locations further away from SRB.

Figure 3-1 below shows examples of the spatial distribution of annual average tritium concentrations in groundwater in the area in 2013.

Figure 3-1: 2013 Annual Average Tritium Concentrations in Groundwater



Since renewal of the licence in 2010, SRB has conducted a groundwater study, which confirmed that the residential wells (with highest tritium concentration of 226 Bq/L for 2013) and the Muskrat River (with tritium concentrations for the last two years in the range of 3.2 – 22 Bq/L) are not at risk of exceeding the Ontario Drinking Water Quality Standard of 7,000 Bq/L. The highest tritium concentration in a potential drinking water well was found in business well B-2, averaging 1,616 Bq/L in 2013. SRB continues to provide bottled drinking water to the business, even though the tritium concentrations were well below the Ontario drinking water standard.

CNSC staff's independent modeling assessment in 2010 was in agreement with SRB's conclusion that the elevated tritium concentrations at MW06-10 is mainly caused by high tritium concentrations in the soil due to historical practices. CNSC's staff independent modeling and analysis of SRB's groundwater monitoring results are further discussed in the *Environmental Assessment Information Report* (Addendum E). Overall CNSC staff conclude that the tritium inventory in the groundwater system around the facility has been decreasing since 2006.

Other Monitoring

SRB engages a qualified third party to perform monitoring and analysis of precipitation, runoff, surface water, produce, milk and wine as in the *Environmental Assessment Information Report* (Addendum E). This monitoring complements the principal monitoring activities which focus on air and groundwater.

In 2013 and 2014, CNSC staff collected and analyzed a number of environmental samples in publicly accessible areas outside the perimeter of the facility. Results obtained by the CNSC are consistent with SRB's third party results and confirm that the public and the environment in the vicinity of SRB are protected from the releases from the facility. Additional information on the CNSC independent environmental monitoring is provided in the *Environmental Assessment Information Report* (Addendum E).

Protection of the Public

CNSC licensees are required to ensure and demonstrate that the health and safety of the public are protected from exposures to hazardous substances released from the facility. There are no releases of non-radiological hazardous substances to the environment from SRB that would pose a risk to the public or environment.

For releases of nuclear substances, these are addressed as public dose in the Radiation Protection SCA. The calculated maximum dose to a member of the public from licensed activities has not exceeded 7 µSv/yr during the last 5 years, approximately 0.7% of the public dose limit of 1 mSv/yr (1,000 µSv).

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

CNSC staff have rated SRB's performance in the Environmental Protection SCA as satisfactory over the last 5 years.

SRB continues to operate the facility in a compliant manner and provides adequate controls for the protection of the environment and the public. Regular environmental inspections of the facility have resulted in no major findings.

Although tritium processing increased during the licensing, tritium releases remain well within the licence limits. SRB strives to work towards emission reduction at all times.

Results from SRB's groundwater monitoring program and CNSC independent environmental monitoring and analysis confirm that the tritium in the groundwater near SRB does not pose any health risk to the workers, or the public.

3.9.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through routine CNSC inspections, supported by further CNSC independent environmental monitoring, and annual documentation reviews.

3.9.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA. SRB's improvement plan is to continue to effectively reduce emissions as much as possible. SRB will operate the facility to remain well within the existing licensed limits.

3.9.4 Conclusion

CNSC staff rate the Environmental Protection SCA as satisfactory. Over the last 5 years, the gaseous emissions and liquid effluents have remained well below the licence limits. The public dose represents a small fraction of the annual public dose limit of 1 mSv (1,000 μSv).

As documented in the *Environmental Assessment Information Report* (attached to this CMD as Addendum E), CNSC staff have determined that SRB's actions during the licensed period, including environmental monitoring, effluent and emissions control and monitoring activities to assess the accuracy of predictions and the effectiveness of mitigation measures, provide adequate controls for the protection of the environment and the public. Current inventories of tritium in the environment are related to past practices. The improving trends in groundwater quality are indicative of the effectiveness of SRB's improved control measures.

Overall CNSC staff conclude that SRB will make adequate provision for the protection of the environment.

3.9.5 Recommendation

One licence condition pertaining to Environmental Protection is included in the proposed licence, section VI, condition 10.1. For the next licence period, CNSC staff recommend to maintain the licence limits as found in Appendix A of the current licence. These and detailed compliance verification criteria for Environmental Protection are included under section 10 of the proposed LCH.

3.10 Emergency Management and Fire Protection

The SCA Emergency Management and Fire Protection covers emergency plans and emergency preparedness programs that exist for emergencies and for non-routine conditions.

This SCA also includes the requirement for the licensee to have a comprehensive fire protection program to minimize the risk to the health and safety of persons and to the environment from fire, through appropriate fire protection system design, fire safety analysis, fire safe operation and fire prevention.

The specific areas that comprise this SCA for SRB are:

- nuclear emergency preparedness and response
- fire emergency preparedness and response

3.10.1 Trends

The following table provides the annual ratings for Emergency Management and Fire Protection over the current licensing period:

EMERGENCY MANAGEMENT AND FIRE PROTECTION				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
The compliance rating for this area is satisfactory. During the licensing period, SRB has maintained appropriate programs and measures in place to effectively respond to an unlikely emergency or fire event. CNSC staff continue to incorporate aspects of emergency and fire response review during regular compliance inspections.				

3.10.2 Discussion

Nuclear Emergency Preparedness and Response

The areas assessed under this SCA for SRB include: nuclear emergency preparedness and response, and fire emergency preparedness and response. CNSC staff also consider any results of participation in exercises.

Following the March 11, 2011, earthquake and tsunami event in Japan, CNSC staff directed all licensees of Class I nuclear facilities, including SRB, to review the lessons learned from the event and submit their responses under subsection 12(2) of the *General Nuclear Safety and Control Regulations*. Following its review, SRB committed to update and revise its emergency plan (Ref. 13). CNSC staff reviewed SRB's revised *Emergency Management and Response Plan* document and found it to be acceptable.

SRB's emergency plan relies on external response assistance from the Pembroke Fire Department to deal with emergency at their facility. CNSC staff find this approach acceptable. SRB is planning a mutual aid emergency response exercise with the Pembroke Fire Department in early 2015. CNSC staff will assess SRB's performance related to emergency preparedness and response at the time of the exercise, and update the Commission on the results of CNSC staff's assessment during the public hearing.

In addition, CNSC staff have confirmed that the Pembroke Fire Department performs a yearly inspection of the facility and during those visits they include fire extinguisher training to SRB management and staff (which includes classroom theory and hands-on demonstration for each attendant), a building fire evacuation drill, and testing of the manual pull station alarm and the subsequent timing of the response by the fire alarm monitoring station to the alarm.

In October 2014, the CNSC published CNSC Regulatory Document, REGDOC 2.10.1 *Nuclear Emergency Preparedness and Response* which sets out the CNSC requirements related to the development of emergency preparedness program for Class I nuclear facilities. The CNSC requires emergency preparedness programs to be based on four components: planning basis; program management; response plan and procedures; and preparedness.

Following the publication of CNSC REGDOC 2.10.1, SRB undertook a review of its emergency preparedness measures and program against the CNSC new requirements as requested by CNSC staff. SRB is currently completing its gap analysis. In addition to the lessons learned through the upcoming emergency response exercise, this gap analysis will contribute to a revision of SRB's emergency plan document to meet the requirements of REGDOC 2.10.1, with a projected completion date of September 30, 2015.

CNSC staff will review SRB's gap analysis and incorporate aspects of the transition and timetable in the proposed LCH.

Fire Emergency Preparedness and Response

SRB has a Fire Protection Program in place to minimize both the probability of occurrence and the consequences of fire at the facility. The program has been established to comply with the requirements of the National Fire Protection Association, NFPA-801 *Fire Protection for Facilities Handling Radioactive Materials*, the *National Building Code of Canada*, the *National Fire Code of Canada* and the *General Nuclear Safety and Control Regulations*.

During this licensing period, SRB has submitted annual third party review reports of inspection, testing and maintenance of fire protection in accordance with their licence. These reports indicate that SRB is meeting requirements of the *National Fire Code of Canada* and NFPA 801.

In December 2013, standard CSA N393 *Fire protection for facilities that process handle, or store nuclear substances* was published. This standard is intended to replace NFPA 801 which is currently in SRB's operating licence. In the same way as NFPA 801, CSA N393 provides the minimum fire protection requirements for the design, construction, commissioning, operation, and decommissioning of facilities which process, handle, or store nuclear substances.

CNSC staff required SRB to perform a gap analysis assessing SRB's *Fire Protection Program* and associated reports and documents in comparison to the requirements specified in CSA N393. Overall the gap analysis found that the majority of the required elements described in the standard are incorporated within the existing SRB's *Fire Protection Program*, associated procedures, reports and documents. No major gaps were identified.

CNSC staff have reviewed the gap analysis and SRB's implementation plan for CSA N393. CNSC staff find SRB's plan and target completion date of July 31, 2015 acceptable. Aspects of the transition and timetable are included as compliance verification criteria in the proposed LCH.

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

Based on reviews of annual reports, and other documentation related to this SCA, CNSC staff have rated SRB'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 SRB's performance in this area through routine inspections and annual documentation reviews.

3.10.3.3 Proposed Improvements

As noted in section 3.10.2, SRB is reviewing its programs to meet the requirements of CSA N393 and REGDOC 2.10.1. CNSC staff will incorporate specific compliance verification criteria for the transition activities related to emergency preparedness and fire protection under section 11 of the proposed LCH.

3.10.4 Conclusion

CNSC staff concludes that SRB has an acceptable *Emergency Management and Response Plan*. SRB is currently reviewing it emergency preparedness program against the recently published CNSC REGDOC 2.10.1 and has committed to meet CNSC requirements by September 30, 2015.

With respect to fire protection, SRB continues to meet the conditions of the licence and CNSC staff's expectations. SRB is currently revising its program and processes to become compliant with CSA N393. CNSC staff find SRB's transition plan and target completion date of July 31, 2015 acceptable.

3.10.5 Recommendation

Two licence conditions pertaining to Emergency Management and Fire Protection are included in the proposed licence, section VI, conditions 11.1 and 11.2. Detailed compliance verification criteria are included under section 11 of the LCH.

3.11 Waste Management

The SCA Waste Management covers 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. It also covers the planning for decommissioning.

The specific areas that comprise this SCA for SRB are:

- waste management practices
- decommissioning plans

3.11.1 Trends

The following table provides the annual ratings for Waste Management over the current licensing period:

WASTE MANAGEMENT				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2013**
SA	SA	SA	SA	SA
Comments				
The compliance rating for this area is satisfactory. SRB maintains an adequate *Waste Management Program*. The preliminary decommissioning plan for the facility has been recently revised and has been found acceptable by CNSC staff.				

3.11.2 Discussion

Waste Management Practices

SRB continues to manage its tritium contaminated waste and hazardous waste in a manner that meets regulatory requirements.

The processes used to store, manage, process and dispose of radioactive waste are documented in SRB's *Waste Management Program*. The *Waste Management Program* was recently revised for continuous improvement and is currently under review by CNSC staff. Related requirements are also included in SRB's *Radiation Safety Program*.

All waste is packaged in approved containers and stored safe. Waste that does not meet the waste clearance criteria is transferred to licensed waste handling facilities as required.

Solid hazardous waste (i.e. non-radiological waste) consists of industrial items such as batteries, fluorescent light tubes, and aerosol cans. These are disposed of in accordance with municipal requirements.

Historically, the only liquid hazardous waste generated at the facility originated from the silk screening process. This process was modified in 2009, resulting in the elimination of this waste stream. SRB no longer generates liquid hazardous waste materials.

CNSC staff conduct routine compliance inspections that include waste management practices. Results from compliance inspections verify that SRB segregates, labels, handles and stores waste resulting from licensed activities in accordance with approved requirements.

Decommissioning Plan

The future decommissioning of a nuclear facility is required to be considered in all phases of the facilities life cycle. In practice, this consideration takes the form of a Preliminary Decommissioning Plan (PDP), which is required under the *Class I Nuclear Facilities Regulations,* subsection 3(k).

Licensees are required to maintain an acceptable PDP that sets out the manner by which the nuclear facility will be decommissioned in the future. The PDP must be kept current to reflect any changes in the site or facility, and meet the requirements of CSA standard N294-09: *Decommissioning of Facilities Containing Nuclear Substances* and the guidance of CNSC regulatory guide G-219: *Decommissioning Planning for Licensed Activities.* All PDP's are assessed by CNSC staff against these requirements. If found acceptable, CNSC staff make recommendations to the Commission for acceptance on the plan's cost estimate and related financial guarantee.

In November 2014, SRB provided a revised PDP (Ref. 14) for CNSC staff review. CNSC staff conclude that the submitted PDP meets the applicable regulatory requirements and provides an acceptable basis for decommissioning cost estimate. Additional information on cost estimates and financial guarantee is presented in section 4.4 of this document.

CNSC staff recommend that SRB review and update the decommissioning plan on a five-year cycle. Proposed detailed compliance verification criteria are included in the associated LCH section 12.2.

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

Based on their review of SRB's reports and submissions, and CNSC routine compliance inspections, CNSC staff have rated SRB's performance for the Waste Management SCA as satisfactory over the last 5 years. SRB provided an acceptable PDP for the facility in 2014.

3.11.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through routine CNSC inspections and annual documentation reviews.

3.11.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA. The PDP must be kept current to reflect any changes in the site or facility. Hence, CNSC staff recommend that SRB review and update the decommissioning plan on a five-year cycle as documented in the proposed LCH.

3.11.4 Conclusion

CNSC staff conclude that SRB's *Waste Management Program* manages the waste effectively to ensure the protection of the environment and the health and safety of persons. CNSC staff conclude that SRB's PDP meets all applicable regulatory requirements under the NSCA.

3.11.5 Recommendation

Two licence conditions pertaining to Waste Management are included in the proposed licence, section VI, conditions 12.1 and 12.2. Detailed compliance verification criteria are included under section 12 of the LCH.

3.12 Security

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

The specific areas that comprise this SCA for SRB are:

- facilities and equipment
- security practices
- response arrangements

3.12.1 Trends

The following table provides the annual ratings for Security over the current licensing period:

SECURITY				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
The compliance rating for this area is satisfactory. SRB has the programs in place to ensure the security of the facility.				

3.12.2 Discussion

SRB maintains a *Facility Security Program* that describes the security measures in place at SRB. The *Facility Security Program* was assessed by CNSC staff as satisfactory.

SRB has demonstrated compliance in this program area through the provision of adequate physical barriers, procedures, systems and devices to meet its security program requirements. SRB continues to maintain security systems and devices through its preventive maintenance program. All security alarms are field tested on a semi-annual basis and records of same retained for verification by CNSC staff.

SRB facility is inspected on a biannual basis to ensure it meets regulatory requirements. Findings, if any, are always addressed in a timely manner and to the satisfaction of CNSC staff.

SRB had no reportable security-related events over the licensing period.

3.12.3 Summary

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

3.12.3.1 Past Performance

Based on their review of SRB's reports and submissions, and CNSC routine compliance inspections, CNSC staff have rated SRB's performance for the Security SCA as satisfactory over the last 5 years.

3.12.3.2 Regulatory Focus

CNSC staff will continue to monitor SRB's performance in this area through routine CNSC inspections and documentation reviews.

3.12.3.3 Proposed Improvements

There are no changes anticipated in the near future for this SCA.

3.12.4 Conclusion

CNSC staff conclude that SRB has an acceptable security program in place that meets regulatory requirements and makes adequate provision for the maintenance of national security. CNSC staff continue ongoing compliance monitoring activities in the security area to verify that SRB's security program, including its implementation, continues to meet regulatory requirements.

3.12.5 Recommendation

One licence condition pertaining to Security is included in the proposed licence, section VI, condition 13.1. Detailed compliance verification criteria are included under section 13 of the LCH.

3.13 Safeguards and Non-Proliferation

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

3.13.1 Trends

Not available, as the SCA is not relevant to the CMD.

3.13.2 Discussion

The SCA 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 *Treaty on the Non-Proliferation of Nuclear Weapons*.

SRB possesses small quantities of depleted uranium for use in its process. While depleted uranium is classified as nuclear material under the *Canada/IAEA Safeguards Agreements* and as such is under IAEA safeguards, in this application it is exempt from routine IAEA verification. In the past, to ensure that CNSC staff could respond to any IAEA request concerning nuclear material in Canada, including depleted uranium in non-fuel cycle applications, safeguards licence conditions were included in SRB's operating licence. During the licensing period, the IAEA has not requested any additional information on SRB.

As part of the current licensing review, CNSC staff have determined that Canada's obligations under the *Treaty on the Non-Proliferation* can be better met via the *General Nuclear Safety and Control Regulations* paragraph 12(1)(*i*), which states that "Every licensee shall take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement". CNSC staff are thus recommending the removal of the safeguards licence condition from the proposed operating licence. This approach would bring SRB's licence in line with that of other licensees in similar situations.

The import and export of controlled nuclear substances, equipment and information identified in the *Nuclear Non-proliferation Import and Export Control Regulations*, require separate authorization from the CNSC, consistent with subsection 3(2) of the *General Nuclear Safety and Control Regulations*.

3.13.3 Summary

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

3.13.4 Conclusion

Based on SRB's licence application, CNSC staff conclude that SRB is prepared to comply with their obligations related to safeguards and non-proliferation as needed.

3.13.5 Recommendation

CNSC staff are recommending that the current Safeguards and Non-Proliferation licence conditions be removed from the proposed operating licence.

3.14 Packaging and Transport

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

The specific areas that comprise this SCA are:

- packaging and transport
- package design and maintenance
- registration for use

3.14.1 Trends

The following table provides the annual ratings for Packaging and Transport over the current licensing period:

PACKAGING AND TRANSPORT				
Overall Compliance Ratings				
2010	**2011**	**2012**	**2013**	**2014**
SA	SA	SA	SA	SA
Comments				
SRB is performing satisfactorily in the safety area of packaging and transport. There were no events reported under the *Packaging and Transport of Nuclear Substances Regulations* for consignments transported from the facility. CNSC compliance inspections resulted in no major findings.				

3.14.2 Discussion

The *Packaging and Transport of Nuclear Substances Regulations* 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.

SRB has developed and implemented a packaging and transport program that ensures compliance with the *Packaging and Transport of Nuclear Substances Regulations* and the *Transportation of Dangerous Goods Regulations* for all shipments leaving the site. SRB's packaging and transport program also covers elements of package design and maintenance as well as the registration for use of certified packages as required by the regulations.

In accordance with the *Transportation of Dangerous Goods Regulations*, SRB provides appropriate training for personnel involved in the handling, offering for transport and transport of dangerous goods at the facility. Through routine compliance inspections, CNSC staff verify that designated workers receive the required training and possess current training certificates.

CNSC staff also conducted one packaging and transport inspection at SRB during current licensing period, which resulted in no major findings.

There were no events reported under the *Packaging and Transport of Nuclear Substances Regulations* for consignments transported from the facility.

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

Based on their review of SRB's reports and submissions, and CNSC compliance inspections, CNSC staff have rated SRB's performance for the Packaging and Transport SCA as satisfactory over the last 5 years.

3.14.3.2 Regulatory Focus

Revised *Packaging and Transport of Nuclear Substances Regulations* are expected to be published in the near future. CNSC staff will review SRB's program and processes against the revised regulations once published.

3.14.3.3 Proposed Improvements

There are no specific improvements anticipated in the near future for this SCA.

3.14.4 Conclusion

Based on staff's assessments of SRB's program, supporting documents and past performance, CNSC staff conclude that SRB continues to comply with the requirements of the *Packaging and Transport of Nuclear Substances Regulations* and the *Transportation of Dangerous Goods Regulations*. As such, CNSC staff have rated SRB's performance as satisfactory for the current licensing period.

3.14.5 Recommendation

One licence condition pertaining to Packaging and Transport is included in the proposed licence, section VI, condition 14.1. Detailed compliance verification criteria are included under section 14 of the LCH.

4. OTHER MATTERS OF REGULATORY INTEREST

4.1 Aboriginal Consultation

The common law duty to consult with Aboriginal groups applies when the Crown contemplates actions that may adversely affect potential or established Aboriginal and/or treaty rights.

The CNSC ensures that all of its licensing decisions under the NSCA uphold the honour of the Crown and consider Aboriginal peoples' potential or established Aboriginal and/or treaty rights pursuant to section 35 of the *Constitution Act, 1982*.

4.1.1 Discussion

This proposed licence renewal involves activities occurring wholly within an existing industrial facility. CNSC staff conducted research to inform the preliminary identification of First Nation and Métis groups who may have an interest in this licence renewal.

The Algonquin of Ontario (Algonquins of Pikwakanagan), Kitigan Zibi Anishinabeg, Algonquin of Quebec (Algonquin Anishinabeg Tribal Council), and the Métis Nation of Ontario (MNO) were identified as all have previously expressed interest in being kept informed of CNSC licensed activities occurring in their traditional territories. Therefore, CNSC staff sent letters for information in December 2014 to the identified groups, providing them information regarding the licence renewal application, the opportunity to apply for participant funding and details regarding the Commission's public hearing. Follow-up phone calls were conducted to ensure they had received the letters and to answer any questions.

To date, CNSC staff have not been made aware of any concerns related to the licence renewal from the identified First Nation and Métis groups.

The CNSC is committed to continuing consultation activities with interested First Nation and Métis groups in relation to SRB and CNSC's regulation of the facility and its activities.

4.1.2 Conclusion

Based on the information received and reviewed to date, including the fact that the application includes no changes to current licensed activities, CNSC staff are of the opinion that the licence renewal is not expected to result in any adverse impacts to any potential or established Aboriginal and/or treaty rights. However, all of the identified First Nation and Métis groups have been encouraged to participate in the licence renewal application review process and in the public hearing to advise the Commission directly of any concerns they may have in relation to this licence application.

4.1.3 Recommendation

No specific licence condition is required for this matter.

4.2 Other Consultation

As per its normal public information process, CNSC staff informed the public via the CNSC website as well as web and print advertising in Pembroke that a Public hearing will be held to renew SRB's Nuclear Substance Processing Facility Operating Licence.

4.2.1 Discussion

The CNSC made available up to $35,000 through its Participant Funding Program (PFP) to assist members of the public, Aboriginal groups, and other stakeholders in providing value-added information to the Commission through informed and topic-specific interventions. This funding was offered to review SRB's licence renewal application as well as information regarding tritium and the environment related to SRB's operations, and to prepare for and participate in the Commission's public hearing.

The public, Aboriginal groups and other stakeholders were informed of the availability of participant funding through a series of public communications:

- posting of the PFP Funding Announcement on the PFP section of the CNSC website
- public information bulletin to subscribers of the CNSC website
- advertisements in on-line and local print media
- notification by letter to potentially interested Aboriginal groups

The deadline for applications was January 9, 2015. A Funding Review Committee, independent from CNSC staff, reviewed the funding applications received, and made recommendations on the allocation of funding to eligible applicants.

Based on recommendations from the Funding Review Committee, the CNSC awarded a total of $25,770 in participant funding to the following recipients, who are required to submit a written intervention and make an oral intervention at the Commission's public hearing:

- The First Six Years Organization
- Dr. Richard Osborne
- Dr. Brant Ulsh
- Lake Ontario Water Keeper and Ottawa River Keeper

4.2.2 Conclusion

Based on the above information, CNSC staff followed its process and the public have been encouraged to participate in the Commission's public hearing. The CNSC provided assistance to interested members of the public, Aboriginal Groups, and other stakeholders, through the PFP, to prepare for and participate in the Commission's public hearing.

4.2.3 Recommendation

No specific licence condition is required for this matter.

4.3 Cost Recovery

A Class I licensed nuclear facility is subject to the requirements of Part 2 of the *CNSC Cost Recovery Fees Regulations* (CRFR). Fees are normally charged on an annual basis and are paid by the licensee on a quarterly basis.

4.3.1 Discussion

At renewal in 2010, the Commission exempted SRB from subsection 24(2) of the NSCA and Part 2 of the *CNSC Cost Recovery Fees Regulations* (CRFR) to the extent to which the requirements apply to the timing of the payments of the prescribed fee arrears or adjustments (Ref. 8).

The exemption was temporary and conditional upon the payment of the fees, as per the schedule stipulated under Licence Condition 16.1 of the current operating licence.

SRB complied with the repayment schedule stipulated in the current licence. The final payment and total cost adjustments were paid on September 25, 2013. SRB is now in good standing with respect to *Cost Recovery Fees Regulations* requirements.

4.3.2 Conclusion

CNSC staff conclude that SRB is in good standing with respect to *Cost Recovery Fees Regulations* requirements for the facility. Based on SRB's previous performance, there are no concerns over payment of future cost recovery fees.

4.3.3 Recommendation

No specific licence conditions or requirement for additional licensing activity are required on this matter.

4.4 Financial Guarantees

The proposed licence requires the applicant to maintain a financial guarantee to fund the activities described in the preliminary decommissioning plan (PDP) that is acceptable to the Commission.

The applicant must report annually that the financial guarantee remains valid, in effect and adequate to fund the future decommissioning of the facility, as per the requirements documented in the proposed LCH.

CNSC Regulatory Document G-206, *Financial Guarantees for the Decommissioning of Licensed Activities* (CNSC G-206), sets out guidance on the development of financial guarantees for licensed facilities and activities. SRB's financial guarantee must comply with the criteria set out in G-206.

4.4.1 Discussion

A financial guarantee was approved by the Commission for SRB on June 28, 2008 based on the previous revision of the PDP. This financial guarantee of $550,476.00 was funded by installments made to an escrow account in October and April of each year with the last installment made in April 2014.

In November 2014, SRB provided a revised PDP (Ref 14). CNSC staff reviewed the revised PDP and concluded that it provided an acceptable basis for decommissioning cost estimate.

SRB updated its financial guarantee to provide a revised cost estimate for the activities that would be undertaken to decommission the facility in 2014 dollars. SRB has estimated the costs for decommissioning of its facility to be $652,488.00.

As a financial guarantee instrument, SRB proposes to continue to use a revised escrow agreement and a revised security and access agreement providing CNSC access to the funds. SRB proposes to fund the increase of $102,012.00 from the previous cost estimate of $550,476.00 by making six (6) equal installments of $17,002.00 to the escrow account over a three year period.

CNSC staff reviewed SRB's financial guarantee against the requirements of Regulatory Document G-206, *Financial Guarantees for the Decommissioning of Licensed Activities* and found it to meet regulatory requirements.

CNSC staff recommend that the Commission accepts SRB's revised financial guarantee as described in section 1.3 of the proposed LCH. CNSC staff will monitor SRB's payments to the escrow account in accordance with the requirements set out in the LCH.

4.4.2 Conclusion

CNSC staff conclude that SRB's financial guarantee meets the applicable regulatory requirements under the NSCA. SRB is required to review and update the cost estimate for decommissioning on a five-year cycle.

4.4.3 Recommendation

CNSC staff recommend that the Commission accepts the revised financial guarantee as outlined in section 1.3 of the proposed LCH.

One licence condition pertaining to financial guarantee for decommissioning is included in the proposed licence, section 1, condition 1.3. Detailed compliance verification criteria are included in the associated LCH section 1.3.

4.5 Improvement Plan and Significant Future Activities

As noted in section 3, SRB has developed improvement plans to address new CNSC requirements for management system, personnel training, emergency preparedness and fire protection. Requirements related to the transition activities are documented in the relevant sections of the LCH.

SRB has not notified CNSC staff of any additional improvements or significant future activities.

4.6 Licensee Public Information and Disclosure Program

A public information and disclosure program (PIDP) is a regulatory requirement for licence applicants. The primary goal of the program, as it relates to the licensed activities, 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, in order to improve their level of understanding. As a component, the program shall include a commitment to and protocol for ongoing, timely communication of information related to the licensed facility during the course of the licence period.

The public information program and its disclosure protocol shall be commensurate with the public's perception of risk and the level of public interest in the licensed activities. It 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.

4.6.1 Discussion

In reviewing and assessing SRB's PIDP, CNSC staff compared SRB's components against those set out in RD/GD-99.*3 Public Information and Disclosure*. CNSC staff's review findings are that SRB's PIDP meets all requirements and intentions outlined in RD/GD-99.3. SRB has undertaken several improvements to its PIDP, demonstrating a commitment to establish an atmosphere of openness and transparency regarding the health and safety of the public and the environment, as it relates to its licensed activities.

The program ensures that information about its operations is effectively communicated to the public. In doing so, SRB's program:

- identifies clear objectives
- targets multiple audiences such as local residents, elected representatives, media, business leaders, community organizations and Aboriginal groups
- is informed by ongoing dialogue with the community, media opinion, and public opinion surveys, to gauge the level of public interest and perceptions
- provides contact information for members of the public who want to obtain additional information or have a facility tour
- has a multi-approach public information strategy to disseminate information to target audiences and to the general public in Pembroke
- includes a public disclosure protocol for the timely release of information on topics of interest to the public

4.6.2 Conclusion

CNSC staff conclude that SRB has a satisfactory PIDP that meets expectations and that information related to the health, safety and security of persons and the environment, and other issues associated with the lifecycle of the facility is being effectively communicated to the public.

4.6.3 Recommendation

A licence condition requiring SRB to implement and maintain a PIDP is included in the proposed licence, section 1, condition 1.4. Detailed compliance verification criteria are included in the associated LCH section 1.4.

5. OVERALL CONCLUSIONS AND RECOMMENDATIONS

5.1 Overall Conclusions

CNSC staff have concluded the following with respect to paragraphs 24(4)(*a*) and (*b*) of the *Nuclear Safety and Control Act* (NSCA), in that SRB Technologies (Canada) Inc.:

1. Is qualified to carry on the activity authorized by the licence.
2. Will, in carrying out that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

5.2 Overall Recommendations

Therefore, CNSC staff recommend that the Commission accepts:

1. CNSC staff's assessment and conclusions identified in section 5.1 above.
2. Pursuant to section 24 of the NSCA, the Commission renews the Nuclear Substance Processing Facility Operating Licence NSPFOL-13.00/2025 for a 10-year period.
3. The Commission accepts the delegation of authority to CNSC staff as outlined in Part I section 1.2 of the LCH.
4. Pursuant to section 24 of the NSCA, the Commission accepts the revised financial guarantee set out in Part II section 1.3 of the LCH.

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11. SRB Technologies (Canada) Inc. *Release Limit Rationale in Support of Licence Application*, October 28, 2009 (e-Doc 4501907).
12. SRB Technologies (Canada) Inc *Review of Hypothetical Incident Scenarios*, February 22, 2008 (e-Doc 4501913).
13. S. Lesveque (SRB), Letter to D. Howard (CNSC), *Request pursuant to Subsection 12(2) of the General Nuclear Safety and Control Regulations: Lessons Learned from Japanese Earthquake*, April 29, 2011 (e-Doc 3974162).
14. SRB Technologies (Canada) Inc. *Preliminary Decommissioning Plan*, November 13, 2014 (e-Doc 4628632).

GLOSSARY

Acronym	Term
ALARA	As Low As Reasonably Achievable
BE	Below expectations
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CRFR	*Cost Recovery Fees Regulation*
CSA	Canadian Standards Association
DRL	Derived release limit
EA	Environmental assessment
FS	Fully satisfactory
GTLS	Gaseous Tritium Light Source
HT	Tritium Gas
HTO	Tritium as Tritium Oxide
LCH	Licence Conditions Handbook
LTI	Lost-time Injury
MNO	Métis Nation of Ontario
mSv	millisievert
NEW	Nuclear Energy Worker
NSCA	*Nuclear Safety and Control Act*
NSPFOL	Nuclear Substance Processing Facility Operating Licence
OPEX	Operating experience
PIDP	Public Information and Disclosure Program
PFP	Participant Funding Program
SA	Satisfactory
SAT	Systematic approach to training
SCA	Safety and control area
SRB	SRB Technologies (Canada) Incorporated
SSC	Structures, systems and components
TBq	Terabecquerel

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.

APPROACH TO ASSESSING AND MANAGING POTENTIAL RISK			
CONSEQUENCE	**MANAGEMENT/MONITORING APPROACH**		
Significant Impact	Considerable management of risk is required	Must manage and monitor risk with occasional control	Extensive management is essential. Constant monitoring and control
Moderate Impact	Occasional monitoring	Management effort is recommended	Management effort and control is required
Low Impact	Random monitoring	Regular monitoring	Manage and monitor
Probability of Occurrence	Unlikely to Occur	Might Occur	Expected to Occur

RISK RANKING SCALE					
L	Low Risk	**M**	Moderate Risk	**H**	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. RATING LEVELS

The following rating levels reflect a recent transition in the rating terminology used by the CNSC.

PREVIOUS RATING LEVEL	DESCRIPTION (CMD 02-M5)	CURRENT RATING LEVEL	DESCRIPTION
A	Exceeds expectations	**FS**	Fully Satisfactory
B	Meets expectations	**SA**	Satisfactory
C	Improvement is required	**BE**	Below Expectations
D	This area is seriously compromised	**UA**	Unacceptable
E	Breakdown		

Note: For SCAs with a security classification of "PROTECTED B" or higher, the classification is indicated in place of the rating level.

Fully Satisfactory (FS)

Compliance with regulatory requirements is fully satisfactory. Compliance within the area exceeds requirements and CNSC expectations. Compliance is stable or improving, and any problems or issues that arise are promptly addressed.

Satisfactory (SA)

Compliance with regulatory requirements is satisfactory. Compliance within the area meets requirements and CNSC expectations. Any deviation is only 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)

Compliance with regulatory requirements falls below expectations. Compliance within the area 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 or applicant is taking appropriate corrective action.

Unacceptable (UA)

Compliance with regulatory requirements is unacceptable, and is seriously compromised. Compliance within the overall area 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 an 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 SRB's management system includes the following:

- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 3(*d*) that an application for a licence for a Class I nuclear facility shall contain the proposed quality assurance program for the activity to be licensed.
- The *General Nuclear Safety and Control Regulations* requires 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:

- It is a requirement of the *General Nuclear Safety and Control Regulations* under section 12, that the licensee shall:
  - 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.

- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 6(*m*) that a licence application contains information on the proposed responsibilities of and the qualification requirements and training program for workers, including the procedures for the requalification of workers.
- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 6(*n*) that a licence application contains information on 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.

Operating Performance

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

- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 6(*d*) that an application for a licence to operate a Class I nuclear facility shall contain 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:

- 3(1)(*i*) of the *General Nuclear Safety and Control Regulations* requires that an application for a licence shall contain a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.
- It is a requirement of the *Class I Nuclear Facilities Regulations* that an application for a licence to operate a Class I nuclear facility shall contain the following information 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.
- Other requirements set out in paragraphs 3(*a*), 3(*b*), 6(*a*) and 6(*b*) of the *Class I Nuclear Facilities Regulations* require more specific information to be submitted in the licence application related to the site and design of the facility and the final safety analysis report.
- Paragraphs 6(*c*) and 6(*d*) of the *Class I Nuclear Facilities Regulations* require that an application for a licence contain a final safety analysis report demonstrating the adequacy of the design of the facility and 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:

- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 6(*d*) that an application for a licence to operate a Class I nuclear facility contain the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

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* require, under sections 4 to 6, that the licensee implements a radiation protection program, ascertain and record doses, and take the required actions in the case that an action level has been reached.
- The *Class I Nuclear Facilities Regulations* require that an application for a licence to operate a Class I nuclear facility contain:
  - Under paragraph 6(*e*), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.

- Under paragraph 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:

- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 3(*f*) that an application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain the proposed worker health and safety policies and procedures.
- SRB's activities and operations must comply with Part II of the *Canada Labour Code*.

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.
- In addition, sections 3 and 6 of the *Class I Nuclear Facilities Regulations* must be met by the applicant. The 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.

- The operating licence requires SRB to control, monitor and record releases of nuclear substances from the facility and that the releases shall not exceed the limits found in the licence.

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".
- It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 6(*k*) that a licence application contains 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 off-site authorities in planning and preparing to limit the effects of an accidental release.
  - Notify off-site authorities of an accidental release or the imminence of an accidental release.
  - Report information to off-site authorities during and after an accidental release.
  - Assist off-site authorities in dealing with the effects of an accidental release.
- Test the implementation of the measures to prevent or mitigate the effects of an accidental release.

Waste Management

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

- It is a requirement of the *General Nuclear Safety and Control Regulations* under paragraph 3(1)(*j*) that an application for a licence include 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.*

Safeguards and Non-Proliferation

The regulatory foundation for the recommendation(s) associated with Safeguards and Non-Proliferation includes the following:

- It is a requirement of the *General Nuclear Safety and Control Regulations* under paragraph 12(1)(*i*) that each licensee take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement, where the applicable agreements are:
  - The *Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.*
  - The *Protocol Additional to the Agreement between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons.*

Packaging and Transport

SRB is required to comply with the *Packaging and Transport of Nuclear Substances Regulations* and Transport Canada's *Transportation of Dangerous Goods Regulations*.

Preliminary Decommissioning Plan and Financial Guarantees

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

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

- Paragraph 3(*k*) of the *Class I Nuclear Facilities Regulations* requires that an application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain the proposed plan for the decommissioning of the nuclear facility or of the site.

Licensee's Public Information Program

It is a requirement of the *Class I Nuclear Facilities Regulations* under paragraph 3(*j*) that an application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain information on the licensee's public information program

C.2 Technical Basis

The technical basis for recommendations, including several guidance documents, national standards and regulatory documents, presented in this CMD, is addressed in details in the LCH.

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 (refer to Addendum A of the Guide to Writing Commission Member Documents).

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	**Safety and Control Area**	**Definition**
Management	Management System	Covers the framework which establishes the processes and programs required to ensure an organization achieves its safety objectives and continuously monitors its performance against these objectives and fostering a healthy safety culture.
	Human Performance Management	Covers activities that enable effective human performance through the development and implementation of processes that ensure 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.
Facility and Equipment	Safety Analysis	Maintenance of the safety analysis that supports that overall safety case for the facility. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a 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 into account changes in the external environment.

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	**Safety and Control Area**	**Definition**
	Fitness for Service	Covers activities that impact on the physical condition of systems, components and structures to ensure that they remain effective over time. This includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.
Core Control Processes	Radiation Protection	Covers the implementation of a radiation protection program in accordance with the RP Regulations. This program must ensure that contamination and radiation doses received are monitored and controlled.
	Conventional Health and Safety	Covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.
	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 *Treaty on the Non-Proliferation of Nuclear Weapons.*

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	**Safety and Control Area**	**Definition**
	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 SRB.

SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	**Safety and Control Area**	**Specific Areas**
Management	Management System	▪ Management System ▪ Organization ▪ Performance Assessment, Improvement and Management Review
	Human Performance Management	▪ Personnel Training
	Operating Performance	▪ Conduct of Licensed Activity ▪ Reporting and Trending
Facility and Equipment	Safety Analysis	▪ Hazard Analysis
	Physical Design	▪ Design Governance ▪ Facility Design
	Fitness for Service	▪ Equipment Fitness for Service/Equipment Performance ▪ Maintenance
Core Control Processes	Radiation Protection	▪ Application of ALARA ▪ Worker Dose Control ▪ Radiation Protection Program Performance ▪ Radiological Hazard Control ▪ Estimated Dose to Public

SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	**Safety and Control Area**	**Specific Areas**
	Conventional Health and Safety	▪ Performance ▪ Practices ▪ Awareness
	Environmental Protection	▪ Effluent and Emissions Control (releases) ▪ Environmental Management System (EMS) ▪ Assessment and Monitoring ▪ Protection to the Public
	Emergency Management and Fire Protection	▪ Nuclear Emergency Preparedness and Response ▪ Fire Emergency Preparedness and Response
	Waste Management	▪ Waste Management Practices ▪ Decommissioning Plans
	Security	▪ Facilities and Equipment ▪ Response Arrangements ▪ Security Practices
	Safeguards and Non-Proliferation	Not applicable
	Packaging and Transport	▪ Package Design and Maintenance ▪ Packaging and Transport ▪ Registration for Use

E. SUPPORTING DETAILS

Environmental Assessment Information Report:
SRB Technologies (Canada) Inc.
Nuclear Substance Processing Facility Operating Licence Renewal

e-Doc 4578578 (Word)

Canada's Nuclear Regulator

Environmental Assessment Information Report: SRB Technologies (Canada) Inc. Nuclear Substance Processing Facility Operating Licence Renewal

March 2015
e-Doc 4578578 (Word)

e-Doc 4578578

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canada

EXECUTIVE SUMMARY

The Canadian Nuclear Safety Commission (CNSC) conducts environmental assessments (EAs) under the *Nuclear Safety and Control Act* (NSCA) for all projects in accordance with its mandate to ensure the protection of the environment and the health of people. This EA Information Report, written by CNSC staff for the Commission and the public, describes the findings of the EA review completed for the application by SRB Technologies (Canada) Inc. (SRB) to renew their existing CNSC licence.

The EA focused on items that are of current public and regulatory interest such as effluent releases, public dose calculations, and specific environmental components. Environmental effects reviews have been conducted under the *Nuclear Safety and Control Act* since 2000. One previous EA under the *Canadian Environmental Assessment Act, 1992* was conducted for SRB in 2001 and the findings have been summarized in this EA Report.

SRB is currently operating under Nuclear Substance Processing Facility Operating Licence NSPFOL-13.00/2015, which will expire on June 30, 2015. In September 2014, SRB submitted its Nuclear Substance Processing Facility Operating Licence Renewal Application to the CNSC.

Based on the EA conducted for the SRB licence renewal, CNSC staff conclude that SRB has and will continue to make adequate provision for the protection of the environment and health and safety of persons. The results from the environmental compliance monitoring program, as part of normal regulatory oversight, were used to ensure that SRB will be in compliance with CNSC requirements.

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1.0 BACKGROUND

SRB Technologies (Canada) Incorporated (SRB) is a gaseous tritium light source (GTLS) manufacturing facility. SRB uses tritium to produce GTLS and manufactures 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.

SRB is located in Pembroke, Ontario, approximately 150 km northwest of Ottawa (figure 1) and leases a space in an industrial building of a small industrial park (figure 2). The closest residence is located approximately 225 metres from the facility. SRB has two stacks releasing tritium from the facility, released as tritium gas (HT) and tritiated water (HTO). SRB also releases tritium, in the form of HTO, in batches to the sewer system as liquid effluent. This liquid effluent is sampled prior to being discharged.

Figure 1: Location of SRB Technologies, Pembroke, ON

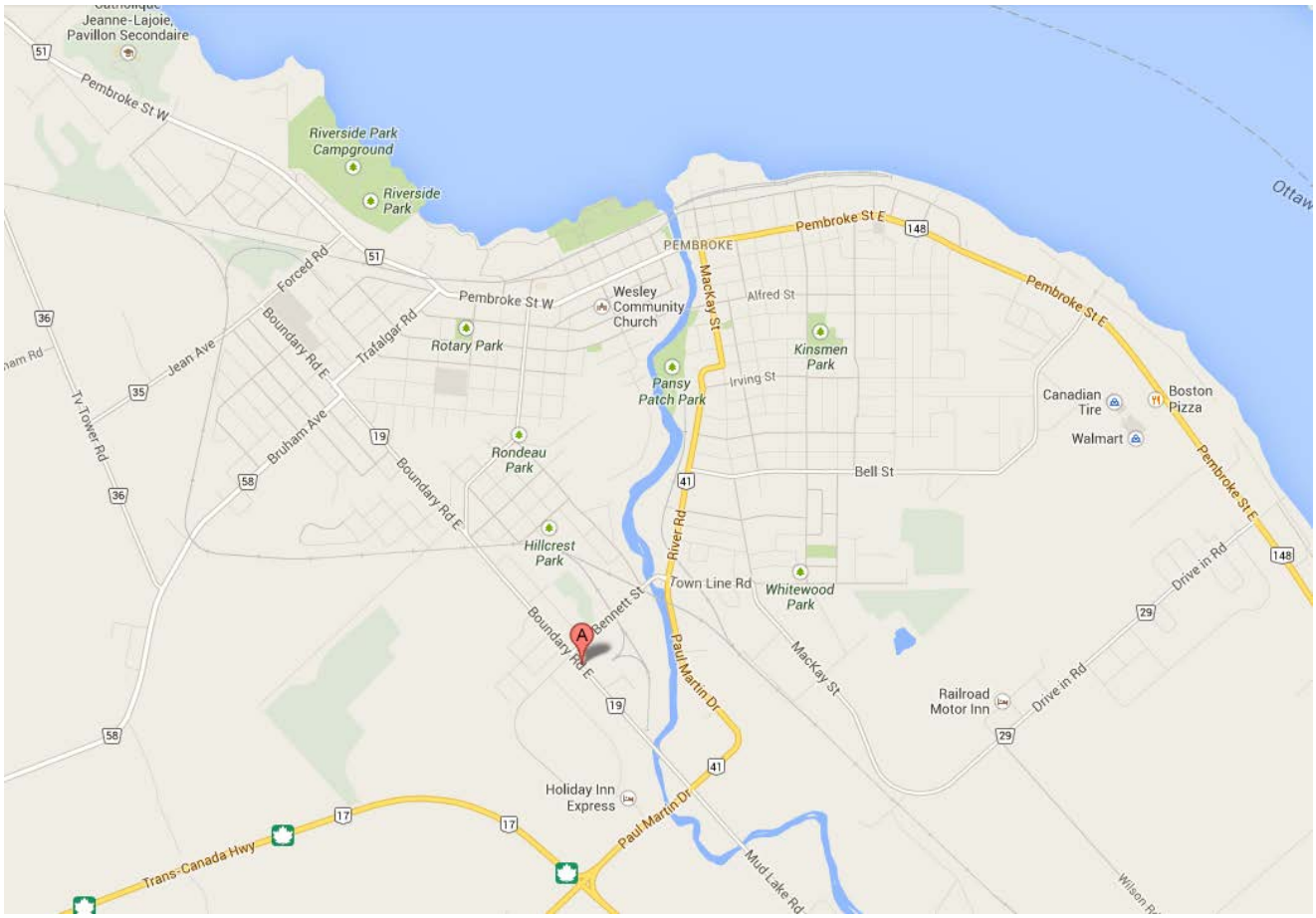


Figure 2: SRB Technologies Facility, Pembroke, ON

The SRB facility has been in operation since 1990 possessing a nuclear substance licence and, in 2000 was issued a Class 1B Nuclear Substance Processing Facility Operating Licence. The current licence, NSPFOL-13.00/2015, was issued in July 2010 and will expire on June 30, 2015. In September 2014, SRB submitted an application to the CNSC for a 10-year Nuclear Substance Processing Facility Operating Licence.

The CNSC conducts environmental assessments (EAs) for all licensing actions under the *Nuclear Safety and Control Act (*NSCA), in order to ensure adequate provisions will be made for the protection of the environment and the health of people. In accordance with the NSCA, CNSC staff assess the detailed design of environmental protection programs that include monitoring, compliance and adaptive management measures that will be implemented to ensure adequate provisions are made for the protection of the environment and the health of people. This is done in a manner consistent with Canadian environmental policies, Acts and regulations and with Canada's international obligations.

This EA Report is based on information submitted by SRB, CNSC staff reviews, independent environmental monitoring results, and includes the following:

- regulatory requirements (section 2)
- environmental protection (section 3)
- status of the current environment (section 4)
- consultation and engagement (section 5)

2.0 REGULATORY REQUIREMENTS

The following provisions of the NSCA and the regulations made under the NSCA are relevant to this EA and were considered by CNSC staff during reviews of SRB submissions:

- subsection 24(4) of the NSCA states that "No licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee:

  (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on
  and
  (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed

- paragraphs 12(1)(*c*) and (*f*) of the *General Nuclear Safety and Control Regulations* state that "every licensee shall:

  (a) 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
  (b) 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 as a result of the licensed activity

- subsection 1(3) of the *Radiation Protection Regulations* that prescribe dose limits for the general public, which is 1 mSv per calendar year

- sections 3 and 6 of *the Class I Nuclear Facilities Regulations.* The application for a licence shall contain under paragraphs 3:

  (a) 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
  (b) the proposed environmental protection policies and procedures
  (c) the proposed effluent and environmental monitoring programs

- The application for a licence shall contain under paragraphs 6:

  (a) the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances
  (b) 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
  (c) 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
  (d) the proposed measures to control releases of nuclear substances and hazardous substances into the environment

2.1 General Policies and Principles

The CNSC regulates nuclear facilities and activities in Canada to prevent unreasonable risk to the environment in a manner that is consistent with Canadian environmental policies, Acts (including the NSCA) and regulations and with Canada's international obligations.

CNSC staff review submissions to ensure that the licensee does not pose an unreasonable risk to the environment. The licensee must demonstrate that:

- provisions to protect the environment are adequate (to be demonstrated through performance assessments, monitoring or other evidence)
- measures taken to protect the environment:
  - are commensurate with the level of risk associated with the activity
  - recognize that variability exists in potentially adverse environmental effects as a consequence of differences in regulated activities, substances, equipment, facilities, the environment and its human components
  - recognize that uncertainty exists in science, and therefore prevent unreasonable risk by keeping all releases to the environment as low as reasonably achievable (ALARA), social and economic factors being taken into account for nuclear substances
  - respect the *Canadian Environmental Protection Act, 1999* and its principles of pollution prevention, precautionary approach, polluter pays, sustainable development and adaptive management
  - are judged against performance indicators and targets that are based on sound science

3.0 PREVIOUS ENVIRONMENTAL ASSESSMENTS AND REVIEWS

The CNSC conducts EAs for proposed nuclear projects under the NSCA to determine whether the proponent will, in carrying out the activity, make adequate provisions for the protection of the environment and the health of people under the NSCA. The purpose of an EA is to identify the possible environmental effects of a proposed project, and determine whether these effects can be mitigated before the project is allowed to proceed. Under the NSCA no decision is rendered on the EA itself, as the information is intended to support the regulatory decision being sought.

A review of environmental impacts using Environmental Risk Assessment (ERA) and Human Health Risk Assessment (HHRA) has been completed under the NSCA at every licensing renewal and /or amendment since the NSCA came into force in 2000.

In 2000, SRB applied to the CNSC for authorization to continue its tritium light manufacturing and tritium light recovery operations at its facility in Pembroke, Ontario. No new construction activities were planned for this project, and no changes to existing approved operations were proposed. The project was subject to a screening-level EA under the *Canadian Environmental Assessment Act, 1992*. CNSC, as a Responsible Authority (RA), delegated to SRB the conduct of the technical support studies for the EA, and the public consultation program. The CNSC conducted a technical review of the technical support documents and prepared an EA screening report [1]. In February 2001, the Commission accepted the CNSC staff proposed EA screening report and concluded, pursuant to the CEAA 1992, that the project, taking into account the appropriate mitigation measures, was not likely to cause significant adverse environmental effects [2].

The EA process identified the requirement for an EA Follow-Up Monitoring Program (FUMP) which would consist of the continuation of the current environmental monitoring program (EMP) (i.e., stack monitoring and worker radiation dose monitoring programs) with modifications where appropriate such as additional precipitation monitoring. The requirements of the FUMP were incorporated into SRB's annual compliance and performance reports.

4.0 STATUS OF THE ENVIRONMENT

This section includes information on items that are of current regulatory and public interest and are a summary of some of the information that is used by CNSC staff to reach the conclusion that the environment is protected from the operations at SRB. CNSC staff verify SRB's environmental performance by reviewing monitoring results on effluent releases (air and liquid) and levels of radioactivity in soils and vegetation which are provided in the licensee's quarterly and annual reports and other submissions. CNSC staff also conducts independent monitoring near the SRB site and information on the Independent Environmental Monitoring Program (IEMP) is provided in section 4.5.

CNSC staff have conducted several research projects that have helped to improve the modeling of the fate and behaviour of tritium in the Pembroke environment [3][4][5]. CNSC staff have also completed many initiatives under the Tritium Studies Project, to enhance the information used in the regulatory oversight of tritium processing and tritium releases in Canada. More information on these CNSC initiatives can be found on the CNSC website at: nuclearsafety.gc.ca/eng/resources/health/tritium/tritium_studies.cfm

4.1 Annual Environmental Monitoring Report

SRB is required to submit an annual compliance and performance report that includes details on the results of the effluent and EMPs related to its operations. SRB's EMP includes monitoring tritium concentrations at various locations: in drinking water wells and numerous other monitoring (groundwater) wells, in milk and produce, in air, and in nearby surface water. The monitoring programs focus on radiological substances and quantify the effect on human and non-human biota. Information in the following sections is taken from the 2013 Annual Compliance and Performance Report [6], unless stated otherwise.

In 2011, in its annual status report to the Commission, SRB submitted a Conceptual Model Document [7]. This document complemented previous environmental assessment information by providing a clear representation of current and predicted groundwater conditions that have arisen from past practices.

4.1.1 Derived Release Limits, Licence Release Limits, and Action Levels

Operational Licence Release Limits (LRLs), Derived Release Limits (DRLs) and Action Levels (ALs) are used to control radiological releases from SRB. The DRL is a limit on the release of a radioactive substance from a licensed nuclear facility under normal operations that gives reasonable assurance that the regulatory public dose limit of 1 mSv per year is not exceeded.

SRB's current DRL values are based on the 2006 DRL Report [8]. SRB's LRLs for airborne and liquid releases are even lower than the DRLs, and are based on an environmental protection target for groundwater of 5,250 Bq/L (25% less than the Canadian Drinking Water Quality Guideline of 7,000 Bq/L). Exceedances of the ALs triggers reporting to the CNSC, a formal investigation to be undertaken by SRB and depending on SRB's investigation results, may result in enhanced regulatory oversight by the CNSC.

Throughout the licensing period, SRB airborne and waterborne releases of nuclear substances remained well below DRLs and LRLs.

ALs serve as an early warning system to ensure that the licensee is carefully monitoring their operation and performance. They are used to indicate a potential loss of control of the environmental or radiation protection programs. They identify results conservatively predicated to be outside of expected normal operation, so that necessary actions can be taken to restore the effectiveness of the program to ensure LRLs are not exceeded.

Unlike DRLs and LRLs which are established based on an annual basis, ALs are established on an operational basis. Therefore, ALs are compared to weekly monitoring data for atmospheric releases, and monthly monitoring data for liquid effluent releases. Exceedances of ALs trigger reporting to the CNSC, followed by an investigation by the licensee to determine if subsequent corrective actions and/or preventative measures are required to be taken to restore the effectiveness of the programs.

4.1.2 Radiological Releases

SRB continues to implement and maintain an effective environmental protection program at the SRB facility in accordance with CNSC regulatory requirements.

CNSC staff complete compliance verification inspections of the effluent and emission monitoring programs on a scheduled basis. SRB radiological releases to the environment (air and water) remained well below its respective LRLs during the current licensing period.

4.1.2.1 Radiological Releases to Sewer (Liquid Effluent)

SRBs radiological releases to the sewer system remain below regulatory limits. Table 1 shows the radiological releases to the sewer system from 2010 to 2014, and demonstrates that liquid effluent from the facility continues to be effectively controlled and that tritium releases are consistently below the licence limit.

Table 1: Liquid effluent monitoring results, 2010–2014

Parameter	2010	2011	2012	2013	2014	Licence Release limit (TBq/yr)
Tritium-water soluble, TBq/yr	0.007	0.008	0.012	0.009	0.012	0.200

4.1.2.2 Radiological Releases to Air (Gaseous Effluent)

SRB has a total of 40 passive tritium-in-air samplers located within a two-kilometer radius of the facility. These samples provide the average concentration of tritiated water in air; and do not measure HT in air, due to HT being a very low contributor to dose. The samples are collected and analyzed by a qualified third-party laboratory, to obtain monthly averages.

The passive air samplers represent tritium exposure pathways for inhalation and skin absorption and are used to calculate the associated public dose. The results obtained from the passive samplers demonstrate that tritium levels in air are low and consistent with the monitored air emissions which are well below SRB's LRLs.

SRB's radiological releases to air remain below LRLs. Table 2 provides the radiological releases to air from SRB for 2010 to 2014. The increase in total tritium released to air between 2012 and 2013 is due to a three-fold increase in tritium processing at SRB (10,224 TBq/year and 30,544

TBq/year, respectively). Emission reduction initiatives have been successful in reducing the ratio of tritium released to atmosphere versus processed from 0.55% in 2010 to 0.26% in 2013. This ratio was as high as 1.70% in 2008.

Airborne HTO is the principal radiological emission associated with dose to the public and it remains very low at the SRB site (maximum calculated dose of 7µSv/year).

There were no AL exceedances at any time from 2010 to 2013, however during the period of October 28 to November 4, 2014, there was a gaseous tritium action level exceedance of the weekly action level for total tritium of 7,753 GBq. The release represents 3.7% of the annual release limit for total tritium. SRB conducted an investigation into this exceedance to identify contributing causes and root causes. SRB's investigation concluded that the higher tritium emissions were related to a gaseous tritium light source leakage and a manifold gauge leak. CNSC staff have reviewed SRB's investigation report and proposed corrective actions and found both to be acceptable.

Table 2: Atmospheric emissions monitoring results, 2010–2014

Parameter	2010	2011	2012	2013	2014	Licence Release limit (TBq/yr)
Tritium as tritium oxide (HTO), TBq/yr	9.17	12.50	8.40	17.82	10.71	67
Total tritium as HTO + tritium gas (HT), TBq/yr	36.43	55.68	29.90	78.88	66.16	448

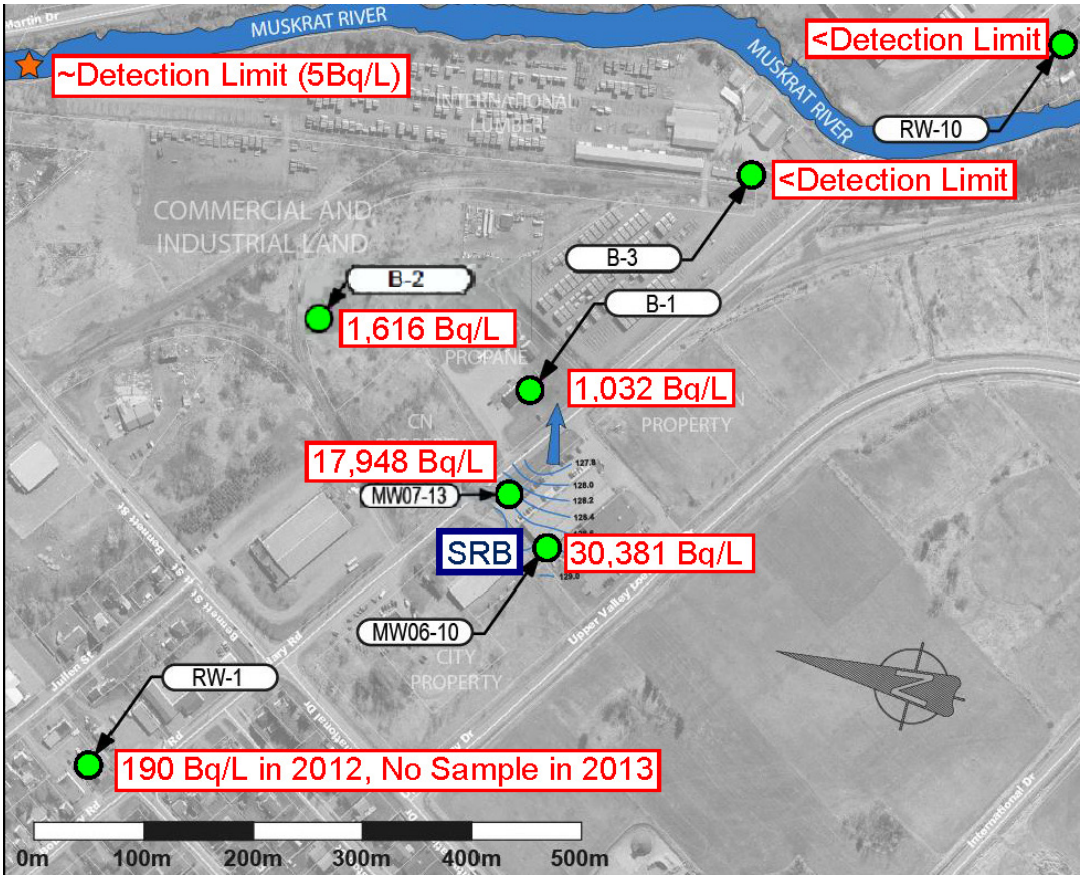
CNSC staff concluded that there is no risk to the environment or the health and safety of people posed by tritium in air.

4.2 Tritium in Groundwater

Groundwater has been sampled in 57 monitoring wells around SRB, including residential wells, business wells and wells for the sole purpose of measuring tritium concentrations. The highest tritium concentration continues to be in well MW06-10, which is located near the SRB stacks. In 2013, it had an average of 30,381 Bq/L - a 23% decrease from 2012, and a maximum of 62,932 Bq/L- a decrease of 8% from 2012. These values are restricted to a small area adjacent to the SRB building and represent past releases from the facility. Tritium concentrations decrease significantly at locations further away from SRB, as shown in figure 3. The highest tritium concentration in a potential drinking water well was found in business well B-2, averaging 1,616 Bq/L in 2013. SRB continues to provide bottled drinking water to this business, even

though the tritium concentrations remain well below the Ontario Drinking Water Standard of 7,000 Bq/L.

Figure 3: Annual average tritium concentrations in groundwater around SRB in 2013



Since its last licence renewal in 2010, SRB completed a groundwater study [7], which confirmed that the residential wells (with highest tritium concentration of 226 Bq/L for 2013) and the Muskrat River (with tritium concentrations for the last two years in the range of 3.2 – 22 Bq/L) are not at risk of exceeding the Ontario Drinking Water Standard of 7,000 Bq/L, neither currently nor in the future.

During SRB's application for the renewal of the Class IB Licence to operate in 2010, there were some concerns on the uprising trend of tritium in the groundwater around the facility. To address the concerns, CNSC staff conducted an independent modeling assessment in early 2010 [9] [10]. The assessment confirmed SRB's conclusion that the elevation of tritium concentrations at MW06-10 was mainly caused by high tritium concentrations in the soil due to historical practice. CNSC staff modeling [9] [10] also predicted that while some monitoring wells were showing an upward trend, they would come down as tritium in the soil is gradually flushed out by infiltrated precipitation, and eventually stabilize in a few years.

The monitoring data collected by SRB since the last licence renewal continue to be within the range predicted from CNSC staff's modeling assessment conducted in 2010, as shown in figures 4 and 5, using the two monitoring wells in close proximity to SRB as an example. The relatively good match between the modeling results and measurements provides validation to CNSC staff's 2010 prediction on the behaviors of tritium in the groundwater system. It also demonstrates that releases of tritium resulting from SRB's operation are under control and the tritium movement in groundwater around the SRB facility is well understood. A similar trend is seen in the average groundwater quality around SRB with tritium concentrations stabilizing/decreasing, and not posing a risk to human health or to the environment.

Figure 4: Predicted vs measured tritium concentrations at MW06-10

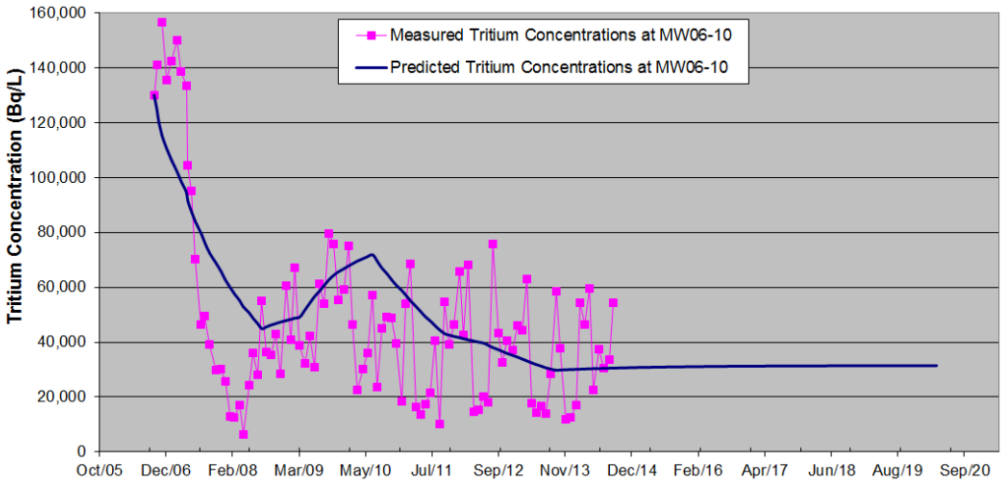
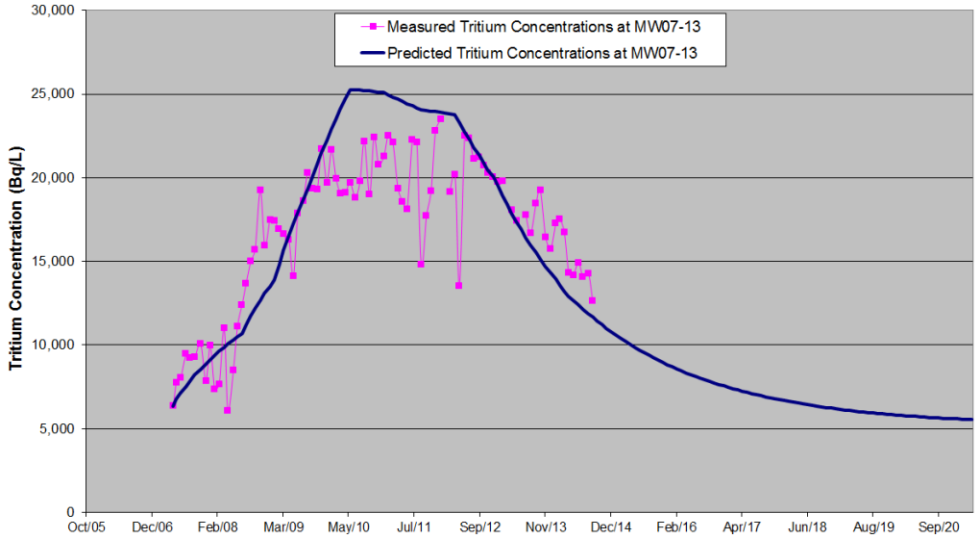


Figure 5: Predicted vs measured tritium concentrations at MW07-13



In summary, the increasing trend of tritium concentrations in the groundwater system around SRB observed prior to early 2010, mainly caused by earlier practice, has stopped and the tritium concentrations have been stabilizing over the years, as was predicted by CNSC staff during the Commission Hearing for the last licence renewal. SRB's operation has not adversely impacted the groundwater quality, and the groundwater quality around SRB continues to improve.

4.3 Other Environmental Monitoring

SRB engages a qualified third party to perform monitoring and analysis of precipitation, runoff, surface water, produce, milk and wine. This provides an elaborate monitoring scheme which is used to observe and study the surrounding environment and to complement the principal monitoring activities which focus on air and groundwater. The results of this environmental monitoring are used in determining doses to the public as discussed in section 4.4.

Upon reviewing this data, CNSC staff can confirm that the public and the environment in the vicinity of SRB are protected from the releases from the facility.

4.3.1 Precipitation Monitoring

Eight precipitation monitors are located near the existing air monitoring stations that are located approximately 250 m from the facility. The samples are collected on a monthly basis and analysed. The average results for the last 5 years are presented in table 3. No particular trend in the precipitation results can be established based on releases from the facility since the facility does not process tritium when there is precipitation.

Table 3: Precipitation monitoring results, 2009–2013

Parameter	2009	2010	2011	2012	2013
HTO Bq/L (Average)	106	82	76	55	103

4.3.2 Runoff Monitoring

There are 6 downspouts located at the facility. Runoff from the downspouts is collected during all precipitation events. The average results for the last 5 years are presented in table 4. No particular trend in the runoff results can be established based on releases from the facility since the facility does not process tritium when there is precipitation.

Table 4: Runoff from downspouts results, 2009–2013

Parameter	2009	2010	2011	2012	2013
HTO Bq/L (Average)	392	248	492	385	798

4.3.3 Surface Water Monitoring

The monitoring of surface water is performed in the Muskrat River, downstream of the facility, 5 to 6 times per year. The results for the last 5 years have been near the minimum detection limit (approximately 5 Bq/L). Therefore, CNSC staff can conclude that the Muskrat River is not impacted by atmospheric releases of tritium.

4.3.4 Produce Monitoring

Produce monitoring is conducted on an annual basis. Produce is obtained from local gardens and markets. The average results from local gardens for the last 5 years are presented in table 5. No particular trend can be established from the data with respect to releases.

Table 5: Produce monitoring results, 2009–2013

Parameter	2009	2010	2011	2012	2013
HTO Bq/L (Average)	90	78	85	48	91

4.3.5 Milk Monitoring

The monitoring of milk is done every four months. Milk is obtained from a local producer and a local distributor. The average results are presented below in table 6. No particular trend can be established from the data with respect to releases since the tritium levels in milk are low.

Table 6: Milk monitoring results, 2009–2013

Parameter	2009	2010	2011	2012	2013
HTO Bq/L (Average)	13	7	7	6	5

4.3.6 Wine Monitoring

Wine monitoring is conducted annually, and the wine is obtained from a local producer. The results are presented below in table 7. No particular trend can be established from the data since the numbers are very low.

Table 7: Wine monitoring results, 2009–2013

Parameter	2009	2010	2011	2012	2013
HTO Bq/L (Average)	10	11	13	7	8

4.4 Monitoring to Determine Public Dose

The dose received by persons as a result of exposure to tritium depends on the amount of tritium taken into the body. This in turn depends on the concentration of tritium in various environmental media to which individuals may be exposed, such as air, drinking water, fruits and vegetables, as well as the amount water and produce consumed.

The calculation method used to determine the dose to the representative person, is described in the SRB EMP document using the effective dose coefficients found in CSA N288.1-08, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities* [11]. A representative person is defined as a person having the average characteristics of a group of individuals who are likely to receive the highest exposures to tritium, given their location and habits. The dose assessed for the representative person is a sum of the following exposure pathways:

- inhalation and absorption through skin at the place of residence and/or the place of work
- consumption of well water
- consumption of produce
- consumption of dairy products

There are no releases of hazardous substances (non-radiological) to the environment from SRB that would pose a risk to the public or environment. For releases of nuclear substances (radiological), the public dose has not exceeded 7 µSv/yr during the last 5 years. Table 8 presents the different pathways that contributed to a dose of approximately 7 µSv/yr to an adult worker. The annual dose accounts for exposures to tritium in the form of tritiated water, tritium gas, and organically bound tritium.

Based on the review of dose data, CNSC staff are satisfied that SRB is adequately controlling radiation doses to members of the public to levels well below regulatory limits.

Table 8: 2013 Critical group annual dose due to tritium uptake based on EMP

Exposure Pathways	Annual Dose, µSv/yr
Inhalation at work	0.44
Skin absorption at work	0.44
Inhalation at residence[1]	0.91
Skin absorption at residence[2]	0.91
Consumption of well water	3.70
Consumption of produce	0.36
Consumption of milk	0.02
Total dose due to tritium uptake	**6.78**

[1]Based on the IEMP results of tritium in air presented in table 9, and using conservative assumptions based on CSA N288.1-14, the calculated dose to a resident from exposure via the inhalation exposure pathway is 1.41 µSv/yr
[2]Based on the IEMP results of tritium in air presented in table 9, and using conservative assumptions based on CSA N288.1-14, the calculated dose to a resident from exposure via the skin absorption pathway is 0.71 µSv/yr

4.5 CNSC Independent Environmental Monitoring Program

The CNSC launched its independent environmental monitoring program (IEMP) to independently verify that the public and environment around licensed nuclear facilities are safe. The IEMP involves taking samples from public areas around the facilities, and measuring and analyzing the amount of nuclear and hazardous substances. Samples are collected by CNSC staff and sent to the CNSC's state-of-the-art laboratory for testing and analyses.

4.5.1 IEMP at SRB

The IEMP for SRB consists of measurements of radiological contaminants. A site-specific sampling plan was developed based on SRB's approved EMP, CSA standards and the CNSC's regulatory experience with the site. In 2013 and 2014, samples were collected in publicly accessible areas outside the perimeter of the SRB facility.

CNSC staff sampled the following in the vicinity of the SRB facility:

- air (from different locations)
- water (Ottawa River and Muskrat River)
- soil samples (on public land)

- vegetation and local food (e.g. grass on public land, wine, milk, apples, potato, carrot, zucchini, cucumber and tomato)

Samples collected were analysed by qualified laboratory specialists in CNSC's laboratory in Ottawa, using appropriate protocols. Water, soil and vegetation samples were analysed for tritium (HTO). Air samples were analysed for HTO and tritium gas (HT).

4.5.2 Results

The preliminary results for air and water samples from 2013 and 2014 are presented below in table 9. The results confirm that the public and the environment in the vicinity of SRB are protected from the releases from the facility. A summary report will be posted on the CNSC website. Sample data will also be presented on a public-friendly dashboard on the CNSC website. Full technical reports will be available on request.

Table 9: Summary of CNSC Preliminary IEMP Results for Air and Water sampled around SRB facility

Radionuclide	Range of Measured Radioactivity Results	Guideline or CNSC Derived Reference Level[1]
Air (Bq/m^3)		
Tritium (HTO)[2]	2.4 – 12	340
Elemental Tritium (HT)	3.7 – 7.7	5,100,000
Water (Bq/L)		
Tritium (HTO)[3]	< 5 – 8.7	7,000[4]

1. CNSC Derived Reference Level represents the concentration required in a given media for a member of the public to receive an effective wholebody dose of 0.1 mSv/a due to exposure to the given radionuclide.
2. Minimum Detection Concentration (MDC) of Tritium in air is 1.5 Bq/m^3;
3. Minimum Detection Concentration (MDC) of Tritium in water is 5 Bq/L;
4. *Ontario Drinking Water Standards*

4.5.3 Conclusions

CNSC staff's assessment of the preliminary IEMP results confirm that the public and the environment around SRB are not adversely affected by releases from the SRB facility. The IEMP results are consistent with the results submitted by SRB, confirming that the licensees' environmental protection program is protective of the health and safety of people and the environment.

5.0 CONSULTATION AND ENGAGEMENT

SRB is required to maintain and implement a public information and disclosure program (PIDP) in accordance with their class 1B operating licence. This program ensures that information about the health, safety and security of persons and the environment is effectively communicated to the public. CNSC staff monitor and verify the licensee's program implementation through the annual compliance and performance reporting process.

SRB has a PIDP that meets the requirements of RD/GD 99.3-*Public Information and Disclosure* [12]. SRB uses multiple products and methods to inform the general public and target audiences. Activities undertaken by SRB include facility tours, presentations to interested parties, an annual presentation to Pembroke City Council, public opinion surveys and frequent updates to their website and pamphlets to provide current information on the facility, including environmental monitoring results and radiation dose data.

SRB's target audiences include residents of Pembroke, local businesses, local special interest groups, and local elected officials, as well as Aboriginal groups who may have an interest in SRB's activities. As part of SRB's commitment to inform the public about their activities, they posted the licence renewal application on their website, issued a news release about the application, and discussed the application in their presentation to Pembroke City Council in November 2014. SRB also provided the news release and information pamphlet to their target audiences.

In addition to SRB's engagement activities, CNSC staff sent letters in December 2014 to three identified Aboriginal groups providing them information regarding the licence renewal application, the opportunity to apply for participant funding and details regarding the Commission's public hearing. Staff followed up with phone calls to ensure they had received the letters and to answer any questions.

The CNSC also hosted a CNSC 101 information session in Pembroke in November 2014. The session provided attendees with an introduction to the CNSC and the work it does to ensure that Canadian nuclear facilities and activities are safe, and how the public can participate in the licensing process.

6.0 CONCLUSION

CNSC staff conclude that, under section 24 of the NSCA, SRB has and will continue to make adequate provision for the protection of the environment and the health and safety of persons. Through ongoing licensing and compliance reviews, CNSC staff continue to confirm and ensure that the environment is protected at the SRB facility.

The information provided in this EA Report supports the recommendation by CNSC staff to the Commission to renew the nuclear substance processing facility operating licence for a 10-year period.

7.0 ACRONYMS

AL	Action Level
ALARA	As Low As Reasonably Achievable
CEAA	Canadian Environmental Assessment Act
CNSC	Canadian Nuclear Safety Commission
DRL	Derived Release Limit
EA	Environmental Assessment
EMP	Environmental Monitoring Program
ERA	Environmental Risk Assessment
FUMP	Follow-Up Monitoring Program
HHRA	Human Health Risk Assessment
HT	Tritium Gas
HTO	Tritiated Water Vapour
IAEA	International Atomic Energy Association
IEMP	Independent Environmental Monitoring Program
NEW	Nuclear Energy Worker
PIDP	Public Information and Disclosure Program
RA	Responsible Authority
SRB	SRB Technologies (Canada) Inc.

8.0 REFERENCES

[1] Canadian Nuclear Safety Commission. *Canadian Environmental Assessment Act Screening Report – Operation of SRB Technologies (Canada) Inc, Pembroke, Ontario*. November 2000.

[2] Record of Proceedings, Including Reasons for Decision – SRB Technologies (Canada) Inc. – *Application for a Nuclear Substance Processing Facility Operating Licence*. February 5, 2001. e-Doc 3007074

[3] Canadian Nuclear Safety Commission. *Tritium Activity in Garden Produce from Pembroke in 2007 and Dose to the Public. Part of the Tritium Studies Project*. INFO-0798. April 2010

[4] Canadian Nuclear Safety Commission. *Environmental Fate of Tritium in Soil and Vegetation. Part of the Tritium Studies Project*. December 2013.

[5] Thompson, P. A., Kwamena, N. O. A., Ilin, M., Wilk, M., and Clark, I. D. (2015) Levels of tritium in soils and vegetation near Canadian nuclear facilities releasing tritium to the atmosphere: implications for environmental models. Journal of Environmental Radioactivity 140:105-113.

[6] SRB Technologies (Canada) Inc., "2013 Annual Compliance and Performance Report", March 31, 2014.

[7] SRB Technologies (Canada) Inc., "Conceptual Model Document In Support of the Annual Status Report to the Commission", February 7, 2011.

[8] EcoMetrix Incorporated. *Derived Release Limits (DRLs) for the SRB Pembroke Facility – 2006*. September 2006.

[9] Canadian Nuclear Safety Commission. *An Update on Tritium Contamination in Groundwater at SRBT*. March 2010 (e-doc 3523400)

[10] CNSC Staff, SRB Technologies (Canada) Inc., Supplemental, CMD 10-H5.C, April 19, 2010 (e-doc 3525542)

[11]CSA Group, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities*, N288.1-08 Update No.1, May 2011

[12] Canadian Nuclear Safety Commission. Regulatory Document RD/GD-99.3. *Public Information and Disclosure*. March 2012.

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 licence
3. The proposed licence conditions handbook
4. The current licence

PROPOSED LICENCE CHANGES

Overview

During the 2010 licence renewal process, CNSC staff proposed to modify the content and format of the licence and prepared a licence conditions handbook (LCH) to improve regulatory clarity, while maintaining adequate regulatory oversight.

The LCH describes compliance verification criteria (CVC) on how the licensee is required to meet the individual licence condition of the corresponding operating licence. The underlying basis for the LCH is to clarify for the public and the licensee, the Commissions expectations for the conduct of authorized activities under the licence. The introduction of the LCH has brought consistency and clarity for all stakeholders involved in the licensing process.

Since the original development of the LCH in 2010, further improvements have been made to the operating licence for Class IB facilities and LCH through:

- the development of standard operating licence and LCH templates
- the refinement of the SCA framework
- experience gained with the use of the LCH

Operating Licence

The proposed operating licence is based on the standard licence template developed by CNSC staff. This standard licence template ensures that standardized licence conditions are used for all CNSC licensees to provide regulatory consistency.

The licence template is structured to include the following sections:

I) Licence number (NSPFOL-13.00/2025)
II) Licensee (SRB Technologies (Canada) Incorporated.)
III) Licence period (July 1, 2015 to June 30, 2025)
IV) Licensed activities (what the licence authorizes the licensee to do)
V) Explanatory notes (which make reference to the LCH)
VI) The licence conditions (LCs) for the relevant SCAs.

One change of note in the proposed licence is the removal of the licence conditions for Safeguards and Non-Proliferation. As part of the current licensing review, CNSC staff have determined that Canada's obligations under the *Treaty on the Non-Proliferation* can be better met via the *General Nuclear Safety and Control Regulations* paragraph 12(1)(i), which states that "Every licensee shall take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement". CNSC staff are thus recommending the removal of the safeguards licence condition from SRB's licence.

Licence Conditions Handbook

The proposed LCH is based on CNSC staff's standard LCH template. It provides regulatory consistency by including the same sections within each SCA. The format includes:

- an introduction which includes the SCA definition and the performance objectives
- the licence condition
- a preamble section outlining the legal requirements
- the CVC section ("shall" statements) including the version control documents
- a list of documents that require version control
- the Recommendations and Guidance section ("should" statements)

The Commission considers the LCH during licence renewal and maintains oversight of it by receiving annual updates of major LCH changes (through the CNSC staff's annual report to the Commission).

Licence Period

The current licence was issued for 5 years. The proposed licence is for 10 years.

PROPOSED LICENCE

e-Doc 4522207 (Word)

e-Doc 4624670 (PDF)

PDF Ref: e-Doc 4624670
Word Ref: 4522207
File / Dossier: 2.02

CLASS 1B NUCLEAR SUBSTANCE PROCESSING FACILITY OPERATING LICENCE

SRB TECHNOLOGIES (CANADA) INCORPORATED

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 its associated Regulations.

I) LICENCE NUMBER: NSPFOL-13.00/2025

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, 2025**, 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 preliminary decommissioning plan..

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 _____ day of _____, 2015

_____

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

PROPOSED LICENCE CONDITIONS HANDBOOK

e-Doc 4473427 (Word)

e-Doc 4624621 (PDF)

Canada's Nuclear Regulator

e-Doc 4473427 (Word)
e-Doc 4624621 (PDF)

DRAFT

Licence Conditions Handbook

SRB TECHNOLOGIES (CANADA) INC.

Nuclear Substance Processing Facility Operating Licence (NSPFOL)

NSPFOL- 13.00/2025

(Effective: July 1, 2015)

Revision 0

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire
Canada

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Revision History:

Effective Date	Rev.#	LCH E-DOCS #	Section(s) changed	Description of the Changes	DCR List E-DOCS #
2015-07-01	0	4473427	N/A	Document prepared for SRB licence NSPFOL-13.00/2025	N/A

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PART I: INTRODUCTION

The general purpose of the Licence Conditions Handbook (LCH) is to clarify the regulatory requirements for each licence condition (LC) and other relevant parts of the licensing basis. This will help ensure that the licensee maintains facility operation in accordance with the licensing basis for the facility and the intent of the licence.

The LCH does not introduce new requirements but elaborates upon the requirements in the *Nuclear Safety and Control Act*, its associated regulations, and the licence. The LCH should be read in conjunction with the licence. The LCH provides compliance verification criteria (CVC) that the licensee must follow to meet the conditions in the licence. The LCH contains operational limits and information regarding delegation of authority and applicable versions of documents referenced in the licence. Furthermore, the LCH provides non-mandatory recommendations and guidance on how to achieve compliance with the conditions and criteria.

1 BACKGROUND

1.1 Objective

This LCH identifies criteria that will be used by Canadian Nuclear Safety Commission (CNSC) staff to assess licensee compliance with the licence conditions (LCs) listed in the NSPFOL Licence NSPFOL-13.00/2025. It also establishes provisions for delegation of authority and conflict resolution.

To support these objectives, the LCH contains the following information:

(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.

The LCH is intended for use by both the licensee and CNSC staff and should be read in conjunction with licence NSPFOL-13.00/2025.

1.2 Delegation of Authority

The statement "a person authorized by the Commission" in 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 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 Operations Officer, Regulatory Operations Branch

2 DESCRIPTION OF THE SECTIONS IN THE LICENCE

2.1 Section I: Licence Number

The alpha numeric expression NSPFOL-13.00/2025 stems from the CNSC standard convention for identifying licences. The following table provides a description of each identifier used in the expression:

Identifier	Description
NSPFOL	Nuclear Substance Processing Facility Operating Licence
13	Refers to facility name (13 = SRB Technologies (Canada) Inc.)
00	Licence version number (00 = Initial licence, 01 = Amendment No. 1, etc.)
2025	Expiration year

2.2 Section II: Licensee

This section of the licence provides the name and the address of the corporate entity that holds the licence, which is referred hereinafter as the "licensee". The licensee is:

SRB Technologies (Canada) Incorporated
320-140 Boundary Road
Pembroke, Ontario
K8A 6W5

2.3 Section III: Licence Period

The duration for which the licence is valid, which in this case, the licence period for NSPFOL-13.00/2025 is from July 1, 2015 to June 30, 2025, unless otherwise suspended, amended, revoked, or replaced.

2.4 Section IV: Licensed Activities

The licence identifies the activities that are being licensed. The box below contains a copy of the text in the licence. The authorized activities are from the list of activities described in section 26 of the *Nuclear Safety and Control Act* (NSCA).

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 nuclear substances that is required for, associated with, or arise from the activities described in (a);

(d) having a restriction on 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).

Facility Location: The SRB facility is located at, 320 Boundary Road, Suite 140, Pembroke, Ontario, further defined in drawing "SRB Technologies (Canada) Inc. Building Floor Plan September 18, 2014 e-Doc 4522521.

2.5 Section V: Explanatory Notes

This section provides clarification of the licence and introduces the LCH as a compliance tool.

2.6 Section VI: Conditions

This section of the licence lists the LCs.

PART II: FRAMEWORK FOR EACH CONDITION

This section of the LCH provides additional information for each LC including information on the requirements and guidance for meeting each LC. The LCH also provides references to licensee documents submitted to meet the requirements and the compliance verification criteria that will be used to verify that the condition is being met and to measure performance.

The information for each LC or group of conditions is organized in the following manner.

Preamble

Contains background history and/or the regulatory context related to the LC and provides, where applicable, the related regulatory requirements contained in the NSCA and associated Regulations.

Compliance Verification Criteria

This section identifies the criteria or the sources from which the CNSC develops compliance verification criteria. Applicable standards such as Canadian Standards Association (CSA) standards, national codes and guidelines, and/or CNSC regulatory documents are identified. Implementation of programs will be assessed through the CNSC's compliance program and will be measured against performance objectives and regulatory expectations.

The documents that are used to assess compliance with LCs are identified in this section. Compliance verification will be conducted against written notification documents referenced within this LCH. Current versions of written notification documents are tracked and can be accessed through the document "SRB Written Notification Tracking Sheet" e-Doc 4472953. This document is controlled by the Nuclear Processing Facilities Division (NPFD).

Recommendations and Guidance

While recommendations and guidance are non-mandatory, this section refers to industry best practices, CNSC documents and other documents that provide recommendations and guidance associated with protection of the environment, health and safety, and other conditions of the NSCA and its associated Regulations. Recommendations and guidance provide acceptable means to meet requirements; however, licensees may propose alternate ways to meet the licence condition.

1. GENERAL LICENCE CONDITIONS

1.1 Licensing Basis

Licence Condition 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").

Preamble

The licensing basis sets the boundary conditions for acceptable performance at a regulated facility or activity, thus establishing the basis for the CNSC compliance program with respect to that regulated facility or activity.

One part of the licensing basis consists of the safety and control measures described in the licence application and the documents needed to support that licence application. This does not mean that all details in those documents are part of the licensing basis; some of these documents may contain administrative elements, which are excluded from the licensing basis. Safety and control measures may be found in high-level, programmatic licensee documents but might also be found in lower-level, supporting licensee documentation. LC 1.1 requires the licensee to conform to, and/or implement, all these safety and control measures.

Relevant documents that require version control.

Source	Document Title	Document #	Revision #
CNSC	Licensing Basis Objective and Definition	INFO-0795	January 2010

This licence condition 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. This licence condition does not explicitly prohibit changes (such as in management or operation) with a neutral or positive impact on safety. This means that changes shall be within the licensing basis and shall be made in accordance with the licensee's management system (see LC 2.1). Changes to licensee documents may require written notification to the CNSC, even if they do not impact the licensing basis; see licence condition 1.2. If the licensing basis is proposed to be changed the Commission would be the licence authority for approval.

Appendix C of the LCH lists the key documents which are deemed to contain the safety and control measures that are considered to form item (iii) of the licensing basis.

In the event of any conflict or inconsistency between LCs or any documents referenced in the LCH, SRB shall direct the conflict or inconsistency to the CNSC for resolution (see Appendix A, section A.3).

The licensee and CNSC staff will discuss any identified conflicts and inconsistencies to ensure a common understanding of CNSC expectations. The resolution of these conflicts and inconsistencies will be documented by CNSC staff and acknowledged by the licensee.

Compliance Verification Criteria

Compliance verification criteria are identified throughout the LCH.

Recommendations and Guidance

There are no recommendations or guidance.

1.2 Changes to the Documents in Support of the Licence Application

Licence Condition 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.

Preamble

The licensee documents that require written notification are primarily selected from the set of documents that were submitted with, or in support of, the application and which describe the licensee's safety and control measures. If the licensee identifies that changes made to documents not listed in the LCH may require written notification; the licensee is to follow the written notification process.

Tables under each LC in the LCH identify the documents (if any) requiring written notification of change. Appendix A describes some of the general criteria that CNSC staff will use to assess changes to documents subject to the written notification requirement.

CNSC staff will track the version history of all revisions cited in the LCH. A spreadsheet list controlled by the Nuclear Processing Facilities Division entitled "SRB Written Notification Tracking Sheet" e-Doc 4472953 has been created for this purpose.

Compliance Verification Criteria

1. The licensee shall ensure that adequate oversight of document changes is taking place such that it is clear that requirements of this licence condition are being met. Documents that require written notification of change are identified in this LCH under the most relevant LC.

2. When the licensee makes any changes to the documents identified in each SCA, CNSC written notification is required as follows:

Definition	Description
"N"	written notification is required as the revised document comes into effect.
"Y"	written notification **prior** to planned implementation.

3. For documents identified as requiring prior written notification and CNSC acceptance, the licensee is to submit the proposed changes 30 days prior to planned implementation. However there are provisions for using judgment and basing the timing of the advance notice on the extent or significance of the changes being made. The written notification shall include a description of the change and a summary explanation of how the changed document remains within the licensing basis. Written notification of minor or administrative changes may be made in batches after the changes have been implemented.

Recommendations and Guidance

There are no recommendations and guidance associated with this licence condition.

1.3 Financial Guarantee

Licence Condition 1.3

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

Preamble

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

This condition requires the licensee to maintain a financial guarantee (FG) for decommissioning that is acceptable to the Commission. The FG shall remain valid and in effect and adequate to fund the activities described in the preliminary decommissioning plan. If the preliminary decommissioning plan is revised and significantly impacts the FG, the expectation is that the FG is revised and submitted to the Commission for acceptance.

SRB has provided a *Preliminary Decommissioning Plan* and an associated cost estimate. From its assessment, CNSC staff deemed both documents to be satisfactory. As a FG Instrument SRB Technologies continue to use an Escrow Account and proposed an additional payment schedule (e-Doc 4657138). The Commission has accepted the cost estimate for decommissioning, the financial instrument and the additional payment schedule.

Compliance Verification Criteria

1. The licensee shall maintain in effect a financial guarantee for decommissioning acceptable to the Commission or a person authorized by the Commission which shall remain valid and in effect and adequate to fund the activities described in the preliminary decommissioning plan.
2. The licensee shall make payments to the escrow account in accordance with the payment schedule that the Commission has approved and is given in the Table below:

Financial Guarantee Payment Schedules

Payment Due date	Decommissioning Escrow Account Deposits
October 31, 2015	17,002.00
April 30, 2016	17,002.00
October 31, 2016	17,002.00
April, 30, 2017	17,002.00
October 31, 2017	17,002.00
April 30, 2018	17,002.00

3. The licensee shall report annually on the status of the financial guarantee to ensure it remains valid, in effect and adequate to fund decommissioning of the facility.

Recommendations and Guidance

CNSC Regulatory Document G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*, sets out guidance on the development of financial guarantees for licensed facilities and activities.

CNSC regulatory document G-219 *Decommissioning Planning for Licensed Activities* provides guidance regarding the preparation of decommissioning plans for activities licensed by the CNSC. It also provides the basis for calculating the financial guarantees discussed in the regulatory document G-206 .

CSA standard N294-09 *Decommissioning of Facilities Containing Nuclear Substances* provides direction on the decommissioning of licensed facilities and specifies requirements for the planning, preparation, execution and completion of decommissioning.

1.4 Public Information and Disclosure

Licence Condition 1.4

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

Preamble

The primary goal of the Public Information Program is to ensure that information related to the health and safety of persons and the environment and other issues associated with the lifecycle of the nuclear facility is effectively communicated to the public.

In addition, the program shall include a commitment to a disclosure protocol in regard to information and reports of interest to the public. The disclosure program shall include timely communication of items of interest to the public such as include routine and non-routine situations, unplanned events and other incidents and activities related to the licensed facility that may be of interest to the public.

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CNSC	Public Information and Disclosure	RD/GD-99.3	2012

1. The licensee shall implement and maintain a public information and disclosure program in accordance with CNSC regulatory document RD/GD-99.3 *Public Information and Disclosure.*

In accordance with licence condition 1.2, the following document requires written notification of changes made:

Document Title	Document #	Prior Notification?
Public Information Program		N

Recommendations and Guidance

There are no recommendations or guidance

2. SCA-MANAGEMENT SYSTEM

The Safety and Control Area "Management System" 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.

2.1 Management System

Licence Condition 2.1

The licensee shall implement and maintain a management system.

Preamble

Paragraph 3(*k*) of the *General Nuclear Safety and Control Regulations* requires that a licence application contain information related to the applicant's organizational management structure including the internal allocation of functions, responsibilities and authority.

Paragraph 3(*d*) the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed quality assurance program for the licensed activity.

A quality assurance program shall control activities at both the working level and at the corporate level from planning stages to completion, provide corporate direction and maintains overall accountability, and ensures effective quality and safety related communications between individuals and organizations.

A licensee shall retain overall responsibility for assuring quality regardless of the delegation of any work or responsibilities to other organizations

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CSA	Management systems requirements for nuclear facilities	N286	2012

Transition plan

The licensee shall be in compliance with CSA standard N286-12, "Management systems requirements for nuclear facilities" by December 31, 2016.

The following compliance verification criteria will be used during the transition period. These requirements apply to safety related activities, components, systems, structures associated with the nuclear facility, procurement, design, and operations.

Quality Assurance Program – General

1. The applicant/licensee identifies clearly in the quality assurance program documentation for the facility, the safety-related systems, structures, and activities to which the program is to be applied.

2. Although the applicant/licensee may delegate work or responsibilities to other organizations, the responsibility for assuring quality remains with the applicant/licensee.

3. The applicant/licensee hereinafter referred to as *the organization* has a quality assurance program that controls work activities from the planning stages on to completion. The quality assurance program covers both the control of activities at the working level, and at the management level. The latter provides the oversight needed to provide corporate direction and maintain overall accountability, and to ensure that communication between individuals and organizations is effective and in the interest of quality and safety.

4. The extent of application of the quality assurance program takes full account of the safety significance of the activity, system, component, or structure. The rationale or the method for determining the extent is covered in *the organization's* quality assurance documentation.

Program Requirements

1. Program Definition; The required quality and the means of achieving it will be defined.

The quality assurance program is a major part of *the organization's* management system. It provides the means of controlling those activities that affect quality and safety. The scope of the program and what it applies to are clearly defined. The program documentation describes policies and consequent systematic processes that are issued by *the organization's* senior management. These enable the requirements that are stated below to be met.

2. Policy; A policy statement will be issued committing all units of the organization to the program.

   A written policy statement certifying the authority of the program, and *the organization's* commitment to its implementation and effectiveness, is issued by senior management who is accountable for ensuring compliance.

3. Organization and Responsibilities; Organizational responsibilities will be defined and understood.

   The organizational structure, responsibilities, levels of authority, and interfaces are specified and communicated. Organizational and unit responsibilities are clear so that communication is effective within *the organization* and between organizations, and can sustain the achievement of good results.

   To ensure that personnel understand their individual responsibilities, training and instructional methods and reviews are provided. The responsibilities of contributing organizations are established and reflected in pertinent documentation or contractual agreements.

   Personnel engaged in performing work, verifying that it is correct, and in auditing the effectiveness of the program have appropriate independence from each other. Senior management's accountability for the effectiveness of the program is defined. The individual assigned responsibility for monitoring and assessing the effectiveness of the program reports to a management level such that the required authority and organizational freedom are provided, and cost and schedule considerations do not override adherence to requirements. This authority permits such individuals to identify problems, initiate or recommend solutions, and confirm their implementation and effectiveness.

   Organizational units, managers and employees understand that they are responsible and accountable for the work they perform and the decisions they make. The results expected of individuals are defined and communicated to them. Actual results are measured and compared against expected results.

4. Personnel Capability; Personnel will be competent at the work they do.

   Qualifications and training requirements are identified, personnel are given appropriate training and instruction, and tasks are assigned to personnel that have been properly trained. Training programs are monitored and assessed regularly, and the competency of personnel is reviewed to maintain their effectiveness and skill levels. Records of training, qualification, and experience are maintained.

5. Use of Experience; Relevant experience will be sought and used.

   The organization has an information-gathering and review process to identify, obtain, and evaluate in-house and external experience gained during the term of the licence and the facility life-cycle. The analysis of this information is used, and action is taken to improve safety, quality and the management processes.

6. Work Planning and Control; Work will be planned and controlled.

   Work is planned and controlled so that it will be performed precisely and systematically. Work activities are identified, sequenced, and defined in approved plans, procedures, instructions, and drawings. The work unit and, where appropriate, the identity of the performer is also specified. Supervisor acceptance is scheduled.

   Requirements are identified for avoiding damage, contamination, and foreign material ingress, for maintaining clean and protective conditions, and for proper handling, storing, shipping and preservation. Independent verifications are identified and scheduled to verify that specified requirements are met. Procedures, instructions, drawings, programs and tools are identified, prepared and approved for use.

7. Work Process Control Practices; The right items, processes and practices will be used.

   Work is assigned to qualified personnel and is carried out according to the requirements that are specified in up-to-date approved instructions, procedures, drawings, or other appropriate media that define e.g. the identification of the specific item or activity, conditions, methods, characteristics, acceptance criteria, and reporting and recording requirements. The preparation, issue, and revision of these requirements is controlled to ensure that it is correct, and that the correct information is available for use. Obsolete information is not used. The prescribed precautions are taken to avoid damage and contamination.

Self-checks and Supervisor checks are performed routinely. In-process and final verifications are done as planned. When deficiencies are found, they are recorded and reported, and items, processes and practices that are deficient or are found to be unacceptable are excluded from use.

The operating condition of systems, equipment and devices is preserved so that they can perform their function reliably. Accuracy is maintained by planning and carrying out periodic adjustments and calibrations. The method and interval of calibrations are defined, and records of calibrations are kept. Methods are used to show the current acceptance and operating status, and to prevent the use of systems, equipment or devices that are inaccurate or not in working order. When deviations beyond accuracy limits are found or suspected, their consequence on past results, and on present performance is evaluated.

8. Verification; Work will be verified to confirm that it is correct. Those who verify work will do so independently from those who do the work.

   Verification is additional to self-checks and to the checks carried out by supervisors. Verification is carried out by personnel who have not performed the work and who have appropriate independence from those who did perform the work. Intermediate and final verifications (reviews, inspections, tests, evaluations, witnessing) are carried out as planned to determine that results are satisfactory, and that the specified requirements are being met. The method of verification is documented. The extent of the verification, its timing, the results and the identification of the verifier are recorded. The results are accepted before further work proceeds.

9. Nonconformance; Deficiencies will be identified and remedied.

   When nonconformances are found, they are identified, recorded, and reported. Further work, processing or use is not permitted without authorization. The nonconformance is reviewed to determine its significance, and to decide on usage as-is, after correction, or rejection. The person(s) who make(s) this determination are competent and have been given this responsibility. Nonconformances that affect or can affect safety and operability are reported to the appropriate levels of management to initiate the process of correcting their cause.

   Note: The term deficiency is sometimes used to describe a nonconformance. Other terms such as snags, failures, malfunctions, errors, defects, noncompliances, are also used.

10. Corrective Action; The root cause of deficiencies will be identified and corrected.

Nonconformances that can affect safety or operability are identified, reported to management and analyzed to determine the (root) cause. Management initiates action to prevent recurrence. Those responsible for the analyses, for initiating and implementing the correction of the cause, and for taking follow-up action are identified.

11. Change Control; Changes to accept items, processes and practices will be controlled.

    Before a change can be made it is justified and subjected to the same level of review and approval as was originally obtained. Persons reviewing and approving a proposed change understand the original intent and the associated requirements, and are able to assess the effect the proposed change will have on both. When a change is proposed, its effect on existing conditions is determined. This includes e.g. design documentation, analyses, computer programs, training, maintenance and operating documents, and other supporting documentation. Work is scheduled to make the corresponding revisions and updates, and alignment is obtained before the change is used, or put into service.

12. Document Control and Records; The preparation and use of documents will be controlled. Essential records will be maintained.

    Documents and records are considered to be important and necessary to manage, perform and assess work effectively, and to demonstrate that requirements are being satisfied on a continuing basis. The documents that are to be produced and controlled and the records that will be generated and retained are identified ahead of time by planning. Systems are established to ensure that only approved and current documents are issued and used, that obsolete documents are withdrawn, that documents and records are available when they are needed, and that appropriate records are produced, are acceptable, and are retained and protected. The resources needed to manage these systems are planned for and allocated.

13. Audits; Periodic assessment of program effectiveness will be conducted.

    Internal audits are planned and carried out on behalf of management to measure performance, the effectiveness of the management processes and to promote improvement. The organizational unit responsible for conducting audits has sufficient authority and organizational freedom to carry out its responsibilities. Persons conducting audits have no direct responsibility for the activities being audited. Results are reported and assessed by management, and action is taken to correct unsatisfactory conditions or to implement improvements. Follow-up action is scheduled to confirm the accomplishment of corrective measures. Audits of external organizations follow these same requirements.

14. Management Self-Assessment; Managers at all levels will regularly assess the management process for which they are responsible.

Managers at all levels regularly assess the management processes for which they are responsible. Managers determine how effective they are in establishing, promoting and achieving quality and safety objectives. Weaknesses in the management processes, and barriers that hinder the achievement of these objectives are identified and corrected.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
SRB Technologies (Canada) Inc. Quality Manual		Y

Recommendations and Guidance

There are no recommendations or guidance

3 SCA- HUMAN PERFORMANCE MANAGEMENT

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

3.1 Human Performance Management

Licence Condition 3.1

The licensee shall implement and maintain a training program.

Preamble

Paragraphs 12(1)(*a*) and 12(1)(*b*) of the *General Nuclear Safety and Control Regulations* require that licensees ensure that there are a sufficient number of properly trained and qualified workers to safely conduct the licensed activities.

Paragraphs 6(*m*) and 6(*n*) of the *Class I Nuclear Facilities Regulations* require that licence applications include the proposed responsibilities, qualification requirements, training program and requalification program for workers; along with the results that have been achieved in implementing the program for recruiting, training and qualifying workers. Paragraph 14 (2) 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.

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CNSC	Personnel Training	REGDOC 2.2.2	2014

1. The licensee shall implement and maintain training programs for workers in accordance with REGDOC 2.2.2 *Personnel Training*, which defines the requirements regarding the development and implementation of a training system.

In Accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
SRBT Training Program Manual		N

Discussion and Guidance

CNSC Document TPED-01 "Objectives and Criteria for Regulatory Evaluation of Nuclear Facility Training Programs" sets out the compliance criteria to evaluate all training programs.

4 SCA-OPERATING PERFORMANCE

The Safety and Control Area 'Operating Performance' includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.

4.1 Operations Program

Licence Condition 4.1

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

Preamble

Paragraph 6(*d*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

An operating program is to include an up to date set of operating limits for the facility and activities authorized under the licence, including limits for the possession, use, management, transfer, storage of nuclear substances, and an inventory of nuclear substances possessed under the licensee's operating licence.

The operating program is to ensure that any modifications are made in accordance with the *National Building Code*, the *National Fire Code*, and CSA 393-13 *Fire protection for Facilities that process, Handle or Store Nuclear Substances*.

CSA N393-13 *Fire protection for Facilities that process, Handle or Store Nuclear Substances*, includes specific reporting requirements for reporting and follow-up of fire incidents and fire protection program audits.

Compliance Verification Criteria

Criteria for Facility Operation

1. The licensee shall operate its facility using up-to-date procedures that have been through a formal development process which includes validation before the procedure is approved for use. In addition, such procedures shall be reviewed (and revised, as appropriate) on a regular basis.

2. The licensee shall maintain an accurate inventory of their nuclear substances, both in use and in storage, and provide details of this inventory to show:

   a) the acquisition of nuclear substances including the quantity received, the form of the substance, and the name of the vendor;

b) the disposition of all nuclear substances acquired for use or processed by the facility, including the name and address of the recipient, a copy of the recipient's licence (if applicable), the quantity of radioactive nuclear substance, and the date of shipment.

c) the authorized tritium possession limit is met.

3. The licensee shall not operate the reclamation unit that is currently found in the facility.

4. The licensee shall continue its practice of not processing tritium when there is precipitation.

Criteria for Fire Protection

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
NRC	National Fire Code of Canada	IRC-10NFC	2010
CSA	Fire protection for Facilities that process, Handle or Store Nuclear Substances	N393	2013
NRC	National Building Code of Canada	IRC-10NBC	2010

5. The licensee shall design, build, modify and otherwise carry out work related to the facility with potential to impact protection from fire in accordance with the *National Building Code of Canada* and the *National Fire Code of Canada*.

6. The licensee shall operate, maintain, test, and inspect the facility in accordance with the National Fire Code.

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

In Accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
SRBT Quality Manual		Y
SRBT Radiation Safety Program		Y
Tritium Inventory Management	RSO-029	N
Safety Analysis Report		Y
Environmental Management System		Y

Recommendations and Guidance

The operating program defines the operating rules consistent with the safety analyses and other licensing support documentation within which the facilities will be operated, maintained and modified, all of which should ensure safety. The operations program establishes safe, uniform, and efficient operating practices within the nuclear facility.

4.2 Reporting Requirements

Licence Condition 4.2

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

Preamble

This condition requires the licensee to implement and maintain a program for reporting information to the CNSC. This includes compliance monitoring and operational performance, occurrence and response to unusual events.

Compliance Verification Criteria

Criteria for Compliance Reporting

1. The licensee shall submit to the Director of NPFD (a person authorized by the Commission, see Part I section 1.2), 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 includes at a minimum:

a. Operational review including equipment and facility performance and changes, significant events/highlights that occurred during the year.
b. Information on production including verification that limits specified in the licence was complied with.
c. Modifications including changes in organization, administration and/or procedures that may affect licensed activities.
d. Health physics information including operating staff radiation exposures including distributions, maxima and collective doses; review of action level or regulatory exceedence(s), if any, historical trending where appropriate.
e. Environmental and radiological compliance including results from environmental and radiological monitoring, assessment of compliance with licence limits, historical trending where appropriate, and quality assurance/quality control results for the monitoring.
f. Facility effluents including gaseous and liquid effluent releases of nuclear substances from the facility, including unplanned releases of radioactive materials and any releases of hazardous substances.
g. Waste management including types, volumes and activities of solid wastes produced, and the handling and storage or disposal of those wastes.
h. Updates regarding activities pertaining to safety, fire protection, security, quality assurance, emergency preparedness, research and development, waste management, tritium mitigation and training (as applicable).
i. Compliance with other federal and/or provincial Regulations.
j. A summary of non-radiological health and safety activities, including information on minor incidents and lost time incidents.
k. A summary of stakeholder engagement activities, public opinion and information products, as committed to in the Public Information Program.
l. Forecast for coming year(s).

2. The licensee shall provide, to the CNSC, the results of the tritium concentration in well water, within 30 days of monitoring the wells.

Criteria for Event Reporting

3. The licensee shall report all incidents in accordance with the NSCA and its regulations. Inclusion of a summary of these incidents in the *Annual Compliance Monitoring and Operational Report* does not release the licensee from any other reporting requirements specified in NSCA or its *Regulations*.

Recommendations and Guidance

The annual report for each calendar year should provide information as found in CNSC document entitled *Annual Compliance Monitoring and Operational Performance Reporting Requirements for Class 1A and 1B Nuclear Facilities* (e-Doc 3471152).

5. SCA – SAFETY ANALYSIS

The SCA entitled "Safety Analysis" addresses the systematic evaluation of the potential hazards associated with the operation of the facility and the conduct of licensed activities; including the evaluation of the effectiveness of the preventative measures and strategies that have been implemented to mitigate these hazards.

5.1 Safety Analysis Program

Licence Condition 5.1

The licensee shall implement and maintain a safety analysis program.

Preamble

Paragraph 3(1)(*i*) of the *General Nuclear Safety and Control Regulations* requires that a licence application contain a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.

Paragraphs 6 (*c*)(d) of the *Class I Nuclear Facilities Regulations* require that a licence application contain: "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".

This condition requires that the licensee implement and maintain a process to identify and assess hazards and risks on an ongoing basis. This would include 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.

CSA N286-12 *Management system requirements for nuclear facilities*, includes specific requirements related to safety analysis that apply to isotope processing facilities. As such, the licensee's safety analysis process is to be performed and documented for the design and carried through the life of the nuclear facility. CSA N286-12 also requires that the safety analysis is periodically reviewed to ensure it is current.

Compliance Verification Criteria

1. The licensee shall maintain the safety analysis report described below to ensure it adequately considers 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.
2. The licensee is to transition to CSA N286-12 by December 31, 2016. A component of the CSA standard requires the licensee to develop a safety analysis process. As such, SRB shall revise its current safety analysis to align with the new safety analysis process by December 1, 2015.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Safety Analysis Report		Y

Recommendations and Guidance

There are no recommendations or guidance.

6. SCA - PHYSICAL DESIGN

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

6.1 Design Program

Licence Condition 6.1

The licensee shall implement and maintain a design program.

Preamble

Paragraph 6 (d) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed measures, policies, methods and procedures to maintain the nuclear facility.

The design basis is the range of conditions and events taken into account in the design of structures, systems and components of a facility according to established criteria, such that the facility can withstand them without exceeding authorized limits for the planned operation of safety systems.

This licence condition 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.

The licensee is encouraged to make continuous improvements to the design of facilities and equipment, as long as the changes remain within the objective of the licensing basis authorized by the Commission.

CSA N286-12 *Management system requirements for nuclear facilities*, includes specific requirements related to design that apply to isotope processing facilities. As such, the licensee's design program is to follow the design requirements found in CSA N286-12.

Compliance Verification Criteria

1. The licensee shall maintain a design program that will be evaluated against activities that impact on the ability of systems, components and structures to meet and maintain their design basis taking into consideration changes in the external environment, the effect of aging and new information arising over time.

2. The licensee shall ensure that all designs, including changes to the designs, meet all relevant safety, code, standard and regulatory requirements.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Quality Manual		Y

Recommendations and Guidance

There are no recommendations or guidance.

7. SCA-FITNESS FOR SERVICE

The safety and control area "Fitness for Service" 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.

7.1 Fitness for Service Program

Licence Condition 7.1

The licensee shall implement and maintain a fitness for service program

Preamble

Paragraph 6(*d*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain 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.

This condition requires that the licensee implement and maintain a maintenance program to ensure that the operating condition of systems, equipment and devices is preserved so that they can perform its function reliably. Accuracy is maintained by planning and carrying out periodic adjustments, calibrations, repairs and replacement.

Compliance Verification Criteria

1. The licensee shall carry out testing and maintenance sufficient to ensure the reliability and effectiveness of all structures, systems, equipment or components affecting safety.

2. The licensee shall determine the extent and frequency of preventive maintenance, testing, surveillance, and inspection of structures, systems and components through a systematic approach, following operating experience and best industry practices, taking into account as a minimum:

    a. their importance to safety;
    b. their inherent reliability;
    c. their potential for degradation (based on operational and other relevant experience, research and vendor recommendations);
    d. the consequences of failure;

e. results of condition monitoring; and
f. the safety analysis.

3. The licensee shall establish, review, and validate procedures for maintenance, testing, surveillance, and inspections.

4. Before any safety-related structure, system, equipment or component is removed from or returned to service, the licensee shall ensure full consideration and approval of the proposed reconfiguration, followed by a documented confirmation of its correct configuration and, where appropriate, functional testing.

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

6. The licensee shall ensure that all items of equipment used for examinations and tests, together with their accessories, are qualified and calibrated before they are used.

7. The licensee shall properly identify all equipment in the calibration records, and shall regularly verify the validity of the calibration in accordance with the quality management system.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Maintenance Program		Y
Quality Manual		Y

Recommendations and Guidance

There are no recommendations or guidance.

8. SCA-RADIATION PROTECTION

The Safety and Control Area "Radiation Protection" covers the implementation of a radiation protection program in accordance with the *Radiation Protection Regulations*. This program must ensure that contamination levels and radiation doses received by individuals are monitored, controlled, and maintained as low as reasonably achievable (ALARA).

8.1 Radiation Protection Program

Licence Condition 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.

Preamble

The *Radiation Protection Regulations* require that the licensee implement a radiation protection program for any activity that is authorized by 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 (the ALARA principle), social and economic factors being taken into account.

Note that the regulatory dose limits to workers and the general public are explicitly provided in sections 13, 14 and 15 of the *Radiation Protection Regulations*.

Action levels 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.*

The *Radiation Protection Regulations* specifies the requirements related to action levels and requirements for when a licensee becomes aware that an action level referred to in the licence has been reached.

Compliance Verification Criteria

1. The licensee shall implement and maintain a radiation protection program that is in accordance with the requirements set out in the *Radiation Protection Regulations*.

2. When the licensee becomes aware that an action level has been reached, it shall notify the Director of NPFD (a person authorized by the Commission, see Part I section 1.2), within seven days.

The licensee action levels are found in the *Licence Limits, Action Levels And Administrative Limits* document. They are:

Effective Dose

Application	Action Level
Effective Dose to Worker	1.0 mSv / quarter
	3.0 mSv / year
	15 mSv / 5 year period
Effective Dose to Pregnant Worker	2.0 mSv for balance of pregnancy
Bioassay Result	1,000 Bq/ml for any sampling period

3. The licensee shall review and if necessary, revise the Action Levels at a frequency of once per five years to validate their effectiveness.

In Accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Radiation Safety Program		Y
Licence Limits, Action Levels And Administrative Limits		Y

Recommendations and Guidance

Guidance on aspects of radiation protection is provided in the following documents:

- CNSC Regulatory Guide G-129, *Keeping Radiation Exposures and Doses "As Low As Reasonably Achievable" (ALARA)*
- CNSC Regulatory Guide G-228, *Developing and Using Action Levels*
- CNSC Regulatory Guide G-91, *Ascertaining and Recording Radiation Doses to Individuals*

- CNSC Regulatory Standard S-260, *Making Changes to Dose-Related Information Filed with the NDR*

9 SCA - CONVENTIONAL HEALTH AND SAFETY

The Safety and Control Area "Conventional Health and Safety" covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.

9.1 Conventional Health and Safety Program

Licence Condition 9.1

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

Preamble

Paragraph 3(f) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain a conventional health and safety program with the proposed worker health and safety policies and procedures.

The regulation of non-radiological health and safety is governed by the *Canada Labour Code Part II*.

The CNSC also has regulatory responsibilities for the oversight of the protection of the health and safety of workers.

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CSA	Standard Z94.4 *Selection, Use and Care of Respirators.*	Z94.4	2011

1. The licensee shall comply with the *Canada Labour Code* Part II.

2. The licensee shall implement and maintain a respirator program for workers in accordance with CSA Z94.4 *Selection, Use and Care of Respirators*, which defines the requirements regarding the Selection, Use and Care of Respirators.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Health and Safety Policies and Procedures		Y
Hazard Prevention Program		Y

Recommendations and Guidance

There are no recommendations or guidance.

10 SCA - ENVIRONMENTAL PROTECTION

The Safety and Control Area "Environmental Protection" covers programs that identify, control, and monitor all releases of radioactive and hazardous substances and the effects on the environment from facilities or as the result of licensed activities.

10.1 Environmental Protection Program

Licence Condition 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.

Preamble

Paragraph 3(*g*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed environmental protection policies and procedures.

Paragraph 3(*h*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed effluent and environmental monitoring programs.

Paragraph 12 (1) (c) of the *General Nuclear Safety and Control Regulations* requires 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

CNSC Regulatory Document REGDOC-2.9.1: Environmental Protection Policies, Programs and Procedures, requires licensees to establish, implement and maintain an Environmental Management System that satisfies the requirements set by the Canadian Standards Association's (CSA) ISO 14001: 2004, *Environmental Management Systems – Requirements with Guidance for Use*.

Canadian Standards Association N288.1-14 "*Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*" provides guidelines and a methodology for calculating the upper limits (the Derived Release Limits) for the rate of release of radionuclides discharged into the atmosphere and surface waters, based on limiting radiation exposures to members of the public.

SRB's derived release limit (DRL) report "*Derived Release Limits for the SRB Pembroke Facility*", was submitted with SRB's licence renewal application. Any new or revised DRL report is to be submitted for CNSC staff review and acceptance before the report is finalized.

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

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CNSC	Environmental Protection Policies, Programs and Procedures.	REGDOC-2.9.1	1
CSA	Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills	N288.4	2010

Transition plan

The licensee is expected to conduct a gap analysis of its current environmental monitoring program against CSA standard N288.4-10, "Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills" by December 31, 2015. Following the gap analysis, the revised environmental monitoring program is expected to be completed by June 30, 2016.

The following compliance verification criteria will be used during the transition period. These requirements identify, control, and monitor all releases of radioactive and hazardous substances and the effects on the environment from facilities or as the result of licensed activities.

1. The licensee shall have a documented environmental protection program for the facility. This program should cover control of all radioactive and hazardous releases to the environment and the assessment of those releases on the environment.

2. The licensee's environmental protection program shall include an environmental management system that conforms to CNSC Regulatory Document REGDOC-2.9.1: Environmental Protection Policies, Programs and Procedures

3. The licensee's environmental protection program shall include an effluent monitoring program.

4. The licensee's environmental protection program shall have an environmental monitoring program.

5. The licensee's environmental protection program shall ensure the control, monitoring and recording of releases of tritium to the environment from the nuclear facility such that the releases do not exceed the release limits specified in Appendix E of this LCH.
6. The licensee environmental protection program shall have action levels for atmospheric releases of tritium to the environment are found in the *Licence Limits, Action Levels And Administrative Limits* document. They are:

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

CHART RECORDER MEASUREMENT
10,000 µCi/m^3 for a duration of one hour

7. When the licensee becomes aware that an environmental action level has been reached, it shall notify the Director of NPFD (a person authorized by the Commission, see Part I section 1.2), within seven days.

8. The licensee shall review and if necessary, revise the Action Levels at a frequency of once per five years to validate their effectiveness.

9. The licensee's environmental protection program shall include a groundwater monitoring program or procedures that include the sampling of groundwater at the wells at the following locations at the frequency specified below.

Location	Frequency
MW series wells	Monthly
CN wells	The months of March, July and November
Residential wells	The months of March, July and November

10. The licensee's environmental protection program shall control and monitor the releases of hazardous substances.

11. The licensee's environmental protection program shall conform with the requirements of federal and provincial environmental regulations.

In Accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Environmental Management System		Y
EH&S Manual Environmental Monitoring Program		Y
Licence Limits, Action Levels and Administrative Limits		Y

Recommendations and Guidance

There are no recommendations or guidance.

11 SCA-EMERGENCY MANAGEMENT AND FIRE PROTECTION

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

11.1 Emergency Management Program

Licence Condition 11.1

The licensee shall implement and maintain an emergency management program.

Preamble

As part of the emergency management 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 on-site activities and cooperating with external response organizations throughout all phases of an emergency.

Compliance Verification Criteria

Relevant Documents that Require Version Control

Source	Document Title	Document #	Revision #
CNSC	*Nuclear Emergency Preparedness and Response*	REGDOC 2.10.1	2014
CNSC	*Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills*	G-225	2001
CNSC	*Testing the Implementation of Emergency Measures*	RD-353	2008

Transition Plan

The licensee shall be in compliance with REGDOC-2.10. *Nuclear Emergency Preparedness and Response* by September 30, 2015.

Until the necessary changes have been implemented in the emergency management program, the previous CNSC regulatory criteria from G-225 *Emergency Planning at Class I Nuclear Facilities and Uranium Mines and Mills* and RD-353 *Testing the Implementation of Emergency Measures* will remain in effect and the following compliance verification criteria will be used during the transition period.

Criteria for Emergency Management Program

1. The licensee shall prepare and maintain a program to ensure that the facility is prepared for and has a planned response to emergencies. This program shall include

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

Criteria for Onsite Emergency Plan

2. The licensee shall prepare an onsite emergency plan and establish the necessary organizational structure for clear allocation of responsibilities, authorities, and arrangements for coordinating site activities and cooperating with external response organizations throughout all phases of an emergency.

3. The licensee shall establish and keep up to date written emergency procedures that clearly define the responsibility and actions of staff in responding to any fire at the facility.

4. The licensee shall develop, keep up to date, and train for, a fire fighting strategy to cover areas in which a fire might affect items important to safety and protection of radioactive materials.

5. When reliance for manual firefighting capability is placed on an offsite resource, the licensee shall provide proper coordination between the facility personnel and the offsite response group, in order to ensure that the latter is familiar with the hazards of the facility.

6. If the facility personnel are required to be involved in firefighting, the licensee shall document their organization, minimum staffing level, equipment, fitness requirements, and training, and their adequacy shall be confirmed by a competent person.

Criteria for Emergency Equipment and Facilities

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

Criteria for Emergency Response

8. The licensee shall make arrangements for responding to events requiring protective measures at the scene for:

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

9. The licensee shall make arrangements to promptly alert the offsite responsible authorities.

In Accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification
Emergency Plan		Y

Recommendations and Guidance

There are no recommendations or guidance.

11.2 Fire Protection Program

Licence Condition 11.2

The licensee shall implement and maintain a fire protection program.

Preamble

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

This SCA also includes the requirement for the licensee to have a fire protection program to minimize the risk to the health and safety of persons and to the environment from fire, through appropriate fire protection system design, fire safety analysis, fire safe operation and fire prevention.

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CSA	Fire protection for Facilities that Process, Handle or Store Nuclear Substances.	N393	2013

Transition Plan

The licensee shall be in compliance with CSA N393-13 *Fire protection for Facilities that process, Handle or Store Nuclear Substances* by July 31, 2015.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification
Fire Protection Program		Y

Recommendations and Guidance

There are no recommendations or guidance.

12 SCA - WASTE MANAGEMENT

The Safety and Control Area “Waste Management” 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.

12.1 Waste Management Program

Licence Condition 12.1

The licensee shall implement and maintain a waste management program.

Preamble

Paragraph 3(1)(*j*) of the *General Nuclear Safety and Control Regulations* requires that a licence application contain information related to the in-plant management of radioactive waste or hazardous waste resulting from the licensed activities.

Paragraph 6(*e*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.

Clause 5.7.3 of CSA standard N292.3-08 "Management of low and intermediate-level radioactive waste," defines the requirements for a waste management program that includes strategies for waste minimization.

Compliance Verification Criteria

1. The licensee shall

    a. ensure that the production, in terms of both rate and volume, of radioactive waste is minimized;
    b. maintain adequate records of inventory and throughput of radioactive wastes produced

2. The licensee shall ensure, to the extent reasonably practicable, that

    a. radioactive waste produced is accumulated in a controlled and contained manner such that it cannot escape from such control or containment; and
    b. no leak or escape of nuclear substances or radioactive wastes can occur without being detected.

3. The licensee shall identify the characteristics of all radioactive and hazardous wastes that are produced in the course of the licensed activities.

4. The licensee shall not produce, in the course of the licensed activities waste for which there is no identified and approved treatment, or storage, or disposal facility.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification
Waste Management Program		Y

Recommendations and Guidance

Guidance on elements that should be included in the Waste Management Program is provided in the following documents:

a. CNSC Policy P-290, *Managing Radioactive Waste*

b. CNSC GD-320, *Assessing the Long Term Safety of Radioactive Waste Management*

c. Management of Low and Intermediate-Level Radioactive Waste, CSA N292.3, 2008

12.2 Preliminary Decommissioning Plan

Licence Condition 12.2

The licensee shall implement and maintain a Preliminary Decommissioning Plan.

Preamble

Paragraph 3(*k*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain a proposed plan for decommissioning of the nuclear facility.

This licence condition requires that the licensee maintain a Preliminary Decommissioning Plan (PDP).

A PDP provides an overview of the proposed decommissioning approach that is sufficiently detailed to assure that the proposed approach is, in the light of existing knowledge, technically and financially feasible and appropriate in the interests of health, safety, security and the protection of the environment. The PDP defines areas to be decommissioned and the general structure and sequence of the principle work packages. The PDP forms the basis for establishing and maintaining a financial guarantee that will assure adequate funding of the decommissioning plan.

The PDP and the cost estimate for decommissioning were finalized in the Preliminary Decommissioning Plan, e-Doc 4628632 and the Financial Guarantee, e-Doc 4657138.

Compliance Verification Criteria

Relevant documents that require version control:

Source	Document Title	Document #	Revision #
CSA	Decommissioning of Facilities Containing Nuclear Substances, issued July 2009	N294	2009

1. The preliminary decommissioning plan for the facility shall comply with CSA standard N294-09 *Decommissioning of Facilities Containing Nuclear Substances.*

2. The licensee shall maintain a decommissioning plan to reflect any changes in the site or nuclear facility. The decommissioning plan shall be revised at a minimum every five years, unless specified otherwise by the Commission.

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Preliminary Decommissioning Plan		Y

Recommendations and Guidance

CNSC regulatory document G-219 *Decommissioning Planning for Licensed Activities* provides guidance regarding the preparation of decommissioning plans for activities licensed by the CNSC. It also provides the basis for calculating the financial guarantees discussed in the regulatory document G-206 *Financial Guarantees for the Decommissioning of Licensed Activities* (further discussed under licence condition 1.3).

13 SCA- SECURITY

The Safety and Control Area “Security” covers the programs required to implement and support the security requirements stipulated in the regulations, in its licence, or in expectations for the facility or activity.

13.1 Security Program

Licence Condition 13.1

The licensee shall implement and maintain a security program.

Preamble

Paragraphs 3(1)(*g*) and (*h*) of the *General Nuclear Safety and Control Regulations* require that a licence application contain information related to site access control and measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information.

Paragraph 6(*l*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed measures to prevent acts of sabotage or attempted sabotage at the nuclear facility.

Paragraphs 12 (1) (*c*), (*g*), (*h*) and (*j*) of the *General Nuclear Safety and Control Regulations* , requires that the licensee shall demonstrate that measures will be in place to maintain the security of nuclear facilities and of nuclear substances, implement measures for alerting the licensee to the illegal use or removal of a nuclear substance, prescribed equipment or prescribed information, or the illegal use of a nuclear facility, and instruct the workers on the physical security program at the site of the licensed activity and on their obligations under that program.

Compliance Verification Criteria

In accordance with licence condition 1.2 , the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Facility Security		Y

1. The licensee shall implement and maintain security measures to prevent persons from carrying out actions capable of affecting the safe and secure operation of the facility. These provisions shall include physical protection, and emergency preparedness.

2. 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.

Recommendations and Guidance

International Atomic Energy Agency, 2008, Nuclear Security Series # 9, Security in Transport of Radioactive Material.

International Atomic Energy Agency, 2009, Nuclear Security Series # 11, Security of Radioactive Material and Associated Facilities.

International Atomic Energy Agency, 2011, Nuclear Security Series # 14, Nuclear Security Recommendation on Radioactive Material and Associated Facilities.

International Atomic Energy Agency, 2011, Nuclear Security Series # 15, Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control.

14 SCA-PACKAGING AND TRANSPORT

The Safety and Control Area "Packaging and Transport" covers the safe packaging and transport of nuclear substances to and from the licensed facility.

14.1 Packaging and Transport Program

Licence Condition 15.1

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

Preamble

Paragraph 6(*e*) of the *Class I Nuclear Facilities Regulations* requires that a licence application contain information on the proposed procedures for transporting nuclear substances.

Every person who transports radioactive material, or requires it to be transported, shall act in accordance with the requirements of the *Transportation of Dangerous Goods Regulations* and the *Packaging and Transport of Nuclear Substances Regulations*.

The *Packaging and Transport of Nuclear Substances Regulations* and the *Transportation of Dangerous Goods Regulations* provide specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Compliance Verification Criteria

1. The licensee shall implement and maintain a packaging and transport program that is in accordance with the requirements set out in the *Transportation of Dangerous Goods Regulations* and in the *Packaging and Transport of Nuclear Substances Regulations.*

In accordance with licence condition 1.2, the following documents require written notification of changes made:

Document Title	Document #	Prior Notification?
Packaging and Shipping General Requirements	SHP-001	N
Document – Dangerous Goods Document	SHP-005	N
Radiation Safety Program		Y

Recommendations and Guidance

Not applicable.

APPENDIX A - Control of the LCH

This appendix describes the administrative processes used to control the LCH, including LCH change control procedure, change review criteria, dispute resolution, records management and reporting to the Commission.

A.1 LCH Change Control Process

Only those authorized in Part I, section 1.2 of this LCH have the authority to make changes to the LCH.

A change control process is applied to the LCH to ensure that:

a. Preparation and use of the LCH are properly controlled

b. All referenced documents are correctly identified and maintained

c. Changes are conducted in accordance with CNSC Regulatory Policy P-299, *Regulatory Fundamentals*

d. Procedures for modifying the LCH are followed

The licensing basis is defined at licence issuance/renewal. A request to change this LCH can be initiated by either CNSC staff or the licensee. The licensee will be consulted on any changes to the LCH that are proposed by CNSC staff.

Those incumbents identified in Part I, section 1.2 may consent to the requested change only once they have determined that the proposed change will not change the objective of the licensing basis.

The following are examples of proposed changes that require a change to the LCH or a document referenced in the LCH:

a. Changes to the design and/or operation of facilities, processes and equipment

b. Clarification of the compliance verification criteria text to achieve a common understanding between the licensee and CNSC staff

c. Changes to the codes, standards and regulatory documents which are identified as compliance verification criteria

d. Changes to recommendations and guidance such as inclusion or amendment of CNSC regulatory guidance documents or recommendations

CNSC staff will take the following steps to update the LCH:

1. The CNSC receives or initiates a notification of proposed change.
2. Initiate a change request using the *LCH Change Request Form* (provided below).
3. Complete a technical review of the proposed change, if required.
4. Consult the licensee. In case of disagreement on the proposed change, the dispute resolution process outlined in section A.3 will apply.
5. Obtain consent for changes from both parties.
6. Update the LCH in accordance with the agreed amendment(s) and send the updated document to the parties identified on the distribution list (see section A.5).

If the change involves the revision of a Written Notification (WN) document, NPFD will also update the registry it uses to track the version history of the WN documents.

LCH CHANGE REQUEST FORM

SRB Technologies (Canada) Inc. NSPFOL- 130.00/2015Licence Conditions Handbook (LCH) Change Request Form		
Document Title	**Current Rev No.**	**Document's E-Docs No.**
REVISION REQUEST INFORMATION		
Requestor	**Division**	**Date of Request: MM / DD / YY**
Line Manager	☐ **Concur with request** ☐ **Do Not Concur**	
Description of Problem to be Resolved: (additional space on reverse of form)		
Proposed Changes: (additional space on reverse of form)		
Other Documents Potentially Affected by Proposed Changes		
SUBJECT MATTER EXPERT (SME) ASSESSMENT		
SME	☐ **Concur with request** ☐ **Do Not Concur**	**Date: MM / DD / YY**
Assessment Comments:		

Revisions to be Reviewed by: (Check off all applicable divisions) Director General – Directorate of Nuclear Cycle and Facilities Regulation			
Name	**Change Request Approved** ☐ YES ☐ NO	**Date: MM / DD / YY**	**Signature**

A.2 Document Control and Approval/Consent

Document Control and Oversight

Following CNSC staffs acceptance of version control documents, the CVC found in the LCH may require updates. The delegated authority identified in section 1.2 has the authority to make the changes to the CVC as long as the changes remain within the licensing basis.

The CNSC uses a risk-informed process to determine the type of regulatory oversight that is appropriate for each licensee document in the licensing basis.

CNSC Review Criteria Related to Document Changes and Approvals/Consent

For the acceptance of document changes described above, CNSC staff verifies if the licensee submission includes the appropriate level of information with regards to the proposed changes or action, to the extent relevant:

- a summary description;
- an indication of the duration (temporary or permanent);
- a justification;
- any relevant supporting documentation;
- an evaluation of the impact on health, safety, security, the environment and Canada's international obligations; and
- an evaluation to determine if the resultant effects remain within the scope of the licensing basis.

The CNSC then assesses whether the following general criteria would be met for the proposed change/action:

- The proposed change or action will be made or done in accordance with licensee's quality assurance and change control processes, applicable design guides, design requirements, standards, operating documentation, regulatory documents, applicable safety principles and applicable safeguards agreement.
- The proposed change or action is in a safety neutral or safety positive direction.
- Following the proposed change or action:
    - the licensee remains qualified to carry out the licensed activity;
    - the licensee remains in compliance with the requirements set out in the applicable laws, regulations and licence;

- the licensee has adequate provision for the protection of the health and safety of persons, protection of the environment, maintenance of national security and measures required to implement international obligations to which Canada has agreed, and
- the licensed activity remains within the limits defined by the licensing basis.

A.3 Dispute Resolution

In case of a dispute between the licensee and CNSC staff regarding changes to the LCH, both parties will meet to discuss the dispute and reach a decision on the path forward. The decision, including its rationale will be documented. If any party is not satisfied with the decision, the resolution process will proceed up to the Director, Director General or Executive Vice-President and Chief Regulatory Operations Officer level. If any party is still not satisfied with the decision, the issue will be brought to the attention of the Commission at a Commission meeting or hearing. The decision made by the Commission will be final.

A.4 Records Management

In order to track changes to the LCH, the document change request and accompanying documentation will be archived in records and referenced in the revision history of the LCH. Electronic communication related to the change, such as comments from reviewers will be stored in the CNSC Information Management System.

A.5 Distribution

NPFD staff will distribute a copy of the updated version of the LCH to the following parties:

- Project Officer, Nuclear Processing and Facilities Division
- SRB Technologies (Canada) Inc.

A.6 Reporting to the Commission

CNSC staff will report on the changes made to the LCH during the previous year in their annual report to the Commission.

APPENDIX B - Glossary of Terms

Acronyms

The following is the list of acronyms used in this document:

AL	Action Level
ALARA	As Low As Reasonably Achievable, social and economic factors taken into consideration
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DCR	Document Change Request
DNCFR	Directorate of Nuclear Cycle and Facilities Regulation
EP	Environmental Protection
HRSDC	Human Resources and Skills Development Canada
IAEA	International Atomic Energy Agency
LC	Licence Condition
LCH	Licence Conditions Handbook
NPFD	Nuclear Processing and Facilities Division
NSCA	Nuclear Safety and Control Act
PDP	Preliminary Decommissioning Plan
RP	Radiation Protection
SAT	Systematic Approach to Training
SCA	Safety and Control Area
WN	Written Notification

APPENDIX C – Documents in support of Licence Application

Documents submitted by the licensee in support of the licence application and ongoing licensing requirements that are referenced within the LCH.

Notes:

N = Notification Required, as described in LC 1.2.

P = Prior Notification and Acceptance Required, as described in LC 1.2.

e-Doc 4472953 maintains document version control of the documents referenced below.

Document Title	Document Number	Notification Requirement	Licence Conditions
Financial Guarantee		Yes	1.3
Public Information Program		No	1.4
Quality Manual		Yes	2.1
SRBT Training Program Manual		No	3.1
Tritium Inventory Management		No	4.1
Safety Analysis Report		Yes	5.1
Maintenance Program		Yes	7.1
Radiation Safety Program		Yes	8.1
Licence Limits, Action Levels and Administrative limits		Yes	8.1
Health and Safety Policies and Procedures		Yes	9.1
Hazard Prevention Program		Yes	9.1
Environmental Management System		Yes	10.1
Environmental Monitoring Program		Yes	10.1

Document Title	Document Number	Notification Requirement	Licence Conditions
Derived Release Limits		Yes	10.1
Emergency Plan		Yes	11.1
Fire Protection Program		Yes	11.2
Waste Management Program		Yes	12.1
Preliminary Decommissioning Plan		Yes	12.2
Facility Security Program		Yes	13.1
Packing and Shipping General Requirements SHP-001		No	14.1
Document - Dangerous Goods SHP-005		No	14.1

APPENDIX D - List of Documents used as Guidance or Criteria

Document #	Document Title	L.C.
INFO-0795	Licensing Basis Objective and Definition	1.1
G-206	Financial Guarantees for the Decommissioning of Licensed Activities, issued June 2000	1.3, 12.2
RD/GD-99.3	Public Information and Disclosure	1.4
TPED-01	Objectives and Criteria for Regulatory Evaluation of Nuclear Facility Training Programs	3.1
e-Doc 3471152	Annual Compliance Monitoring and Operational Performance Reporting Requirements for Class 1A and 1B Nuclear Facilities.	4.2
G-129	Keeping Radiation Exposures and Doses “As Low As Reasonably Achievable (ALARA)”, issued October 2004.	8.1
G-228	Regulatory Guide, “Developing and Using Action Levels”, March 2001	8.1
G-91	Ascertaining and Recording Radiation Doses to Individuals	8.1
S-260	Making Changes to Dose-Related Information Filed with the NDR	8.1
REGDOC 2.9.1	Environmental Protection Policies, Programs and Procedures	10.1
CSA Standard N393	Fire protection for Facilities that Process, Handle or Store Nuclear Substances	11.1

Document #	Document Title	L.C.
G-225	Emergency Planning at Class I Nuclear Facilities and Uranium Mines, issued August 2001	11.1
P-299	Regulatory Fundamentals	Appendix A
CNSC Policy P-290	Managing Radioactive Waste	12.1
GD-320	Assessing the Long Term Safety of Radioactive Waste Management	12.1
CSA N292.3, 2008	Management of Low and Intermediate-Level Radioactive Waste	12.1
CSA N294	Decommissioning of Facilities Containing Nuclear Substances, issued July 2009	12.2
G-219	Decommissioning Planning for Licensed Activities, issued June 2000	12.2

APPENDIX E – Environmental Release Limits

To Atmosphere

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

To Sewer

Nuclear Substance and Form	Limits (Bq/year)
Tritium-Water Soluble	2.0E+11

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CURRENT LICENCE

e-Doc 3567309 (Word)

e-Doc 3567309 (PDF)

Your file Votre référence

Our file Notre référence

2.02

NUCLEAR SUBSTANCE PROCESSING FACILITY OPERATING LICENCE

SRB TECHNOLOGIES (CANADA) INCORPORATED

I) LICENCE NUMBER: **NSPFOL-13.00/2015**

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, 2010 to June 30, 2015, unless suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

a) operate a tritium processing facility (hereinafter "the facility") at the location named in Part II of this licence;

b) possess, transfer, use, process, manage, and store the nuclear substances that are required for, associated with, or arise from the activities described in a); and

c) possess a maximum of 6000 terabecquerel of tritium in any form.

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 content of Appendix A, "RELEASE LIMITS", attached to this licence forms part of the licence.

c) The "SRBT LICENCE CONDITIONS HANDBOOK (LCH)" provides 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 described in the LCH:

a) Changes to the safety and control measures described in the application and the documents needed to support that application are permitted provided that the objective of the licensing basis is met.

b) Changes that are outside of the boundary conditions set by the licensing basis are not permitted without the prior written approval of the Canadian Nuclear Safety Commission (hereinafter "the Commission").

1.2 The licensee shall give written notification to the Commission of any changes made to the documents needed to support the licence application.

1.3 The licensee shall, in the event of any conflict or inconsistency between licence conditions or codes, standards or regulatory documents referenced in this licence, direct the conflict or inconsistency to the Commission or a person authorized by the Commission, for regulatory interpretation.

2. MANAGEMENT SYSTEM

2.1 The licensee shall implement and maintain a management system for the facility.

2.2 The licensee shall give written notification of any changes to the programs or documents referenced in the management system prepared to meet condition 2.1.

2.3 The licensee shall maintain and implement a process for reporting to the Commission that includes reporting of all events required by the *Nuclear Safety and Control Act* and its Regulations, and routine reports on the results of monitoring programs. The process shall define the frequency of the routine reports.

2.4 The licensee shall prepare an annual compliance and performance report.

2.5 The licensee shall implement and maintain a program for public information for the facility, including a public disclosure protocol.

3. HUMAN PERFORMANCE MANAGEMENT

3.1 The licensee shall implement and maintain a program for training staff for the facility.

4. OPERATING PERFORMANCE

4.1 The licensee shall implement and maintain a program for operation of the facility.

4.2 The operating program shall provide direction for safely operating the facility and shall reflect the safety analysis referred to in condition 5.1.

4.3 The licensee shall ensure that its workers handle radioactive nuclear substance in accordance with written work procedures. These procedures shall be provided to all workers and shall be available wherever radioactive nuclear substances are handled or stored.

4.4 Unsealed source material shall be stored on uranium beds or in the handling volumes of the gas fill rigs.

4.5 The licensee shall establish and maintain, in addition to any record required to be maintained pursuant to the *Nuclear Safety and Control Act* and its Regulations, full and accurate records to show:

a) the acquisition of nuclear substances including the quantity received, the form of the substance, and the name of the vendor;

b) the inventory of all radioactive nuclear substances at the facility; and

c) the disposition of all nuclear substances acquired for use or processed by the facility, including the name and address of the recipient, a copy of the recipient’s licence (if applicable), the quantity of radioactive nuclear substance, and the date of shipment.

5. SAFETY ANALYSIS

5.1 The licensee shall have safety analysis documentation that describes the safety analysis for the facility.

6. PHYSICAL DESIGN

6.1 The licensee shall not make any change to the design of, or equipment at the nuclear facility, that would introduce hazards different in nature or greater in probability than those considered by the safety analysis, without the prior written approval of the Commission or a person authorized by the Commission.

7. FITNESS FOR SERVICE

7.1 The licensee shall implement and maintain a program for maintenance for the facility.

7.2 The licensee shall implement and maintain a program for periodic inspection and testing for the facility.

8. RADIATION PROTECTION

8.1 The licensee shall implement and maintain a program for radiation protection for the facility.

8.2 The licensee shall notify the Commission within 24 hours of becoming aware that an action level has been exceeded and shall file a written report within 21 working days of becoming aware of the matter.

9. CONVENTIONAL HEALTH AND SAFETY

9.1 The licensee shall implement and maintain a program for occupational health and safety for the facility.

10. ENVIRONMENTAL PROTECTION

10.1 The licensee shall implement and maintain an environmental protection program for the facility.

10.2 The licensee shall control, monitor and record releases of tritium to the environment from the nuclear facility such that the releases do not exceed the release limits specified in Appendix A.

10.3 The licensee shall control and monitor the releases of hazardous substances.

10.4 The licensee shall notify the Commission within 24 hours of becoming aware that an action level for environmental releases has been exceeded and shall file a written report within 21 working days of becoming aware of the matter.

11. EMERGENCY MANAGEMENT AND FIRE PROTECTION

11.1 The licensee shall implement and maintain a program for emergency preparedness to address on-site and off-site events which can affect the facility.

11.2 The licensee shall implement and maintain a program for fire protection for the facility.

12. WASTE MANAGEMENT

12.1 The licensee shall implement and maintain a program for waste management for the facility.

12.2 The licensee shall maintain a preliminary decommissioning plan for decommissioning the facility. This shall be reviewed every five years or when requested by the Commission or person authorized by the Commission

13. SECURITY

13.1 The licensee shall implement and maintain a program for nuclear security at the facility.

14. SAFEGUARDS

14.1 The licensee shall take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement.

14.2 The licensee shall provide the International Atomic Energy Agency, an International Atomic Energy Agency inspector or a person acting on behalf of the International Atomic Energy Agency with such reasonable services and assistance as are required to enable the International Atomic Energy Agency to carry out its duties and functions pursuant to a safeguards agreement.

15. PACKAGING AND TRANSPORT

15.1 The licensee shall implement and maintain a program for packaging and transport for the facility.

16. NUCLEAR FACILITY SPECIFIC

16.1 The licensee shall comply with the payment schedule for arrears on the CNSC Cost Recovery Fees that has been accepted by the Commission.

16.2 The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission and payments to any decommissioning escrow account shall be according to the schedule accepted by the Commission.

16.3 The licensee shall submit to the Commission an annual Review Engagement Report reporting the gross revenue and profits of the company.

SIGNED at OTTAWA this 30 day of June, 2010.

M. Binder

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

APPENDIX A

RELEASE LIMITS

To Atmosphere

Nuclear Substances and Form	Limits (Bq/year)
Tritium as Tritium Oxide	6.72E + 13
Total Tritium as Tritium Oxide and Tritium Gas	4.48E+ 14

To Sewer

Nuclear Substance and Form	Limits (GBq/year)
Tritium-Water Soluble	200