Preliminary Decommissioning Plan

April 2026

EXECUTIVE SUMMARY

SRB Technologies (Canada) Inc. (SRBT) is the world's leading producer of gaseous tritium light sources (GTLS) – flame-sealed borosilicate glass capsules which are internally coated with a phosphorescent powder, and vacuum back-filled with high-purity tritium gas.

The low-energy beta particles emitted during the decay of the tritium gas interact with the phosphorescent powder and produce visible light. These light sources are then installed into various devices that require a reliable light source without electrical power or other extraneous power source.

As prescribed by the *Class I Nuclear Facilities Regulations*, and as required by licence condition 11.2 of operating licence NSPFL-13.00/2034, SRBT is required to document and maintain a decommissioning plan. These requirements are met by this Preliminary Decommissioning Plan (PDP), which represents an important component of the licensing basis of the SRBT Class I nuclear facility.

As required by the SRBT Licence Conditions Handbook (LCH), this version of the PDP has been developed in accordance with Canadian Nuclear Safety Commission (CNSC) Regulatory Document (REGDOC)-2.11.2, *Decommissioning* as well as in line with the requirements and applicable informative annexes of Canadian Standards Association (CSA) standard N294-19, *Decommissioning of facilities containing nuclear substances*

Within the PDP, feasible decommissioning envelopes for the entire facility are established and documented which can be accomplished with low risk to the health and safety of the decommissioning personnel, the public, and the environment.

The PDP must also describe the expected costs associated with completing facility decommissioning. Once accepted by the CNSC, these costs establish the magnitude of the financial guarantee for decommissioning that must be put in place, in accordance with condition G.3 of NSPFL-13.00/2034, and REGDOC-2.11.2.

The PDP helps to ensure that the SRBT facility is able to adequately prepare for the future costs of decommissioning, and to help identify potential issues well in advance so that solutions can be pursued proactively.

SRBT Preliminary Decommissioning Plan

April 2026

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APRIL 10/2026
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Revision History

Release Date	Reviewed By	Revision Notes
March 14, 2006	S. Levesque S. MacDougall	
January 30, 2007	S. Levesque	Document revised to address comments in CNSC staff letter dated July 5, 2006. Changes outlined in SRBT letter dated January 30, 2007 tilted “CNSC Review of the Preliminary Decommissioning Plan and the Associated Cost Estimate plus Financial Guarantee”.
June 15, 2007	S. Levesque	Document revised to address comments in CNSC staff letter dated February 23, 2007. Changes outlined in SRBT letter dated June 15, 2007 titled “CNSC Review of the Preliminary Decommissioning Plan and the Associated Cost Estimate plus Financial Guarantee”.
March 20, 2008	S. Levesque	Document revised to reflect acceptance of the Financial Guarantee for the Safe State of closure by hearing dated September 12, 2007. Document now also includes final “Escrow Agreement” and “Financial Security And Access Agreement” signed by CNSC President on January 14, 2008.
June 11, 2008	R. Fitzpatrick S. Levesque	Document revised to reflect submission of SRBT letter dated June 11, 2008 tilted “Financial Guarantee for the Full Cost of the Decommissioning and Cost Recovery Fee Arrears”.
March 31, 2009	R. Fitzpatrick S. Levesque	Document revised to reflect acceptance of the Financial Guarantee by hearing dated April 3, 2008 and June 12, 2008. Document also includes latest final “Escrow Agreement” and “Financial Security And Access Agreement” signed by CNSC President on February 20, 2009.
June 23, 2013	K. Belec R. Fitzpatrick S. Levesque	Document revised to meet requirement for review every five years.
June 20, 2014	S. Levesque D. McNab T. Donahue	Document revised to address comments in CNSC staff letters dated September 17, 2013 and January 14, 2014.

Revision History (continued)

Release Date	Reviewed By	Revision Notes
November 13, 2014	S. Levesque D. McNab T. Donahue	Document revised to address comments in CNSC staff letters dated August 22, 2014 and November 7, 2014
November 29, 2019	R. Fitzpatrick K. Levesque S. Levesque J. MacDonald	Plan revised in accordance with compliance verification criterion 3 under section 12.2 of Part II of the SRBT Licence Conditions Handbook, which states that "*The decommissioning plan shall be revised at a minimum of every five years, unless otherwise specified by the Commission*".
November 29, 2024	O. Egan R. Fitzpatrick K. Levesque S. Levesque J. MacDonald T. Sennett	Plan revised in accordance with compliance verification criteria in section 11.2 of the LCH for NSPFL-13.00/2034, which states "*The licensee shall revise the PDP at a minimum every 5 years, or if there are any changes to the facility operations or design that affect the estimated cost of decommissioning. When the PDP is revised, the cost of decommissioning shall be reviewed*". Revised in accordance with latest applicable regulatory requirements and guidance included in the LCH, including CNSC REGDOC-2.11.2, *Decommissioning,* and CSA standard N294:19, *Decommissioning of Facilities Containing Nuclear Substances*.
June 20, 2025	CNSC staff	Addendum added in response to CNSC staff feedback received April 24, 2025.
April 10, 2026	O. Egan R. Fitzpatrick K. Levesque S. Levesque J. MacDonald T. Sennett	Revised to incorporate information from June 20, 2025 addendum into main body of plan (except for two future recommendations, which will be incorporated in 2031), and to incorporate specific feedback provided by CNSC staff during a focused meeting on December 3, 2025, including revision of the labour rates applied for decommissioning tasks and activities to increase accuracy of estimate, and five of the seven recommendations for future revisions of the plan.

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Acronyms and Abbreviations

CCL	Conditional Clearance Level
CLW	Clearance-level Waste
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DCGL	Derived Concentration Guideline Level
DDP	Detailed Decommissioning Plan
DSL	Dosimetry Service Licence
DU	Depleted Uranium
EMS	Environmental Management System
ERA	Environmental Risk Assessment
FG	Financial Guarantee
GTLS	Gaseous Tritium Light Source
HTO	Tritium Oxide
LCH	Licence Conditions Handbook
LLW	Low-level Waste
LSC	Liquid Scintillation Counting
MARSSIM	Multi-Agency Radiation Site Survey Investigation Manual
NEW	Nuclear Energy Worker
NSPFL	Nuclear Substance Processing Facility Licence
OBT	Organically-bound Tritium
PDP	Preliminary Decommissioning Plan
PIP	Public Information Program
PPE	Personal Protective Equipment
REGDOC	Regulatory Document
SRBT	SRB Technologies (Canada) Inc.
WMP	Waste Management Program

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1. Background

On March 14, 2006 SRB Technologies (Canada) Inc. (SRBT) submitted to the Canadian Nuclear Safety Commission (CNSC) staff a Preliminary Decommissioning Plan[1] (PDP).

In a letter[2] dated July 6, 2006 CNSC staff provided SRBT comments on the submitted PDP. SRBT addressed these comments in a letter[3] dated January 30, 2007.

In a letter[4] dated February 23, 2007, CNSC staff provided SRBT additional comments specifically on the cost estimate included in the PDP. SRBT addressed these comments in a letter[5] to CNSC staff dated June 15, 2007.

As reported in CNSC staff Commission Member Document (CMD) 07-H145[6] released on July 27, 2007, CNSC staff subsequently reviewed and accepted the revised cost estimate and a hearing was held by the Commission on September 12, 2007, to approve the Financial Guarantee (FG) for the Safe State of Closure of the facility.

In a Record of Proceedings, Including Reasons for Decision[7] released by CNSC on October 23, 2007 after the hearing, the Commission accepted the FG provided by SRBT for the safe state of closure of its facility.

In a letter[8] dated June 11, 2008, SRBT provided CNSC staff a proposal for funding of the full value of the FG. CNSC staff subsequently reviewed SRBT's proposal and recommended[9] at a licence hearing on June 12, 2008 that the Commission accept the proposed funding schedule for the full value of the FG.

In a Record of Proceedings, Including Reasons for Decision[10] released on June 26, 2008 after the hearing, the Commission accepted the FG provided by SRBT for the full value.

On June 23, 2013, SRBT submitted to the CNSC staff a revised Preliminary Decommissioning Plan[11]. In a letter[12] dated September 17, 2013, CNSC staff provided SRBT comments on the revised PDP. SRBT addressed these comments in a letter[13] dated November 19, 2013.

In a letter[14] dated January 15, 2014, CNSC staff provided SRBT with additional comments specific to an overview of the radiological, chemical and physical conditions predicted to exist at end of operations and FG requirements.

SRBT then hired consultants Doug McNab of D&J Consulting, and Terry Donahue of RadSafe Canada Ltd., to revise SRBT's PDP to address both CNSC staff comments and make changes and improvements to the PDP based on their knowledge of decommissioning other CNSC licensed facilities.

Mr. Donahue and Mr. McNab were directly involved in the full decommissioning of Shield Source Inc., in Peterborough, Ontario, which had been a CNSC licensed facility with operations very similar to that of SRBT.

On June 20, 2014, SRBT submitted to CNSC staff a newly revised PDP[15] which addressed CNSC staff comments from two letters dated September 17, 2013[12], and January 15, 2014[14]. On August 22, 2014[16] CNSC staff provided comments on the review of SRBT's revised PDP and FG.

In a response[17] dated September 21, 2014, SRBT provided CNSC staff a response to the comments from the CNSC staff letter[16] dated August 22, 2014.

In an e-mail[18] dated October 27, 2014, CNSC staff responded and indicated SRBT had addressed all comments; however, not enough justification was given for decreasing the contingency factor from 25% to 15%.

In a letter[19] dated October 30, 2014, SRBT proposed to CNSC staff that a contingency factor of 10% shall be applied in the FG only for those definitive projected operational costs which are strictly included in the 'running costs', as such costs are based on known expenditures. These include known, fixed costs such as electricity costs, heating, rent and similar costs. A contingency factor of 25% was to be applied to all other FG costs projected within the PDP.

In a letter[20], dated November 7, 2014, CNSC staff provided SRBT a response accepting the proposal to use a 10% contingency for running costs and 25% contingency factor added to all other listed phase items, as this has been accepted previously.

CNSC staff accepted the 2014 version of the PDP on November 24, 2014[21], noting that previous comments had been addressed.

In 2019, SRBT revised the PDP in accordance with the guidelines and requirements described in regulatory guide G-219, *Decommissioning Planning for Licensed Activities,* and in Canadian Standards Association (CSA) standard N294-09 (R2019), *Decommissioning of facilities containing nuclear substances.*

The 2019 version of the PDP was submitted to CNSC staff on November 29, 2019[22]. In a letter on February 3, 2020, CNSC staff informed SRBT that the revised PDP and cost estimate of $727,327.00 were acceptable[23].

A renewed, draft escrow agreement and financial security and access arrangement was provided to CNSC staff by SRBT shortly thereafter[24], and subsequently presented to the Commission for consideration as a revised FG by a panel of the Commission via a

hearing in writing[25]. A decision to accept the revised FG was made by the Commission on December 8, 2020[26].

Since the acceptance of the previous PDP and FG in 2020, there have been no significant changes in site conditions, nor incidents or events that would trigger an update. The criteria which would trigger an update of the PDP (as listed in section 6.1 of REGDOC-2.11.2) were not met or realized.

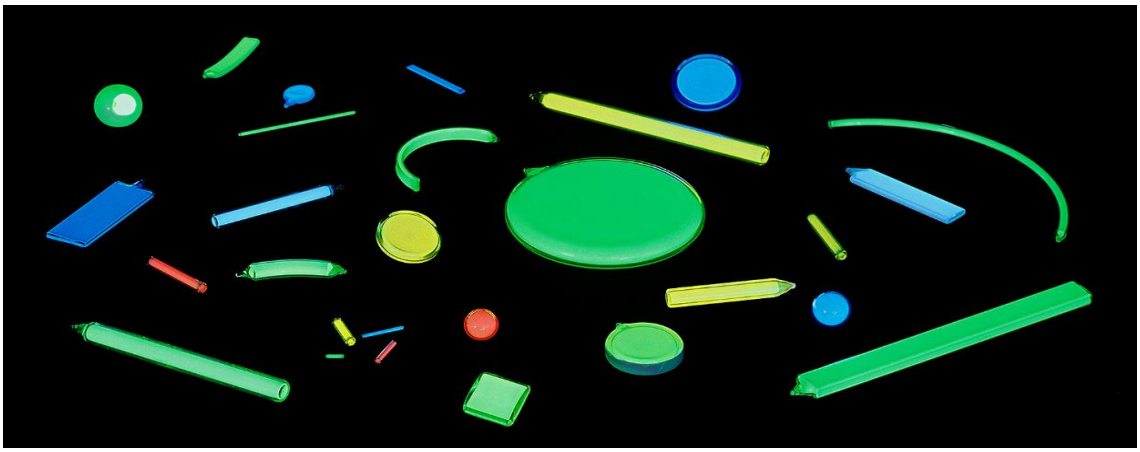
As such, this revision of the PDP and associated FG has been initiated as part of the five-year cycle of review and revision of this key licensing basis document, in accordance with section 11.2 of the in-force (Rev. 0) Licence Conditions Handbook (LCH) associated with NSPFL-13.00/2034.

This revision also incorporates information based on comments and feedback from CNSC staff on previously drafted revisions to the plan. This feedback was received by SRBT on April 24[27], October 8[28], and December 3, 2025[29].

2. Introduction

SRB Technologies (Canada) Inc. is a small company that has been in Pembroke since 1990, manufacturing gaseous tritium light sources. SRBT is the original developer of the gaseous tritium light source which is a glass capsule internally coated with luminescent powder and filled with tritium. The interaction between the particles emitted by the tritium and the luminescent coating produces light on a continuous basis.

Figure 1: VARIOUS TYPES OF TRITIUM LIGHT SOURCES PRODUCED BY SRBT



The products that SRBT manufactures which use these light sources are crucial to ensure the safety and security of people all over the world, including peace keeping forces. Other lighting technologies require wiring, power or batteries which result in a lack of reliability, portability and in some cases safety. Our lighting products do not use electricity thereby reducing energy consumption and aid the environment against climate change.

Figure 2: VARIOUS TYPES OF PRODUCTS PRODUCED BY SRBT

SRBT is licensed by the Canadian Nuclear Safety Commission under Nuclear Substance Processing Facility Licence number NSPFL-13.00/2034, which authorizes the operation of a Class I nuclear facility for the purpose of manufacturing radiation devices – specifically, gaseous tritium lights and devices that use these lights.

The requirements for such a licence are described in the *General Nuclear Safety and Control Regulations* and the *Class 1 Nuclear Facility Regulations*. In particular, Section 3(k) of the *Class 1 Nuclear Facilities Regulations* requires that every application for a licence in respect to a Class 1 nuclear facility, other than a license to abandon, shall contain the proposed plan for the decommissioning of the nuclear facility.

SRBT's PDP has been prepared in accordance CNSC REGDOC-2.11.2, *Decommissioning*, and in consideration of the guidance provided in CSA document N294-09 (R2019), *Decommissioning of facilities containing nuclear substances*.

SRBT must also estimate the cost for all activities included in their decommissioning plan in accordance with CNSC REGDOC-3.3.1, *Financial Guarantees for the Decommissioning of Nuclear Facilities and Termination of Licensed Activities.*

3. Scope

This document describes the preliminary plan for the decommissioning of the SRBT facility located at 320-140 Boundary Road, Pembroke, Ontario. It describes those actions that will be taken between the time that:

- A decision is made to permanently shutdown the facility, and
- The CNSC grants a Licence to Abandon, and the facility and possession of the leased premises are returned to the owner.

This document describes the preliminary plans for the decommissioning of the facility, as they exist on the date of approval of this plan. The PDP will be reviewed and updated every five years in accordance with the requirements of the SRBT LCH. It will also be updated should any of the criteria in section 6.1 of REGDOC-2.11.2 are met during the operations phase of the facility.

This PDP is intended for the purposes described in the introduction only, and will be used as the basis for developing the Detailed Decommissioning Plan (DDP), once a decision has been made to shutdown the facility.

The DDP will be prepared prior to the permanent shutdown of the facility, and will be submitted to the CNSC (and any other appropriate regulatory agency) in support of an application for a Licence to Decommission.

4. Geographic Description

4.1 Site Location – Area Under Control of Licensee

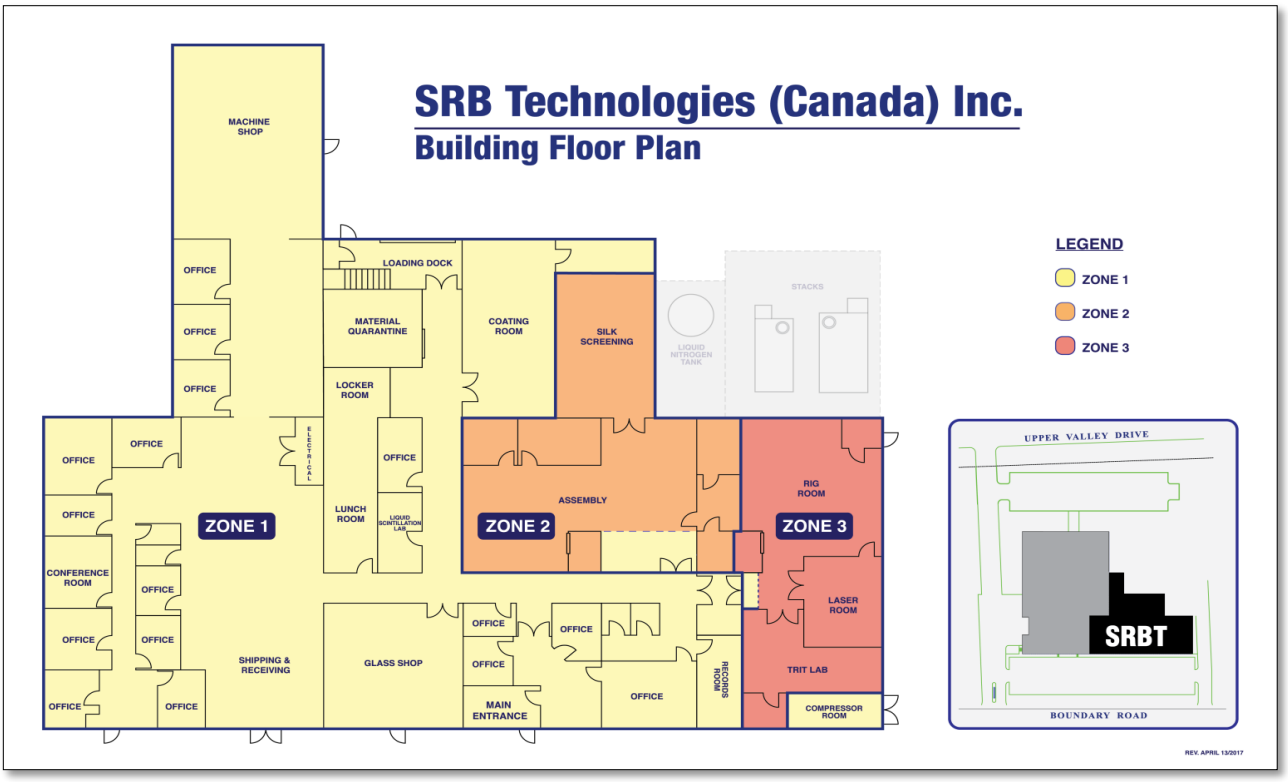
The SRBT facility is located at 320 Boundary Road in Pembroke, Ontario. Pembroke is located approximately 150 km northwest of Ottawa on the south shore of the Ottawa River at the mouth of the Muskrat River. The Muskrat River runs from south to north past Boundary Road approximately 500 meters to the east of SRBT and eventually discharges in the Ottawa River.

The building which houses the facility is situated on parts of lots 28 and 29 of Concession 1, and was constructed in 1990 with a slab-on-grade floor. The current zoning of the facility is M3 (Industrial Park Zone) as designated under municipal by-law 88-17. This zoning excludes residential use.

SRBT fully controls approximately 1,400 square metres of the interior floor space of the building, as well as the immediate surrounding grounds outside of the facility. A fenced compound is maintained on the northwest corner of the facility, housing the primary active ventilation system components (fans, motors, stacks).

The floor plan diagram below illustrates the area of the building and property that are under the direct control of SRBT.

Figure 3: SRBT FACILITY BUILDING FLOOR PLAN



4.2 Site Location – Surrounding Area

The SRBT facility resides within an area known as TransCanada Corporate Park – an industrial park within the boundary of the City of Pembroke.

Within the same building as the SRBT facility are two other commercial / industrial businesses. The adjacent business is a company that specializes in the manufacture of personal protective equipment and clothing intended for such application as bomb disposal and military special operations. A third tenant provides various industrial process gas and equipment to local customers.

Directly across the road from SRBT is a commercial pool and spa services vendor, as well as a small local propane distribution facility.

Land allocated for agricultural purposes lies generally to the west of the facility, extending out approximately 300-500 metres. As well, the headquarters of the Pembroke Fire Department is located due west of the facility.

The local detachment of the Ontario Provincial Police lies to the southwest, along with the Renfrew County District Health Unit. To the south there are two major-chain hotels as well as a local distillery and a truck stop.

To the north of the property is the Pembroke and Area Community Centre, which houses a full-size skating rink. Several other businesses are located within 500 metres to the north, east and north east.

The nearest zoned residential area is called Johnston Meadows, which was originally developed in the 1970s but has expanded since. From the location of the active ventilation system stacks, the nearest residential area is approximately 250 metres to the northwest. In addition, a narrow band of land along Boundary Road to the southeast is zoned residential.

The main portion of the City of Pembroke lies north of the facility. The population of Pembroke was most recently assessed by Statistics Canada[30] to number 14,364 persons.

Figure 4: SRBT FACILITY LOCATION

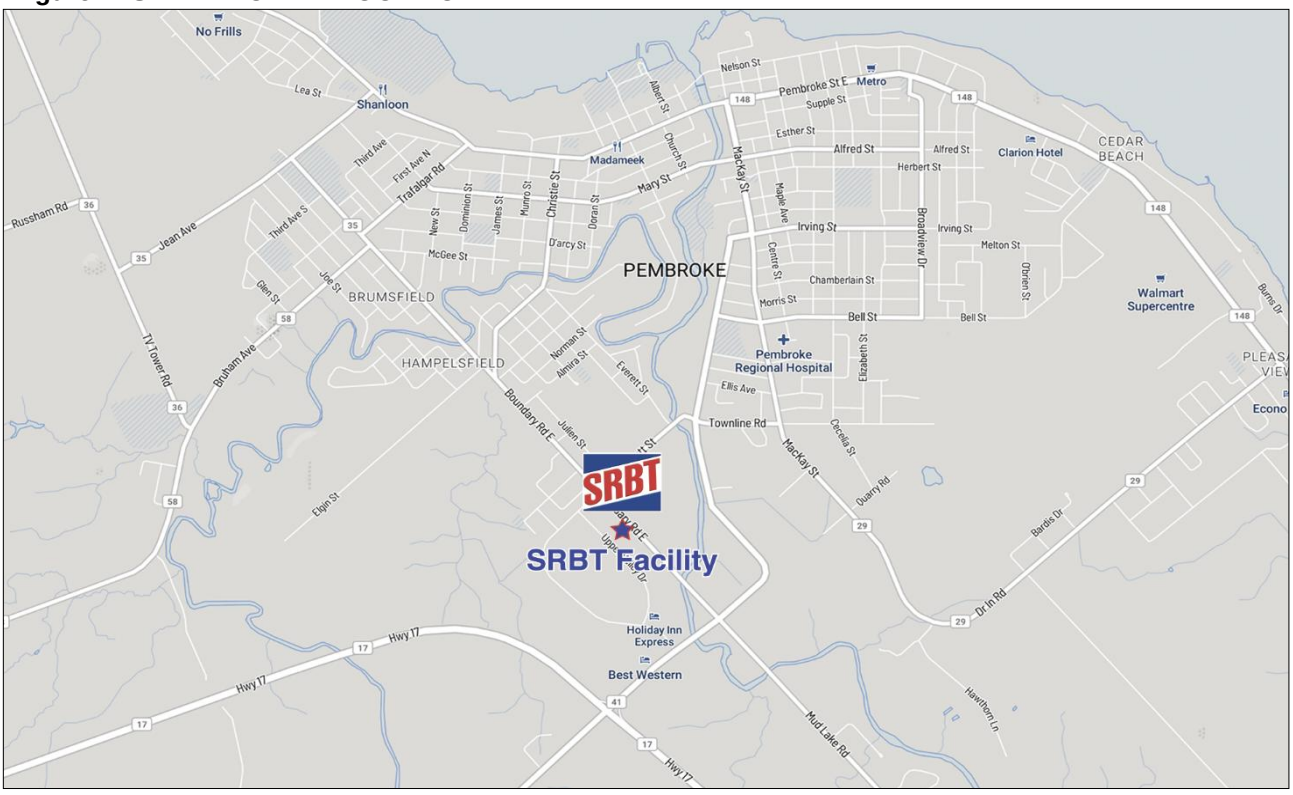


Figure 5: AERIAL PHOTOGRAPH LOOKING SOUTHWEST OF SRBT FACILITY

Figure 6: AERIAL PHOTOGRAPH LOOKING NORTHWEST OF SRBT FACILITY

Figure 7: AERIAL PHOTOGRAPH LOOKING NORTHEAST OF SRBT FACILITY

4.3 Site Location – Surrounding Environment

A complete and fulsome description of the surrounding environment, including terrestrial and aquatic species known or suspected to inhabit the area, can be found in SRBT's *Environmental Risk Assessment* (ERA)[31].

Climax vegetation in this ecoregion is characterized by mixed hardwoods. There are some areas within a few kilometres of the facility where typical regional forest cover occurs; however, within 1,000 metres of the facility, there is a very limited presence of meaningful areas of forest, wetland or other natural cover.

The area immediately surrounding the facility is varied in terrestrial character. In general, much of the land to the north, northwest and northeast of the facility consists of moderately dense urban and suburban development, while the rest of the surrounding areas to the south, east and west are much more open, with dispersed housing, open grassy fields, some limited forested areas, a small river, and various swamps, drainage ditches, seasonal creeks and streams.

As the facility is located very near the boundary of the City of Pembroke, and exists within a relatively urbanized and developed zone, the populations of flora and fauna are typical of modified landscapes. Species typical of more natural landscapes are not widely encountered in the area immediately surrounding the facility.

The facility is situated between the Muskrat River, the Indian River, and the Ottawa River. The nearest aquatic and riparian areas relative to the facility are located on the Muskrat River, which lies approximately 400 m to the east and southeast of the facility.

The banks of this river are generally occupied by limited riparian habitat; however, to the southeast of the SRBT facility, the river presents significantly greater amounts of natural habitat of this type, as population and dwelling density is far lower than within the city limits. Wetland habitat (marsh and swamp) can be found along the banks of the river in this direction.

5. Facility Description

5.1 General

SRBT's facility is located at 320 Boundary Road, Pembroke, Ontario. Pembroke is located approximately 150 km northwest of Ottawa on the south shore of the Ottawa River at the mouth of the Muskrat River.

The facility is located in an industrial park in the southern part of the city of Pembroke, and is housed in a three-unit Butler Building complex owned by 898702 Ontario Inc. The complex is comprised of a steel frame with a metal and block exterior.

The building consists of a single story consisting of a concrete block and steel I-beam frame, with a metal clad on metal framework roof.

The interior walls separating building tenants are of concrete block construction, while interior walls within the suite occupied by SRBT are generally steel frame with gypsum hardboard.

Interior ceilings are either Armstrong ceiling tile or gypsum hardboard. The main floor is concrete, and tile/epoxy covered in some areas.

No known hazardous building materials such as asbestos were used in the construction of the building.

The building is served by standard municipal sources for electricity, water and sewers. Building heating is provided primarily by natural gas-fed furnaces at various locations.

The facility is divided into four main parts that are separated by cinderblock firewalls, which are located:

- Between Zone 3 and the rest of the facility.
- Between the original main facility and the first expansion (what is now the shipping area and south offices).
- Between the first expansion and the latest expansion in 2016.

The wall between the SRBT facility and the sole neighbouring building tenant is a fire separation with a fire resistance rating of one hour. SRBT occupies the end unit at the northern end of the building (Unit 140).

The facility includes an extensive set of physical fire protection systems, including fire detection and suppression systems and components, all built and maintained in accordance with applicable nuclear regulatory requirements.

Facility ventilation is primarily served by two active ventilation systems, supplemented by several smaller standard ventilation units. The active ventilation systems reduce the spread of contamination and will be used to help facilitate decommissioning and dismantling in the future.

A complete and fulsome description of the components and systems of the facility can be found in the latest version of SRBT's Safety Analysis Report[32].

5.2 Nuclear Substance Processing

SRBT uses vacuum-based processing equipment in order to process tritium gas (T2) for the purposes of manufacturing GTLS. A GTLS consists of a hermetically sealed borosilicate glass capsule, internally coated with a phosphorescent powder and filled with tritium gas.

The low-energy beta radiation emitted by the tritium gas upon decay interacts with the powder and causes it to emit visible light. These 'Betalights'® are then installed into various devices which provide a reliable, uninterrupted source of light when conventional power sources are unfeasible or suboptimal. SRBT operates several 'processing rigs' in order to create these GTLS. These rigs are vacuum-based systems of valves, pumps and tubing, and are designed to have a tritium trap attached in order to fill light sources.

A tritium trap is a specialized vacuum device that contains approximately 30 grams of depleted uranium (DU), which is used as an adsorbent material for the tritium gas under vacuum conditions. At typical room temperatures, tritium gas will adsorb onto the DU and be retained as a hydride. This property of DU allows for the safe and secure storage of significant quantities of tritium gas over time. When the DU is heated to around 400 degrees C, tritium gas will begin to be released from the DU hydride matrix. When these processes are performed at vacuum pressures in the absence of air or other gaseous contaminants, tritium gas can effectively be processed and used to fill light sources. This is the principal technical characteristic of the processing facility with respect to tritium.

Tritium processing equipment is located in Zone 3 of the facility, denoting the radiological zone with the greatest potential for exposure to hazards posed by the use of tritium gas. Processing takes place in an area known as the Rig Room. Within the Rig Room, four double-sided ventilated cabinets house the main filling stations where light sources are filled with tritium. A total of eight processing rigs may be installed and in service depending on operational requirements.

A second area within Zone 3 is known as the Laser Room. In this area, laser cutting equipment is used to process long, thin GTLS known as ‘laser sticks. These sticks are cut to specification using specialized lasers.

Finally, within Zone 3 is the Tritium Laboratory, which houses equipment known as the Bulk Splitter. This system is used to take bulk amounts of tritium purchased by SRBT on specialized containers and subdivide it onto containers that will interface with the processing rigs. The principles of operation of the bulk splitter are the same as those used on the processing rigs.

5.3 Facility Layout

A general floor plan of the portion of the building occupied by SRBT is shown previously in Figure 3. With the latest facility expansion taking place in 2016, the SRBT facility has achieved a footprint of approximately 1,400 m^2 .

The interior areas of the facility are divided into three separate radiological zones, to reduce the spread of contamination, and in the future, to help facilitate decommissioning and dismantling. The zones are defined in SRBT’s *Radiation Safety Program*, and are briefly described here.

- Zone 1

  Zone 1 consists of offices, hallways, lunchroom, glass shop, coating room, shipping area, a moulding / machining area, and the storage area. Zone 1 is the largest zoned area in the facility with an area of 1,092 m2. The ground floor area of this zone is approximately 864 m^2. The remaining area is that of the second-floor mezzanine.

  Tritium contamination potential in Zone 1 is considered to be very low. As per the Radiation Safety Program, the administrative control limit for tritium contamination in Zone 1 is 4 Bq/cm^2, averaged over an area of 100 cm^2. Routine swipe samples are taken in Zone 1 on a weekly basis, and results are trended and recorded.

- Zone 2

  Zone 2 consists of the assembly room and silk-screening room. The floor area of this zone is approximately 180 m^2. All Zone 2 areas are approximately 3 metres in height, and have plasterboard ceilings.

  Staff access to Zone 2 areas is controlled. Minimum personal protective equipment (PPE) for entry into Zone 2 includes a lab coat, shoe covers and safety glasses.

The potential for tritium contamination is considered to be low but possible, due to the potential for breakage when technicians handle filled GTLS. The administrative control limit for tritium contamination in Zone 2 is 4 Bq/cm^2, averaged over an area of 100 cm^2 (the same value applied in Zone 1). Routine swipe samples are taken in Zone 2 every other day, and results are trended and recorded. Tritium in air concentrations are continuously monitored and recorded.

- Zone 3

Zone 3 consists of the Rig Room, Laser Room, Waste Room and the Tritium Lab, which includes a secure storage room. The floor area of Zone 3 is approximately 128 m^2.

Staff access to Zone 3 areas is controlled. Minimum PPE for entry into Zone 3 includes a lab coat, shoe covers, safety glasses and gloves.

The potential for tritium contamination and/or tritium exposures are greatest in Zone 3 due to the nature of the work being conducted in this area. The administrative control limit for tritium contamination in accessible areas of Zone 3 is 40 Bq/cm^2 averaged over an area of 100 cm^2. Routine swipe samples are taken in Zone 3 every weekday of operations, and results are trended and recorded. Tritium in air concentrations are continuously monitored and recorded.

5.4 Facility Equipment

A list of relevant equipment located in Zones 1, 2 and 3 is detailed in Appendix A.

5.5 Radioactive Materials

The following radioactive materials / nuclear substances are used or stored within the SRBT facility:

- Tritium

Tritium gas is used to fill light sources. The facility operating licence issued by the CNSC authorizes SRBT to possess a maximum of 6,000 TBq of tritium at any time.

During routine operations, the tritium inventory typically varies between 3,000 and 5,000 TBq at any given time, depending on production demands. This quantity of tritium generally represents the typical amount on site at any one time; however, it may fluctuate within the bounds of the limit.

The tritium in the facility is generally contained in GTLS, in tritium traps, and in Type ‘B’ shipping containers (routinely, Croft Associates Model 3605D, certificate CDN/E204/ (Rev. 8)).

- Depleted Uranium

Depleted uranium (DU) is used in getter beds, otherwise known as tritium traps, that are used during the manufacturing process.

The inventory of depleted uranium on site is limited to 10 kg, with between 2 to 4 kg typically held in getter beds / traps, and the remaining ‘virgin’ DU kept in secure storage for use in tritium traps that will be manufactured at a later date.

- Check sources

Sealed sources are used as internal reference standards in the two liquid scintillation counters (LSC) operated on site. These counters are located in the LSC lab.

Each of the TriCarb 2910 LSC includes a Ba-133 sealed source having an initial activity of 740 kBq. This activity falls below the exemption quantity of 1,000 kBq for this nuclear substance, as defined in the *Nuclear Substances and Radiation Devices Regulations*.

Check / calibration sources (sealed vials containing less than 5 kBq of tritium and carbon-14 activities) are also stored in the LSC lab, and are used to calibrate the liquid scintillation counters on a routine basis, and as reference standards as part of laboratory quality control processes. These standards also fall well below the exemption quantities for these nuclear substances.

5.6 Nature and extent of contamination

For floors, walls, and work surfaces, tritium contamination levels are predicted to be in line with the levels measured as part of routine contamination monitoring processes completed during facility operations.

A compilation of contamination assessment results between 2019-2023 for each radiological zone of the facility is provided in Appendix B.

The components comprising the active ventilation systems can be effectively decontaminated; however, the planning envelope for these systems assumes dismantlement and disposal as radioactive waste. All other facility ventilation systems are not predicted to be contaminated with significant quantities of tritium.

For all primary systems and components (namely, tritium processing equipment), the contamination levels are predicted to be in excess of clearance criteria, even with decontamination. An appreciable amount of fixed or embedded tritium contamination is also expected in components associated with the rigs and bulk splitter rigs.

5.7 Hazardous Materials

Limited amounts of hazardous materials are used for various purposes within the SRBT facility. Hazardous materials used in significant quantities are listed below:

Table 1: Hazardous Materials Typically Used at SRBT

Product	Form	Typical Quantity on Site	Disposal
Acetone	Liquid	40 L	Hazardous Waste Facility
Argon	Gas	100 L	Empty container returned to supplier
Chloroform	Liquid	4 L	Hazardous Waste Facility
Diethyl Ether	Liquid	4 L	Hazardous Waste Facility
Epoxy Paint	Liquid	4 L	Hazardous Waste Facility
Epoxy Thinner / Primer	Liquid	7 L	Hazardous Waste Facility
Ethylene glycol	Liquid	1 L	Hazardous Waste Facility
Hydrofluoric Acid	Liquid	4 L	Hazardous Waste Facility
Liquid Nitrogen	Gas	500 L	Empty container returned to supplier
LSC Cocktail	Liquid	10 L	Hazardous Waste Facility
Methyl Hydrate	Liquid	8 L	Hazardous Waste Facility
Orthophosphoric Acid	Liquid	1 L	Hazardous Waste Facility
Oxygen	Gas	75 lbs.	Empty container returned to supplier
Poly Stripper and Thinner	Liquid	25 L	Hazardous Waste Facility
Poly Thinner	Liquid	20 L	Hazardous Waste Facility
Propane	Liquid	10 L	Empty container returned to supplier
Screen Printing Inks	Liquid	50 L	Hazardous Waste Facility

Consult the Appendix A of the SRBT ERA[31] for a fulsome list and risk screening of all non-radiological / conventional hazardous materials used at the facility.

There are no processing systems that are expected to contain hazardous substances in the facility. In virtually every case, these substances are handled manually in very small quantities, and only when required during light source / device manufacturing.

6. Decommissioning Strategy

6.1 End State Objective

The objective of decommissioning is to permanently retire the SRBT facility from service in a manner that protects the health, safety and security of workers, the public and the environment.

Upon completion of facility decommissioning, the building will be in a condition that will permit the release of the facility from any further regulatory control by the CNSC. Possession of the leased premises will be returned to the owner for future commercial or industrial use, or for redevelopment.

6.2 Strategy for Decommissioning

A strategy of immediate (prompt) decommissioning will be adopted for the facility. In this approach, decommissioning begins immediately after the shutdown phase of the facility ends. The facility will be decontaminated, dismantled and cleaned up without any planned delays until a licence to abandon is issued.

The rationale for selecting this strategy for decommissioning is that it is a cost-effective, rapid approach to removing regulatory controls on the site, and neither deferred nor *in situ* decommissioning would result in any reasonable gains in safety management.

- There is little advantage to be gained from deferring the decommissioning of the facility given that the only radioactive material likely to remain in the facility at the time of decommissioning is tritium, which has a half-life of 12.3 years. Any decay that might occur during any reasonable period of deferral will be negligible.
- In-situ decommissioning is not practical since the facility is housed in a leased building that is expected to be returned to the owner in a condition that permits the re-use or redevelopment of the property, and facility components can most effectively and safely be decommissioned at the site.

The facility will not enter any interim end-states. There will be no planned periods of storage-with-surveillance, nor in-situ decommissioning.

There will be no requirements for long-term institutional controls for the facility during the post-operational phases of its lifecycle.

6.3 Planning Assumptions

Decommissioning of the SRBT facility is based on the following assumptions:

- The facility will continue to operate at its current capacity until a decision is made to cease operations;
- The decision to cease operations will be based on normal business considerations and will be made at least one year in advance of shutdown;
- At the end of the operations phase of the facility, it will be in a physical state very similar to its state during operations. Equipment and systems will remain as they are, with all radioactive and hazardous materials safely and properly sealed and stored;
- Inventories of radioactive, hazardous and other materials will be reduced in the three-month period preceding shutdown, and any remaining inventory of these materials will be dispositioned in the first month following shutdown;
- The decommissioning work will only commence following the issuance of a Licence to Decommission by the CNSC;
- At the start of the decommissioning phase of the facility, the inventories of radioactive and hazardous materials will have been minimized to the extent practical. Post-operational surveys will have been completed in support of the DDP. Where feasible, decontamination of surfaces and equipment will have reduced the levels of removable tritium contamination in anticipation of decommissioning work commencing. Active ventilation systems, effluent monitoring systems, and radiological hazard monitoring systems will continue to be in full operation.
- This PDP has been prepared and costed under the assumption that all activities completed under the safe shutdown and decommissioning phases are completed by third party contractors working under CNSC oversight.
- Decommissioning will continue until the site is in a condition that will permit its release from any further regulatory control by the CNSC;
- At the conclusion of the decommissioning process, the CNSC will issue a Licence to Abandon the facility; and
- Possession of the leased premises will be returned to the owner for future commercial or industrial use or redevelopment.

7. Planning for Decommissioning

7.1 Decision to Decommission

SRBT's decision to decommission will be based on an intentional business choice. It is anticipated that SRBT will decide to decommission one year prior to the shutdown of the facility.

This decision is akin to a 'decommissioning tomorrow' approach, versus other approaches such as deferred decommissioning or, in-situ decommissioning, or storage with surveillance. The 'decommissioning tomorrow' approach is justified and optimal, considering the low-level of risk posed by the facility type and the nuclear substances involved, as well as the end-of-life business model of the company and facility.

After the decision to decommission is made, SRBT will notify CNSC of their intent to cease operations and proceed with decommissioning of the facility. For planning purposes, it is assumed that the facility will be decommissioned within six months from initiation of the Safe Shutdown Phase.

The process steps to be followed as a result of the decision to shutdown the facility are outlined in Table 2, and consist of twenty-seven activities conducted in four main phases:

- Operating / Decommissioning Planning Phase;
  - *At the end of this phase of decommissioning, the facility will be in an identical physical state as during operations.*
- Safe Shutdown Phase;
  - *At the end of this phase of decommissioning, the facility will be in an identical physical state as it was at the end of the previous phase, except for the total inventory of tritium and radioactive waste, which will be lowered to a minimum as the safe shutdown phase proceeds.*
- Decommissioning Phase;
  - *At the end of this phase of decommissioning, the facility will physically remain laid out in a similar state with respect to offices, rooms, and general working areas, except for the removal of any infrastructure that could not be decontaminated satisfactorily. All nuclear processing-related equipment and contaminated items or materials will have been removed and disposed of in accordance with the DDP, including active ventilation systems. Groundwater monitoring wells will have been decommissioned as well.*

- End State Phase
    - *At the end of this phase of decommissioning, the end-state will have been achieved. The facility will be in an identical physical state as it was at the end of the previous phase, except for the removal of all other equipment and materials owned by SRBT (i.e. computers, non-nuclear substance processing equipment, LSC counters, etc.) unless otherwise dispensed with (i.e. sold or transferred to another incoming business).*

The decommissioning planning schedule described in Table 2 is based upon the assumption that the decision to shut down is not due to unexpected circumstances, and can be supported by the current SRBT management team; however, the activities as listed in the Safe Shutdown, Decommissioning and End State Phases could be implemented by either the SRBT management team, a qualified third party, or a combination therein.

The decommissioning cost estimate provided in this document is conservative, and based upon a worst-case scenario, where the termination of activities is due to unexpected events. All activities listed from line items 4-27 in Table 2 assume completion by a qualified third party. The funds allocated in the FG are also based on this worst-case scenario.

Table 2: Decommissioning Planning Schedule

	DESCRIPTION	OPERATING PHASE												SHUTDOWN					
		MONTHS																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	OPERATING/DECOMMISSIONING PLANNING PHASE																		
1.	Decision to decommission by SRBT.	√																	
2.	Notify CNSC.	√																	
3.	Tritium processing/sign production ceases.												√						
	SAFE SHUTDOWN PHASE																		
4.	Notification to Customers: cessation of returned products (old signs).													√					
5.	Final shipment of all remaining product to customers (filled signs).													√					
6.	Remove radioactive and hazardous waste and ship to approved facility.													√					
7.	Initial post-operational surveys: contamination assessments, core sampling.													√					
8.	Sample analysis (in house and 3rd party analysis).													√	√				
9.	Public Engagement Plan.													√					
10.	Review of Radiation Protection Program as part of DDP development.													√					
11.	Develop and submit Detailed Decommissioning Plan to CNSC.													√					
12.	Prepare/submit Decommissioning Licence Application.													√					
13.	CNSC Impact Assessment decision. (**1 day estimated**)														√				
14.	CNSC Review of Decommissioning Licence Application and associated program review (including any required Impact Assessment). **(40 days estimated)**													√	√				
15.	CNSC licence assessment and decisions process. **(20 days estimated)**															√			
16.	Mobilization: set up and preparation for decommissioning phase														√				
17.	Decommissioning Licence approved.															√			
	DECOMMISSIONING PHASE																		
18.	Decontamination and dismantling (all zones, rig room equipment and fume hoods).																√		
19.	Decommissioning of outside wells, air handling units																√		
20.	Soil assessment (analysis by 3rd party)																√		
21.	Packaging and transport of radioactive waste																√		
22.	Final surveys (MARSSIM)																	√	
23.	Complete and submit decommissioning Final Report																	√	
	END STATE PHASE																		
24.	Apply for Licence to Abandon																		√
25.	CNSC Review of decommissioning Final Report **(5 days estimated)**																		√
26.	CNSC review of abandonment licence application & CMD development **(4 days estimated)**																		√
27.	Licence to abandon approved																		√

7.2 Operating and Decommissioning Planning Phase (Activities 1 – 3)

7.2.1 SRBT intends to provide a minimum notice of 12 months when it has been decided to cease production activities and to prepare to decommission the SRBT facility.

7.2.2 Once that decision has been made by SRBT management, CNSC will be informed of that decision and this notification will be in at least 12 months in advance of any planned decommissioning activities.

7.2.3 At the end of the Operating Phase tritium processing and sign production activities have ended.

The activities listed below are operational activities that would be the first to be implemented following SRBT's decision to cease production and prepare for decommissioning.

It is SRBT's intent to provide at least 12 months notice to CNSC in advance of ceasing operations, and these listed activities would be completed in that 12-month period.

These activities do not require a 12-month window for completion and could be completed in a much shorter period of time in the event of an unexpected termination of operations.

7.3 Safe Shutdown Phase (Activities 4 – 17)

7.3.1 SRBT has a long-standing practice of accepting the return of expired signs from customers. These customers will be given sufficient notice of the planned closure of the facility to allow them to return expired signs and to arrange alternate disposal avenues for the future.

7.3.2 All filled signs will be shipped to customers in order to bring to zero the inventory of tritium gas filled products.

7.3.3 The inventory of existing radioactive waste and hazardous waste will be packaged and shipped for disposal at approved/licensed facilities. Tritium traps will be removed from the production equipment and returned to the supplier or another facility licensed to accept the material for reuse or disposal. Any hazardous materials remaining on the site that will not be required for use during the decommissioning will be packaged for disposal in accordance with the Regulations applicable at the time.

- *NOTE: low-level waste (LLW) is currently transferred to Canadian Nuclear Laboratories for long-term storage and ultimate disposal.*

7.3.4 Initial post-operational surveys will be initiated to collect data to assist in the development of the DDP. These surveys will include extensive contamination assessments following a Multi-Agency Radiation Site Survey Investigation Manual (MARSSIM)[33] approach to numbers and locations. These post-operational surveys will also include a review of the operating records and results of previous radiation surveys. A review will be completed of any hazardous materials used within the facility. Environmental monitoring results will also be reviewed.

7.3.5 Contamination survey sample analysis can be completed in house; however, the cost estimates assume 3rd party analysis of the samples.

7.3.6 The Public Engagement Plan to be implemented during decommissioning phases of the SRBT facility lifecycle will be the Public Information Program (PIP) currently in effect during operations.

The SRBT PIP includes requirements and provisions for public engagement that are triggered by licence applications, such as the application for a licence to decommission the facility.

The SRBT PIP also includes provisions that specifically address the public and Indigenous engagement requirements described in Section 5.3 of CSA N294:19, including:

- the effective communication of any environmental and health and safety issues that may arise as a result of decommissioning activities to the public;
- the consideration of public feedback;
- specific Indigenous engagement activities, including early engagement and identification whether proposed decommissioning activities could have potential effects on Indigenous and/or treaty rights;
- the establishment of target audiences, communication and feedback methods, processes for evaluation of public and media opinions, and
- contact information.

7.3.7 The SRBT *Radiation Safety Program* will be reviewed to ensure alignment of program requirements and the activities proposed in the DDP.

7.3.8 The DDP will be developed, supported by the results of the initial post-operational survey. The information obtained during the initial post-operational survey will be used to identify those structures, systems and components that may be contaminated with radioactive materials; determine the procedures and tools that will be required during the decommissioning; and identify any potential hazards to workers, the public or the environment. It will also identify what decommissioning work, if any, may be required in the area around the facility.

The Detailed Decommissioning Plan will describe the actions that will be taken to permanently retire the facility from operation in a manner that ensures the health, safety, and security of workers, the public, and the environment. The Detailed Decommissioning Plan will contain the elements outlined in section 7.1.1 of REGDOC-2.11.2.

7.3.9 In parallel to the development of the DDP an application for a Decommissioning Licence will be completed and submitted to CNSC with the DDP. This application for a Licence to Decommission will be prepared in accordance with the regulations outlined in sections 3 and 7 of the *Class I Nuclear Facilities Regulations*. Any other required permits and licenses from federal, provincial, and municipal agencies will be obtained before any decommissioning work begins.

7.3.10 CNSC has estimated 1 person-day of effort is required for a regulatory review of the Environmental Assessment.

7.3.11 CNSC has estimated 40 person-days of effort are required to fully review and assess the DDP and Decommissioning licence application. Regulatory approval of the DDP will be in place prior to dismantlement and demolition work beginning.

7.3.12 CNSC has estimated 20 person-days of effort are required to complete the licensing assessment and the licence approval decisions process.

7.3.13 Mobilization allows time for the procurement of decommissioning supplies and additional PPE if required. The work performed during this phase of the decommissioning is intended to prepare the facility for subsequent ‘Decontamination and Dismantling’ work. Mobilization may include, but is not limited to:

- Delivering to the site any special equipment or tools that will be required during the decontamination and dismantling work;

- Ensuring that the site services that will be required during the decontamination and dismantling work are available and disconnecting any services that will not be required; and
- Preparing temporary storage areas for wastes, recyclable materials and re-usable equipment.

7.3.14 SRBT will remain in the Safe Shutdown Phase until CNSC has approved the application for decommissioning of the facility and a Decommissioning Licence has been granted.

7.4 Decommissioning Phase (Activities 18 – 23)

The Decommissioning Phase describes the steps and activities to be taken to permanently retire the SRBT facility from service in a manner that protects the health, safety and security of workers, the public and the environment.

Upon completion of this phase, the facility will be in a condition that will permit the release of it from any further regulatory control by the CNSC.

7.4.1 Decontamination and dismantling activities describe the removal of all equipment used in the tritium gas fill process. Decontamination processes will be carried out on all equipment that can be easily decontaminated to approved clearance levels. Equipment that cannot be decontaminated to meet regulatory limits will be dismantled, packaged and shipped to a licensed waste management facility. These activities will be carried out in Zones 2 and 3.

7.4.2 Decommissioning of the outside wells involves the removal of the well casings by a qualified third-party contractor. Air handling units will be decommissioned only once all facility work packages have been completed.

7.4.3 Soil assessments will be conducted as part of the final clearance survey. Historical soil sampling results near the facility have consistently measured below the unconditional clearance level of 100 Bq/g. Additional information on tritium concentrations in soil near the facility can be found in the SRBT ERA[31].

7.4.4 Radioactive waste shall be packaged and prepared for transport in accordance with applicable regulations. All radioactive waste will be shipped to a licensed waste management facility.

7.4.5 Final clearance surveys shall be completed to verify that clearance levels proposed in the DDP have been satisfied. The MARSSIM[33] methodology will be implemented for facility final clearance surveys.

7.4.6 Complete and submit the Decommissioning Final Report, documenting all activities, radiological conditions, waste volumes and final status for submission to CNSC.

7.5 End State Phase (Activities 24 – 27)

In the End State Phase all of the decommissioning activities have been completed and the Decommissioning Final Report has been submitted to CNSC for review and approval.

7.5.1 An application for a Licence to Abandon will be submitted.

7.5.2 CNSC has estimated 5 person-days of effort are required to review the Decommissioning Final Report.

7.5.3 CNSC has estimated 4 person-days of effort are required to review the Abandonment Licence Application and prepare the CMD.

7.5.4 Licence to Abandon is approved.

7.6 Labour Costing Projections

Each individual activity associated with the phases of the Preliminary Decommissioning Plan (PDP) has an estimated resource projection, measured in person-days, for completion of the activity.

The projected labour projections were originally estimated in the 2014 revision of the PDP, and were carried over into the 2019 revision of the PDP (with modification to account for facility expansion in Zone 1). The estimations were made based on decades of operating experience, the design details of all impacted structures, systems and components, and the radiological and conventional safety controls that would be implemented in order to proceed with the work.

All estimations include an inherent level of conservatism in selecting the amount of person-days to be allocated – more person-days of effort are credited that what is expected to be required.

Furthermore, all decommissioning work activities are costed in with an additional 25% contingency factor, adding even more conservatism to the estimation of effort to achieve these activities during decommissioning.

Labour costing estimates for the various types of work to be performed during the Decommissioning Phase were obtained through inquiry to local construction companies, through inquiry of government databases on wages for professional occupations, and through quotes from third-party service provider companies that SRBT has worked with extensively during the operational phase of the facility.

These rates were provided in terms of dollars per hour, and are presented in Table 3 below on a per person-day basis (7.5 working hours per day) to align with the resource planning estimate type made in the plan.

Table 3: Planned Labour Costs

Type of Labour	$ / person-day
A. Work already typically performed by in-house resources, including packaging and shipment of non-decommissioning low-level waste (LLW), and other general physical labour of a non-technical nature:	$150 ($20 per hour)
B. Work of an advanced / complex / technical nature, including physical decommissioning activities throughout the facility:	$315 ($42 per hour)
C. Public relations activities and communications:	$428 ($57 per hour)
D. Licensing, DDP preparation, other regulatory / administrative / reporting work of a technical nature:	1,090 ($145 per hour)
E. Non-routine radiological measurements, including those performed by third parties:	$2,325 ($310 per hour)

NOTES:

[A] Rate for this type of manual labour provided by local construction company familiar with SRBT's facility and operations.

[B] Rate for this type of labour taken as the 'High' rate from the database found at https://www.jobbank.gc.ca/marketreport/wages-occupation/8448/ca for a construction worker in Ottawa.

[C] Rate for this type of activity taken as the 'High' rate from the database found at https://www.jobbank.gc.ca/wagereport/occupation/21001 for a public relations worker in Ottawa.

[D] Rate for this type of activity provided by independent third-party consultant used extensively by SRBT for similar complex, regulatory and technical deliverables.

[E] Rate for this type of activity provided by independent third-party service provider used extensively by SRBT for similar radiological and environmental measurements.

(All rates are current as of January 13, 2026)

8. Decommissioning Planning Envelopes and Work Packages

8.1 Overview

In order to adequately facilitate the SRBT facility decommissioning requirements, and as described in CSA N294, decommissioning planning envelopes have been developed and defined work packages have been structured for each envelope.

The decommissioning process identifies one planning envelope for the Safe Shutdown Phase and six planning envelopes for the Decommissioning Phase.

Third party contractors, experienced in the decommissioning of a similar Class 1B facility, assisted SRBT in 2014 in the development of the original planning envelopes, and the work packages within each envelope. The 2019 revision of the PDP advanced this work, updated the facility condition, and modernized the expected resourcing and costing figures for each discrete work activity. The 2024 revision of the PDP further advances these concepts.

Before decommissioning begins there are a number of activities identified in the Safe Shutdown Phase that must be completed. These activities can all be completed in one planning envelope. This planning envelope does not require the same level of detail as the decommissioning envelopes, but will describe the scope of work, the duration of the activity and the associated cost.

There are no post-operational planning envelopes separate from those described in this PDP.

8.2 Technical Approach

The decommissioning planning envelopes and work packages are structured such that the work activities will proceed from radiological areas with greatest potential for tritium contamination to those radiological areas of lowest contamination potential.

Classification of areas follows MARSSIM[33] guidelines. In these guidelines, classification is defined as “the process by which an area or survey unit is described according to radiological characteristics.” Areas with some potential for residual contamination are described in these guidelines as “impacted areas”.

Impacted areas are further divided into one of three classifications: Class 1, 2 and 3.

8.2.1 Class 1 Areas

Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based

on previous radiation surveys) above the Derived Concentration Guideline Level (DCGL).

Examples of Class 1 areas include:

- site areas previously subjected to remedial actions;
- locations where leaks or spills are known to have occurred;
- former burial or disposal sites;
- waste storage sites; and
- areas with contaminants in discrete solid pieces of material and high specific activity.

8.2.2 Class 2 Areas

Areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL.

Examples of Class 2 areas include:

- locations where radioactive materials were present in an unsealed form;
- potentially contaminated transport routes;
- areas downwind from stack release points;
- upper walls and ceilings of buildings or rooms subjected to airborne radioactivity;
- areas handling low concentrations of radioactive materials; and
- areas on the perimeter of former contamination control areas.

8.2.3 Class 3 Areas

Any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL, based on site operating history and previous radiation surveys.

Examples of areas that might be classified as Class 3 include:

- buffer zones around Class 1 or Class 2 areas, and
- areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification.

These classification guidelines will be considered for each planning envelope, and the various work packages in those envelopes, to assist in determining the degree of survey effort in the Detailed Decommissioning Plan.

For Class 1 survey units (separate locations within the planning envelopes), MARSSIM[33] suggests that survey unit sizes do not exceed 100 m^2 floor area for structures and 2,000 m^2 for land areas. Similarly, Class 2 survey units are limited to 1,000 m^2 and 10,000 m^2, respectively. Class 3 survey units are not limited in size.

Based on SRBT's knowledge of the operations, the facility has been grouped into one Safe Shutdown Phase planning envelope and six Decommissioning Phase planning envelopes.

Safe Shutdown Planning Envelope

- Planning Envelope 1 – Safe Shutdown activities

Decommissioning Phase Planning Envelopes

- Planning Envelope 2 – Zone 3 Areas
- Planning Envelope 3 – Zone 2 Areas
- Planning Envelope 4 – Zone 1 Areas
- Planning Envelope 5 – Zone 3 Ventilation System (ductwork)
- Planning Envelope 6 – Air Handling Units and Stacks
- Planning Envelope 7 – Decommissioning of the Outside Sampling Wells

The ventilation system, air handling units and stacks (planning envelopes 5 & 6) will be totally dismantled and disposed of as active waste. Consequently, Planning Envelope 5 and 6 will not be evaluated by the surveys discussed in this PDP.

Since the remaining planning envelopes represent areas with similar use, construction, and contamination potential, the areas will be categorized as follows:

Table 4: Safe Shutdown Phase Planning Envelope

Planning Envelope	Work Package	Details
1	1. Notification to Customers	9.1
1	2. Final Shipment of Product to Customers	9.2
1	3. Removal of Radioactive Waste	9.3
1	4. Removal of Hazardous Materials	9.4
1	5. Complete Post-operational Surveys	9.5
1	6. Sample Analysis and Environmental Monitoring	9.6
1	7. Public Engagement Plan	9.7
1	8. Prepare Detailed Decommissioning Plan	9.8
1	9. Mobilization	9.9

Table 5: Decommissioning Phase Planning Envelopes

Planning Envelope	Work Package	Details
2	1. Tritium Lab	10.1
2	2. Laser Room	10.2
2	3. Rig Room	10.3
3	1. Assembly Room	11.1
3	2. Silk-Screening Room	11.2
4	1. Entire Zone 1 Area	12.1
5	1. Zone 3 Ventilation Systems (Interior)	13.1
6	1. Air Handling Units and Stacks (Exterior)	14.1
7	1. Removal of Groundwater Monitoring Wells	15.1

8.3 Radiological Clearance Levels

As part of routine facility operations, SRBT's *Licence Limits, Action Levels and Administrative Limits* document specifies the administrative limits for non-fixed surface contamination limits as separate values, depending on the radiological zone.

For the purpose of this PDP, the most restrictive operational administrative limit will be adopted as the Radiological Clearance Level during decommissioning activities, for the purpose of free release (i.e. reuse of items, equipment, and building surfaces). Contamination assessments by swipe sample will be averaged over 100 cm^2.

For items or equipment designated as waste, SRBT's *Waste Management Program* includes a conditional clearance level (CCL) that ensures effective waste management strategies are applied, and in accordance with the principle of keeping radiological exposures as low as reasonably achievable.

The current CCL is defined in terms of a specific activity value limit of 0.15 MBq / gram, up to a maximum of 5,000 kg of waste material per disposal pathway. This limit applies to any waste items physically within Zone 2 or Zone 3 of the facility.

Table 6: Radiological Clearance Levels

Zone	Surface	Operational Administrative Limit
1	All surfaces	4.0 Bq/cm^2
2	All surfaces	4.0 Bq/cm^2
3	All surfaces	40.0 Bq/cm^2

Zone	Surface	Decommissioning Radiological Clearance Level ***Free Release***
All zones	All surfaces	4.0 Bq/cm^2

Zone	Surface	Decommissioning Radiological Clearance Level ***Waste Management***
2 and 3	All surfaces	0.15 MBq / g (maximum of 5,000 kg for any disposal pathway)

8.4 Principal Hazards Anticipated

Tritium represents the only radiological hazard anticipated during decommissioning activities at the SRBT facility.

As well, conventional, chemical, electrical, fire and security hazards will also be assessed in the development of each individual work package.

At the detailed planning stage, plans and protocols will be developed for monitoring all work hazards, personnel dosimetry, environmental emissions and effluents, and materials, sites and structures to be cleared from regulatory control. It is expected that current operational protocols for all of these monitoring activities will remain highly effective during the decommissioning phases of the facility lifecycle.

8.5 Radiological Safety

All workers involved in decommissioning activities will protected from radiological hazards, and be monitored for exposure to ionizing radiation, in accordance with SRBT's *Radiation Safety Program* requirements.

SRBT will continue to maintain a Dosimetry Service Licence (DSL) in order to perform bioassay measurements and dose assessments for decommissioning workers, until the decommissioning of the facility is complete.

In support of the DSL, SRBT's Dosimetry Service Program will also continue to be implemented, including all management system provisions for quality assurance and control elements, throughout the decommissioning of the facility. All personnel involved with the physical decommissioning of the facility will be designated as Nuclear Energy Workers (NEW).

In addition, radiation protection action levels used during operations shall remain in place in order to ensure control of decommissioning work, and the protection of workers. These action levels are as follows:

Table 7: Radiation Protection Action Levels

Parameter	Action Level
NEW – Quarter of a year	0.50 mSv
NEW – Calendar year	1.50 mSv
NEW – Five-year period	4.00 mSv
Pregnant NEW – Balance of Pregnancy	0.10 mSv
Bioassay result – tritium concentration in urine	400 Bq / ml

8.6 Conventional Health and Safety

Work will be performed in accordance with the requirements of the Canada Occupational Health and Safety Regulations, and the decommissioning licence issued by the CNSC.

The SRBT Health and Safety Policy, associated safety procedures, and the Hazard Prevention Program govern the health and safety provisions and requirements for all workers at SRBT. These management system elements will remain in place, and will provide effective safety controls during decommissioning activities, ensuring that all work is performed safely.

Safety is the number one priority in all aspects of our work, and engineering controls, safe work procedures and personal protective equipment will be used to effectively protect workers from any occupational safety hazards throughout decommissioning.

8.7 Security

During decommissioning, SRBT expects to continue to maintain the security of the facility in accordance with the existing SRBT *Security Program*.

The existing security arrangement will remain effective in ensuring an appropriate level of security at the facility throughout decommissioning work. Any modification to the security provisions in place will be controlled and approved by CNSC staff prior to implementation.

8.8 Environmental Protection

As part of the facility operating licence, SRBT maintains and implements a comprehensive Environmental Management System (EMS), which includes the following key management system programs / processes:

- Environmental Protection Program – compliant with CNSC REGDOC 2.9.1
- Groundwater Protection Program – compliant with CSA N288.7
- Environmental Risk Assessment[31] (and process) – compliant with CSA N288.6
- Environmental Monitoring Program – compliant with CSA N288.4
- Effluent Monitoring Program – compliant with CSA N288.5
- Groundwater Monitoring Program – compliant with CSA N288.7

In addition, environmental action levels used during operations shall remain in place in order to ensure control of decommissioning work, and the protection of the public and the environment. These action levels are as follows:

Table 8: Environmental Protection Action Levels

Parameter	Action Level
Weekly gaseous effluent – tritium oxide	1,000 GBq
Weekly gaseous effluent – tritium oxide + elemental tritium	5,000 GBq
Weekly liquid effluent – water soluble tritium	1.75 GBq

Throughout decommissioning, the EMS will continue to be implemented as required until such time that all nuclear substances have been removed from the premises, the building meets free release criteria, and the final decommissioning report has been accepted by CNSC staff.

Two exceptions to this will be the cessation of the Groundwater Monitoring Program and the gaseous effluent elements of the Effluent Monitoring Program, as the monitoring wells and active ventilation systems will be decommissioned in advance of the final report being issued.

Once the final report is accepted, all remaining EMS programs will be terminated, and any monitoring equipment in the area surrounding the facility will be removed.

8.9 Waste Management

As a key element of the operating licence, SRBT implements and maintains a comprehensive Waste Management Program (WMP), which includes processes and controls for both radioactive and hazardous waste.

This program meets the requirements of the applicable N292-series of CSA standards, including N292.0, N292.3 and N292.5, and has proven effective at ensuring safe management of waste materials throughout all aspects of operation of the facility. For the purposes of decommissioning, the WMP will continue to be maintained and implemented. Any changes to this program will be controlled and submitted to CNSC staff for review and regulatory acceptance prior to implementation.

All waste materials will be prepared for shipment, packaged, labeled and surveyed for external contamination as required. Waste material that meets regulatory or conditional clearance levels will be handled and packaged appropriately, and sent to a recycling facility or municipal landfill. Waste that exceeds clearance levels will be designated as

low-level waste, and properly packaged and shipped to a licensed radioactive waste handling facility.

All reasonable effort will be made to segregate as much material as possible for reuse or recycling, to minimize the volume of waste that is generated, and to avoid generating mixed wastes (containing both radioactive and hazardous materials).

8.9.1 Radioactive Waste

Radioactive wastes will include any materials that exceed clearance levels and cannot reasonably be decontaminated and cleared for release.

Conditional clearance levels will be those specified in the detailed decommissioning plan / WMP as accepted by the CNSC, while unconditional clearance levels are those prescribed in the *Nuclear Substances and Radiation Devices Regulations*.

Radioactive wastes will be packaged for transport and disposal in accordance with the requirements of the regulations applicable at the time of the decommissioning.

All radioactive wastes will be removed from the site for storage or disposal at a licensed radioactive waste management facility prior to the beginning of the final survey.

Low-level waste (LLW) is costed in line with the latest prices on a per-unit volume basis, for drums of waste materials, by Canadian Nuclear Laboratories.

8.9.2 Hazardous Waste

Hazardous wastes will include any materials defined as hazardous by applicable regulations. Hazardous wastes will be prepared for transport and disposal in accordance with the requirements of the regulations applicable at the time of the decommissioning.

All hazardous wastes will be removed for disposal to a hazardous waste management facility prior to the beginning of the decommissioning activities.

No hazardous materials are expected to be used during decommissioning activities; therefore, no hazardous waste will be generated by these activities.

8.9.3 Reusable and Recyclable Materials

Office equipment and furniture that meet the clearance levels will be sold for reuse where possible. Similarly, some production equipment, such as the milling

machine, injection molding machine, and painting equipment will be sold for reuse where possible.

Metals and other recyclable materials that meet clearance levels will be segregated from any other wastes during the course of the work. These materials will be sent to an authorized facility for recycling.

8.9.4 Demolition Waste

Any material that is neither hazardous nor radioactive and that is not suitable for either reuse or recycling will be sent for disposal at a local waste management site that is authorized to accept these wastes.

8.10 Planning Envelope / Work Package Details

As part of the preliminary planning of decommissioning work, these activities are assumed to be conducted by a qualified third-party contractor. Contractors will be required to follow the DDP following its approval by the CNSC.

Each decommissioning phase planning envelope and work package includes:

- A brief description of, and diagram showing, the areas and components to be decommissioned;
- An overview of the principal radiological, chemical and physical conditions during decommissioning;
- An overview of the principal radiological, chemical and physical conditions predicted to exist following decommissioning activities;
- A statement describing the strategic approach (prompt removal);
- A statement describing the final end-state objective in each planning envelope;
- A description of the main work package details, including:
  - the general technical approach,
  - principal hazards,
  - general strategy for the protection of workers, the public and the environment,
  - type, quantity and disposition of wastes generated,
  - duration, and
  - cost.

It is expected that there are no specific activities for which additional protective/mitigation procedures will be required at the detailed planning stage.

9. Planning Envelope 1: Safe Shutdown State

9.1 Work Package 1: Notification to Customers

Following the decision to decommission the facility, SRBT customers will be notified of this decision.

The current process allows customers to return expired signs to SRBT for dismantling and disposal. The purpose of the customer notification is to give the customers sufficient time to return any expired signs to SRBT before decommissioning commences, and to allow the customer to find alternate routes for accepting expired signs.

9.1.1 Duration

Twenty person-days (1 calendar month) of effort have been determined to be sufficient to complete this work package.

9.1.2 Cost

Table 9: Cost Summary Planning Envelope 1, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Notification to customers (person-day effort)	20	150	$3,000
WORK PACKAGE COST			**$3,000**

9.2 Work Package 2: Final Shipment of Product to Customers

Following the decision to decommission the facility SRBT will have an inventory of signs ready for shipment to customers.

This inventory of new signs will be shipped to customers before decommissioning commences. Policy requires the customer to cover the cost of shipping; therefore, these costs are not included in the PDP.

9.2.1 Duration

Forty person-days of effort are estimated for completion of this work package. This estimate is based on current inventory and operational experience.

9.2.2 Cost

Table 10: Cost Summary Planning Envelope 1, Work Package 2

Activity	Quantity	Unit Cost ($)	Total
Prepare and ship inventory (person-day effort)	40	150	$6,000
WORK PACKAGE COST			**$6,000**

9.3 Work Package 3: Removal of Radioactive Waste

SRBT implements a comprehensive Waste Management Program that ensures routine shipments of low-level radioactive waste are conducted on a frequent basis. By policy, the volume of LLW retained in storage over time is kept to a minimum.

This material consists of contaminated conventional trash / waste, crushed glass stubs from processing operations, expired light sources, and tritium traps removed from service.

A review of SRBT's recent waste inventory trends shows that a reasonably conservative maximum volume of LLW stored on site is not expected to exceed 2 m^3 upon cessation of operations.

Once final products have been shipped to customers, and production operations have completed ceased, all LLW on site will be properly packaged, labelled and shipped to a licenced waste management facility for storage and disposal prior to beginning decommissioning activities.

9.3.1 Duration

Based on current operating experience this work package can be completed with 10 person-days of effort.

9.3.2 Cost

Table 11: Cost Summary Planning Envelope 1, Work Package 3

Activity	Quantity	Unit Cost ($)	Total
Radioactive waste (volume)	2 m^3	31,445	$62,890
Prepare and ship waste (person-day effort)	10	150	$1,500
WORK PACKAGE COST			**$64,390**

9.4 Work Package 4: Removal of Hazardous Materials

Hazardous materials can either be returned to supplier (gas cylinders) or disposed of at a local waste management hazardous waste facility. Decommissioning activities will not generate hazardous waste. All hazardous waste will be removed prior to decommissioning.

9.4.1 Duration

It is estimated that 10 person-days of effort is required to collect, package and transport the hazardous waste to a hazardous waste handling facility.

9.4.2 Cost

Table 12: Cost Summary Planning Envelope 1, Work Package 4

Activity	Quantity	Unit Cost ($)	Total
Hazardous Waste	Current inventory	1000	$1,000
Prepare and ship waste (person-day effort)	10	150	$1,500
WORK PACKAGE COST			**$2,500**

9.5 Work Package 5: Post-operational Surveys

Detailed post-operational surveys will be completed to collect data to assist in the development of the Detailed Decommissioning Plan.

These surveys will include extensive contamination assessments following a MARSSIM[33] approach to location and number of samples collected, including core samples of materials as deemed required.

9.5.1 Duration

Five person-days of effort have been estimated to complete post-operational survey activities, not including the analysis of the samples.

Core sampling cost estimates are based upon recent services provided to SRBT by an independent laboratory for similar project types, on a per-sample basis.

9.5.2 Cost

Table 13: Cost Summary Planning Envelope 1, Work Package 5

Activity	Quantity	Unit Cost ($)	Total
Post-operational surveys (person-day effort)	5	2,325	$11,625
Core sampling, analysis, shipment and report	16	475	$7,600
		Total	**$19,225**

9.6 Work Package 6: Sample Analysis and Environmental Monitoring

Sample analysis describes the time allocated to analyze the contamination samples collected during the post-operational surveys. This work package also allocates time and costs to ongoing environmental monitoring during the Safe Shutdown and Decommissioning Phases.

9.6.1 Duration

Two person-days of effort have been estimated to complete the swipe sample analysis. One person-day per month (for 5 months) has been estimated to complete the environmental monitoring activities. These activities include collection of the passive air samples and well samples and the analysis of these samples. The environmental monitoring activities are planned over the 5-month period covering the Safe Shutdown and Decommissioning Phases.

9.6.2 Cost

Table 14: Cost Summary Planning Envelope 1, Work Package 6

Activity	Quantity	Unit Cost ($)	Total
Sample Analysis (person-day effort)	2	2,325	$4,650
Environmental Monitoring (person-day effort)	5	2,325	$11,625
		Total	**$16,275**

9.7 Work Package 7: Public Engagement Plan

As part of its licensed activities, SRBT implements an established and mature Public Information Program (PIP). This program describes the methodologies associated with all aspects of public engagement by the organization.

The Public Engagement Plan to be implemented during decommissioning phases of the SRBT facility lifecycle will be the PIP currently in effect during operations.

The SRBT PIP includes requirements and provisions for public engagement that are triggered by licence applications, such as the application for a licence to decommission the facility.

The SRBT PIP also includes provisions that specifically address the public and Indigenous engagement requirements described in Section 5.3 of CSA N294:19, including:

- the effective communication of any environmental and health and safety issues that may arise as a result of decommissioning activities to the public;
- the consideration of public feedback;
- specific Indigenous engagement activities, including early engagement and identification whether proposed decommissioning activities could have potential effects on Indigenous and/or treaty rights;
- the establishment of target audiences, communication and feedback methods, processes for evaluation of public and media opinions, and
- contact information.

A review of the PIP will be conducted during the safe shutdown phase, prior to decommissioning work commencing, and any changes required or recommended will be finalized and implemented prior to beginning decommissioning activities. This will help ensure that all target audiences are fully informed of the work, and have the opportunity for input.

The program will also allow for timely updates to the target audience on the progress and status of the decommissioning activities.

9.7.1 Duration

Two person-days of effort are anticipated for review of the current program. Five person-days of effort are estimated for monthly updates during the decommissioning process (5 months) and one person-day of effort for a final update.

9.7.2 Cost

Table 15: Cost Summary Planning Envelope 1, Work Package 7

Activity	Quantity	Unit Cost ($)	Total
Public Engagement Plan (person-day effort)	8	428	$3,424
		Total	**$3,424**

9.8 Work Package 8: Prepare Detailed Decommissioning Plan

A DDP refines and adds details to the PDP – it is an evolution of the decommissioning planning process.

The content of the DDP will meet all requirements as defined in Section 7.1 of REGDOC-2.11.2. As per this REGDOC, “the DDP shall document the decommissioning strategy; decontamination, dismantling and/or clean-up activities; final end-state objectives; the principle hazards and protection plans; a waste management plan; a cost estimate; and financial guarantee arrangements”.

The detailed decommissioning plan will describe the actions that will be taken to permanently retire the facility from operation in a manner that ensures the health, safety, and security of workers, the public and the environment.

9.8.1 Duration

Eight person-days of professional effort are estimated to develop the detailed decommissioning plan. This amount of effort is based on previous third-party experience in writing a similar work plan for a Class 1B licensed facility. The information provided in the preliminary decommissioning plan shall be the foundation for development of the detailed decommissioning plan.

9.8.2 Cost

Table 16: Cost Summary Planning Envelope 1, Work Package 8

Activity	Quantity	Unit Cost ($)	Total
Prepare Detailed Decommissioning Plan	8	1,090	$8,720
		Total	**$8,720**

9.9 Work Package 9: Mobilization

Mobilization describes the preliminary coordination and procurement of equipment and services necessary to support the decommissioning activities. Mobilization may include, but is not limited to:

- Obtaining and delivering to the site any special equipment or tooling required,
- Ordering of PPE,
- Ensuring that necessary site services are available,
- Arranging for disconnection and/or isolation of site services that are not required to support decommissioning activities,
- Preparing temporary storage areas for wastes, recyclable materials and re-useable equipment, and
- Ordering approved shipping containers for radioactive waste.

9.9.1 Duration

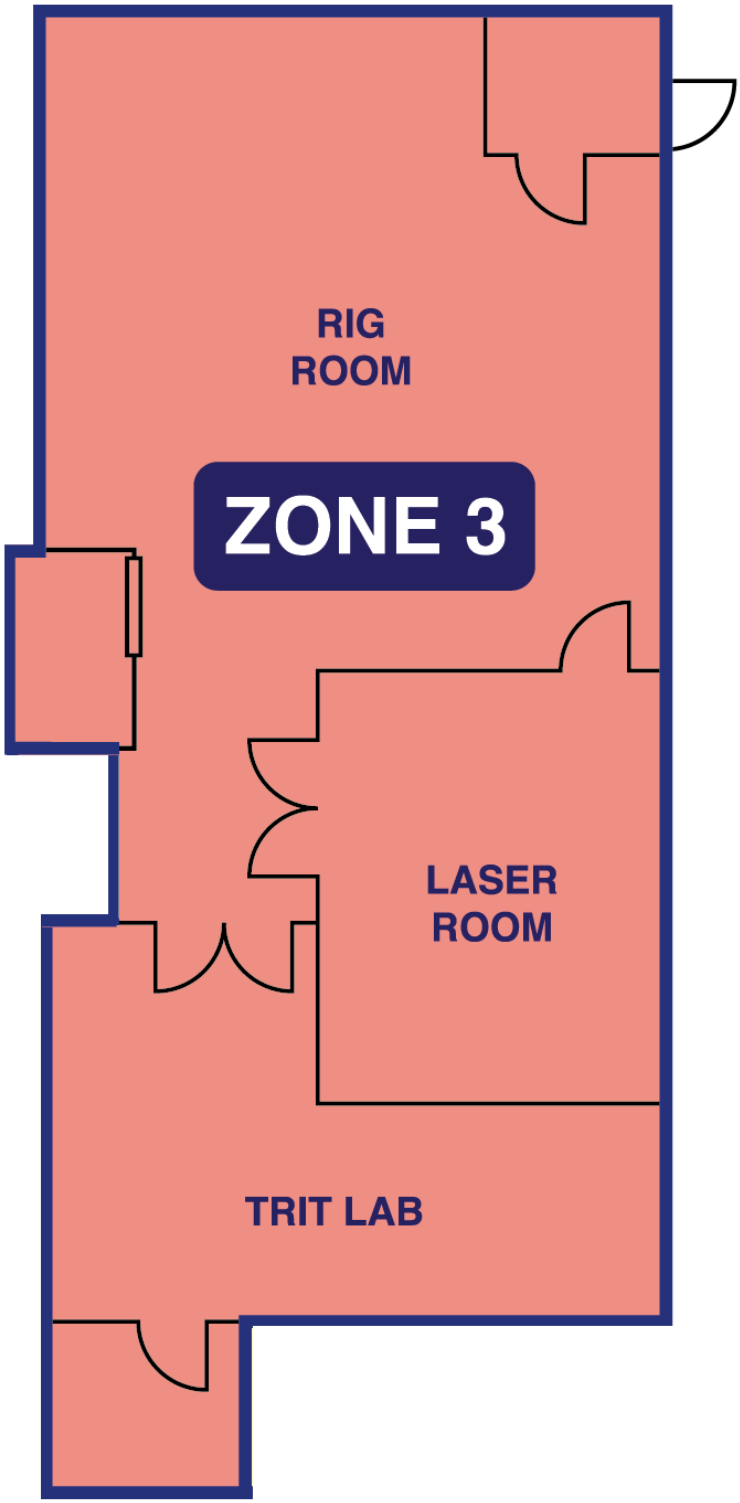
Three person-days of effort are estimated to complete this work package.

9.9.2 Cost

Table 17: Cost Summary Planning Envelope 1, Work Package 9

Activity	Quantity	Unit Cost ($)	Total
Mobilization (person-day effort)	3	315	$945
		Total	**$945**

10. Planning Envelope 2: Zone 3 Work Area



10.1 Work Package 1: Tritium Lab

10.1.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
2	3	1	Tritium Lab	28	Class 1

The Tritium Lab is a separate room within the Zone 3 area and consists of the following key decommissioning components:

- Bulk Splitting Rig and Fume Hood
- Secondary Fume Hood
- Items not associated with processing (furniture, shelving, cabinets etc.)

10.1.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- Bulk Splitting Rig
  - Tritium is the only radiological hazard present in the Bulk Splitting Rig. Tritium gas will be drawn down from the volumetric cylinders to the tritium traps. Residual tritium contamination may be present in the internal components.
  - There are no chemical hazards associated with this unit.
  - Electrical power supply will be disconnected.
  - There are no other physical or industrial hazards associated with the Bulk Splitting Rig.
- Secondary Fume Hood
  - Low levels of residual tritium contamination may be present on the interior of the fume hood structure.
  - There are no chemical hazards associated with this unit.
  - Electrical power supply will be disconnected.
  - There are no other physical or industrial hazards associated with this fume hood.

- Other items
    - Very low levels of removable tritium contamination may be present on the surfaces of furniture, cabinetry, shelving, and any other items in this area.
    - Operating experience strongly suggests that any items exhibiting surface contamination can be readily decontaminated to meet clearance levels, either as clearance-level waste or for unconditional clearance.
    - There are no physical, industrial or chemical hazards associated with these items.

10.1.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- Bulk Splitting Rig
    - Processing components of the bulk splitting rig will have been properly dismantled, packaged and shipped to a licenced waste management facility for disposal.
    - Structural components will have been decontaminated and assessed as either clearance-level waste (CLW), or volume-reduced and packaged and shipped as LLW.
    - No radiological, chemical, physical or industrial hazards will exist after decommissioning.
- Secondary Fume Hood
    - Structural components will have been decontaminated and assessed as either CLW, or volume-reduced and packaged and shipped as LLW.
    - No radiological, chemical, physical or industrial hazards will exist after decommissioning.
- Other items
    - All other items in this area will have been decontaminated and assessed as CLW.
    - No radiological, chemical, physical or industrial hazards will exist after decommissioning.

10.1.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

10.1.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Tritium Lab will be in a condition that will permit the release of the room from any further regulatory control by the CNSC once Planning Envelope 5 work has been completed.

10.1.6 Technical Approach to Decommissioning

The Bulk Splitting Rig will be dismantled. Based on operating experience, the scroll pumps, stainless steel tubing, fittings and valves from the Bulk Splitter and Reclaim Rig are likely to be contaminated to such an extent that decontamination is not practical and these components will be packaged for radioactive waste disposal.

The other components will be decontaminated and surveyed to confirm that they meet regulatory clearance levels.

A contingency factor of 20% of the volume of a drum of LLW is allocated in this planning envelope for items that cannot be decontaminated below clearance levels.

As appropriate, contamination surveys will include indirect measurements (swipe) and direct measurements of fixed and removable tritium activity by laboratory analysis or survey instrument.

10.1.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Continuous tritium-in-air monitors shall be employed in the work areas.

Ongoing contamination assessments shall be carried out in the work areas.

Normal Zone 3 PPE shall be the minimum requirement and upgraded should monitored conditions require enhanced levels of protection.

Active ventilation shall continue to operate during dismantling and disassembly activities in this work area. Real-time stack monitoring shall continue to operate.

10.1.8 Type, Quantity and Disposition of Wastes Generated

Table 18: Waste Summary – LLW (Planning Envelope 2, Work Package 1)

Component / Item	Volume (m^3)	Disposition
Bulk splitting rig header, tubing, cylinders	0.030	Licenced LLW facility
Bulk splitting rig scroll pump	0.030	
LLW Contingency (20% drum volume)	0.048	
Total Volume LLW	**0.108**	

Table 19: Waste Summary – CLW (Planning Envelope 2, Work Package 1)

Component / Item	Mass (kg)	Disposition
Bulk splitting rig fume hood structure	150	Landfill / Metal Recycler
Secondary fume hood structure	150	
Other furniture and items	100	
Total Mass CLW	**400**	

10.1.9 Duration

Five (5) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, decontamination and packaging activities.

10.1.10 Estimated Cost

Table 20: Cost Summary Planning Envelope 2, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0.108 m^3	31,445	$3,397
Labour	5 person-days	315	$1,575
WORK PACKAGE COST			**$4,972**

10.2 Work Package 2: Laser Room

10.2.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
2	3	2	Laser Room	24	Class 1

The Laser Room contains two (2) laser cutting units, only one of which is in operation. These systems are used to cut miniature tritium light sources. The units are contained within ventilated cabinets connected to the active ventilation systems.

As well there is a stainless-steel work station and a steel storage cabinet, both of which are connected to the active ventilation systems as well. There are other items not associated with processing, including furniture and cabinetry.

10.2.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- Tritium is the only radiological hazard present in the Laser Room.
- Laser cutting chambers are likely to be contaminated to an extent that decontamination will not be practical. All other items and components are expected to be contaminated to a much lesser extent, and able to be decontaminated to below clearance levels.
- There are no chemical hazards associated with this area.
- Electrical power supply will be disconnected from all equipment.
- There are no other physical or industrial hazards associated with the Laser Room.

10.2.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- Laser cutting equipment will have been dismantled. Cutting chambers will have been packaged and disposed of as LLW, while all other items and components have been decontaminated and processed as clearance-level waste.
- No radiological, chemical, physical or industrial hazards will exist after decommissioning.

10.2.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

10.2.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Laser Room will be in a condition that will permit the release of the room from any further regulatory control by the CNSC once Planning Envelope 5 work has been completed.

10.2.6 Technical Approach to Decommissioning

The laser cutters will be dismantled. Based on operating experience, the cutting chambers are likely to be contaminated to such an extent that decontamination is not practical and these components will be packaged for radioactive waste disposal.

All other components will be decontaminated and surveyed to confirm that they meet regulatory clearance levels. A contingency factor of 20% of the volume of a drum of LLW is allocated in this planning envelope for items that cannot be decontaminated below clearance levels.

As appropriate, contamination surveys will include indirect measurements (swipe) and direct measurements of fixed and removable tritium activity by laboratory analysis or survey instrument.

10.2.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Continuous tritium-in-air monitors shall be employed in the work areas. Ongoing contamination assessments shall be carried out in the work areas.

Normal Zone 3 PPE shall be the minimum requirement and upgraded should monitored conditions require enhanced levels of protection.

Active ventilation shall continue to operate during dismantling and disassembly activities in this work area. Real-time stack monitoring shall continue to operate.

10.2.8 Type, Quantity and Disposition of Wastes Generated

Table 21: Waste Summary – LLW (Planning Envelope 2, Work Package 2)

Component / Item	Volume (m^3)	Disposition
Laser cutting chambers (2)	0.048	Licenced LLW facility
LLW Contingency (20% drum volume)	0.048	
Total Volume LLW	**0.096**	

Table 22: Waste Summary – CLW (Planning Envelope 2, Work Package 2)

Component / Item	Mass (kg)	Disposition
Stainless Steel Workstation	50	Landfill / Metal Recycler
Ventilated laser cabinets	75	
Metal storage cabinet	50	
Other furniture and items	25	
Total Mass CLW	**200**	

10.2.9 Duration

Two (2) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, decontamination and packaging activities.

10.2.10 Estimated Cost

Table 23: Cost Summary Planning Envelope 2, Work Package 2

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0.096 m^3	31,445	$3,019
Labour	2 person-days	315	$630
WORK PACKAGE COST			**$3,649**

10.3 Work Package 3: Rig Room

10.3.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
2	3	3	Rig Room	60	Class 1

The Rig Room is a separate room within the Zone 3 area consisting of the following key decommissioning components:

- Up to eight (8) separate tritium processing fill stations (‘Rigs’) installed in four (4) separate ventilated cabinets, including scroll pumps.
- One (1) glass stub crusher.
- One (1) ‘muffle’ oven.
- A bank of stainless-steel fume hoods and associated cabinetry, including three (3) separate work stations for muffle, crushing and wash processes.
- Other items not associated with tritium processing, including pre-fill drying ovens, a computer workstation, and other furniture and cabinetry.

10.3.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- Tritium Fill Stations / Rigs
  - Tritium is the only radiological hazard present in the processing rigs. Tritium traps will have been removed and processed as part of earlier work (see Planning Envelope 1, Work Package 3). Residual tritium contamination will be present in the internal rig components, such as tubing, valves and pumps.
  - Auxiliary systems delivering liquid nitrogen and inert gas to certain processing rigs will have been disconnected and emptied.
  - Electrical power supply will be disconnected.
  - There are no other potential chemical, physical or industrial hazards associated with the filling rigs.

- Glass Stub Crusher
  - Residual tritium contamination may be present on the interior of the stub crusher.
  - Electrical power supply will be disconnected.
  - There are no other potential chemical, physical or industrial hazards associated with the stub crusher.
- Muffle Oven
  - Residual tritium contamination may be present on the interior of the muffle oven.
  - Electrical power supply will be disconnected.
  - There are no other potential chemical, physical or industrial hazards associated with the muffle oven.
- Fume Hood Bank
  - Low levels of residual tritium contamination may be present on the interior of the fume hood structure.
  - Electrical power supply will be disconnected.
  - There are no other potential chemical, physical or industrial hazards associated with these fume hoods.
- Other items
  - Operating experience strongly suggests that any items exhibiting surface contamination can be readily decontaminated to meet clearance levels, either as clearance-level waste or for unconditional clearance.
  - There are no physical, industrial or chemical hazards associated with these items.

10.3.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- Tritium Fill Stations / Rigs
  - All tritium gas filling heads will have been properly disconnected and capped, and packaged and shipped as LLW. Scroll pumps will have been disconnected, and all tritium-exposed components of the pumps will be processed as LLW as well. Ventilated cabinetry and rig electronics will be dismantled, decontaminated and processed as either LLW or CLW.
  - No radiological, chemical, physical or industrial hazards will exist after decommissioning.
- Glass Stub Crusher
  - The stub crusher will have been dismantled, packaged and shipped as LLW.
  - No radiological, chemical, physical or industrial hazards will exist after decommissioning.
- Muffle Oven
  - The muffle oven will have been dismantled, and interior components packaged and shipped as LLW. Outer components will be decontaminated and processed as either LLW or CLW.
  - No radiological, chemical, physical or industrial hazards will exist after decommissioning.
- Fume Hood Bank
  - Operating experience strongly suggests that the fume hoods will be readily decontaminated, and will be either processed as CLW or repurposed.
  - There are no other potential chemical, physical or industrial hazards associated with these fume hoods.

- Other items
    - Operating experience strongly suggests that any items exhibiting surface contamination can be readily decontaminated to meet clearance levels, either as CLW or for unconditional clearance.
    - There are no physical, industrial or chemical hazards associated with these items.

10.3.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

10.3.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Rig Room will be in a condition that will permit the release of the room from any further regulatory control by the CNSC once Planning Envelope 5 work has been completed.

10.3.6 Technical Approach to Decommissioning

The tritium filling rigs, glass stub crusher and muffle fume hood will be dismantled. Based on operating experience, the all ‘wetted’ tubing associated with the processing rigs, including exposed scroll pump components, are likely to be contaminated to such an extent that decontamination is not practical. These components will be packaged for radioactive waste disposal.

All other components will be decontaminated and surveyed to confirm that they meet regulatory clearance levels.

A contingency factor of 100% of the volume of a drum of LLW is allocated in this planning envelope for items that cannot be decontaminated below clearance levels.

As appropriate, contamination surveys will include indirect measurements (swipe) and direct measurements of fixed and removable tritium activity by laboratory analysis or survey instrument.

10.3.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Continuous tritium-in-air monitors shall be employed in the work areas. Ongoing contamination assessments shall be carried out in the work areas.

Normal Zone 3 PPE shall be the minimum requirement and upgraded should monitored conditions require enhanced levels of protection.

Active ventilation shall continue to operate during dismantling and disassembly activities in this work area. Real-time stack monitoring shall continue to operate.

10.3.8 Type, Quantity and Disposition of Wastes Generated

Table 24: Waste Summary – LLW (Planning Envelope 2, Work Package 3)

Component / Item	Volume (m^3)	Disposition
Filling heads, scroll pumps (8)	0.50	Licenced LLW facility
Glass stub crusher	0.10	
Muffle oven – interior components	0.05	
LLW Contingency (100% drum volume)	0.24	
Total Volume LLW	**0.89**	

Table 25: Waste Summary – CLW (Planning Envelope 2, Work Package 3)

Component / Item	Mass (kg)	Disposition
Ventilated cabinetry for rigs	200	Landfill / Metal Recycler
Fume hood bank	400	
Muffle oven – exterior components	20	
Scroll pumps – non-wetted components	80	
Drying ovens	200	
Other furniture and items	200	
Total Mass CLW	**1,100**	

10.3.9 Duration

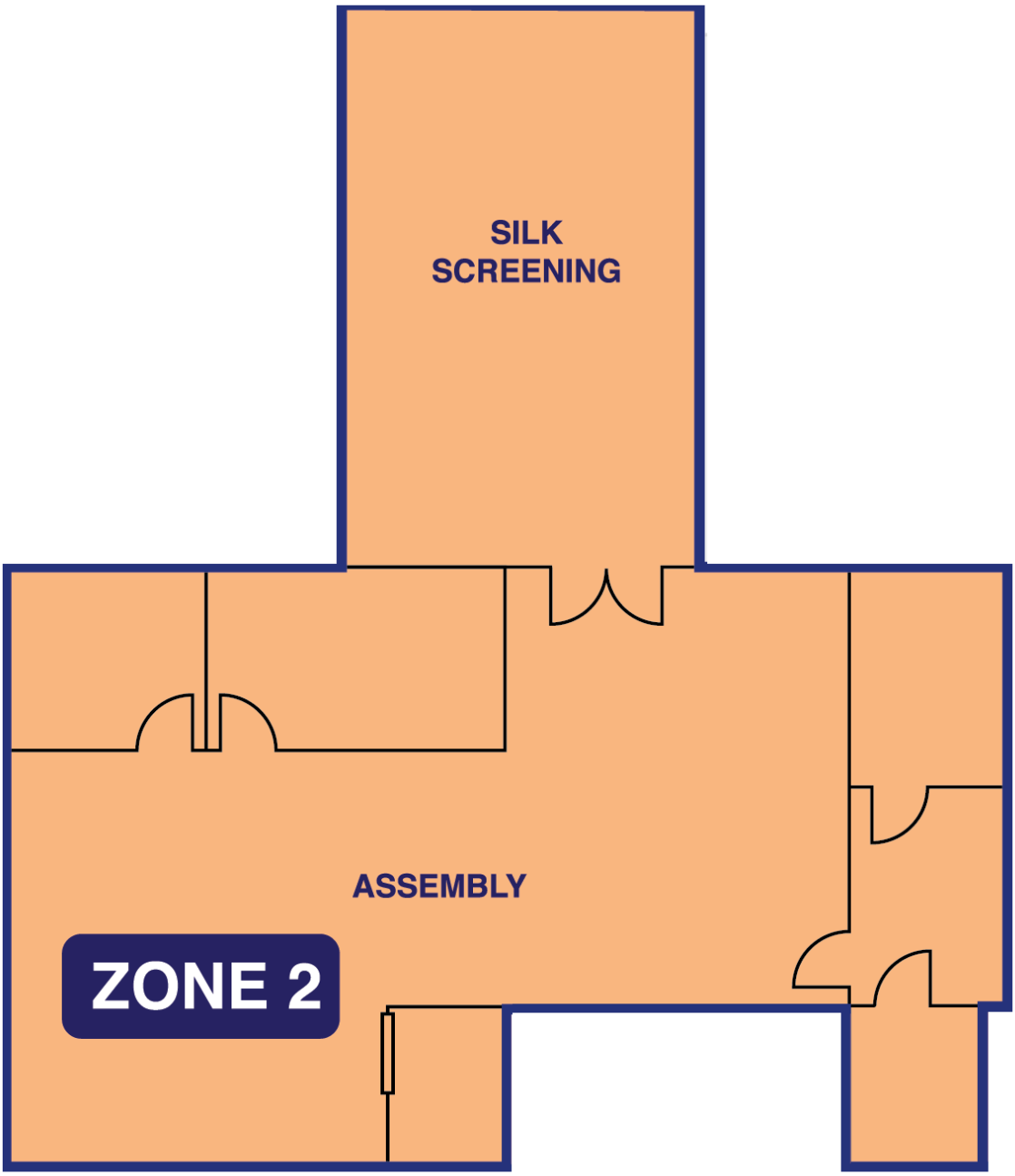
Eighteen (18) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, decontamination and packaging activities.

10.3.10 Estimated Cost

Table 26: Cost Summary Planning Envelope 2, Work Package 3

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0.89 m^3	31,445	$27,987
Labour	18 person-days	315	$5,670
WORK PACKAGE COST			**$33,657**

11. Planning Envelope 3: Zone 2 Work Area



11.1 Work Package 1: Assembly Room

11.1.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
3	2	1	Assembly Area	114	Class 2

The Assembly Area consists of the work stations associated with the brightness testing and installation of GTLS tubes into various sign frames. These tubes have all been leak tested in Zone 3 before being transferred to the Zone 2 Assembly Area.

The extent of decommissioning activities in this area will consist of radiological clearance surveys of all work stations and equipment, walls and floor areas.

The tritium-in-air stack monitors are located in the Assembly Area and will be decommissioned after the Zone 3 ventilation and facility stacks have been decommissioned.

11.1.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- There exists low potential for tritium contamination in this area. All GTLS tubes will have been removed from this area prior to decommissioning.
- Residual tritium contamination may be present in the tubing and components of the tritium-in-air stack monitoring system.
- Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.
- There are no electrical or pressurized systems in this area that require disconnecting or depressurizing to facilitate decommissioning activities.

11.1.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- There will be no radiological or chemical hazards remaining in this area after decommissioning.
- The area will be cleared of all work stations, furniture, shelving and other associated components.
- The room will be vacant after decommissioning.

11.1.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

11.1.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Assembly Area will be in a condition that will permit the release of the room from any further regulatory control by the CNSC.

11.1.6 Technical Approach to Decommissioning

Detailed tritium contamination surveys will be conducted on all furniture, equipment, shelving, work stations and all other removable components to ensure that clearance levels are met. Surveys will include indirect measurements (swipe) and direct measurements for fixed and removable tritium activity using a portable survey instrument that works on any flat, conducting surface.

All furniture and cabinetry is expected to be either processed as CLW, or repurposed for other use. Cabinets and equipment are expected to be able to be reused by other businesses after undergoing clearance assessments.

Once the area is cleared of equipment and furniture a MARSSIM[33] based radiological clearance survey will be completed of the walls and floors to ensure that clearance levels are met.

A final detailed physical inspection will be conducted in all areas of the Assembly Area after the removal of all equipment to confirm the absence of any GTLS tubes.

11.1.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Continuous tritium-in-air monitors shall be employed in the work areas. Ongoing contamination assessments shall be carried out in the work areas.

Normal Zone 2 PPE shall be the minimum requirement and upgraded should monitored conditions require enhanced levels of protection.

Real-time stack monitoring shall continue to operate. Note that the real-time stack monitoring equipment shall remain operational until Planning Envelope 5 has been completed; only then may the equipment be shut down and decommissioned.

11.1.8 Type, Quantity and Disposition of Wastes Generated

Table 27: Waste Summary – LLW (Planning Envelope 3, Work Package 1)

Component / Item	Volume (m^3)	Disposition
Stack monitoring piping / tubing	0.03	Licenced LLW facility
Total Volume LLW	**0.03**	

Table 28: Waste Summary – CLW (Planning Envelope 3, Work Package 1)

Component / Item	Mass (kg)	Disposition
Shelving, work tables, equipment, chairs and cabinetry that cannot be repurposed	300	Landfill / Metal Recycler
Total Mass CLW	**300**	

11.1.9 Duration

Four (4) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, decontamination and physical removal of all waste and repurposed items.

11.1.10 Estimated Cost

Table 29: Cost Summary Planning Envelope 3, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0.03 m^3	31,445	$944
Labour	4 person-days	315	$1,260
WORK PACKAGE COST			**$2,204**

11.2 Work Package 2: Silk-Screening Room

11.2.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
3	2	2	Silk-Screening Room	43	Class 2

The Silk-Screening Room is an area where formerly, speciality light frames were built and painted before the installation of GTLS tubes. The room is currently used primarily for sonic welding of modules for commercial safety signs, with other less frequent operational tasks taking place.

11.2.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- There exists very limited potential for tritium contamination in this area. No radioactive materials are routinely handled or stored in this area.
- Any chemical/hazardous materials, including paint products, will have been transferred to a Hazardous Waste Facility, if required.
- There are no electrical or pressurized systems in this area that require disconnecting or depressurizing to facilitate decommissioning activities.

11.2.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- There will be no radiological or chemical hazards remaining in this area after decommissioning.
- The area will be cleared of all work stations, furniture, shelving and other associated components.
- The room will be vacant after decommissioning.

11.2.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

11.2.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Silk-Screening Room will be in a condition that will permit the release of the room from any further regulatory control by the CNSC.

11.2.6 Technical Approach to Decommissioning

Detailed tritium contamination surveys will be conducted on all furniture, equipment, shelving, work stations and all other removable components to ensure that clearance levels are met. Surveys will include indirect measurements (swipe) and direct measurements for fixed and removable tritium activity using a portable survey instrument that works on any flat, conducting surface.

All furniture and cabinetry is expected to be either processed as CLW, or repurposed for other use. Cabinets and equipment are expected to be able to be reused by other businesses after undergoing clearance assessments.

Once the area is cleared of equipment and furniture a MARSSIM[33] based radiological clearance survey will be completed of the walls and floors to ensure that clearance levels are met.

A final detailed physical inspection will be conducted in all areas of the Assembly Area after the removal of all equipment to confirm the absence of any GTLS tubes.

11.2.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Ongoing contamination assessments shall be carried out in the work areas.

Normal Zone 2 PPE shall be the minimum requirement and upgraded should monitored conditions require enhanced levels of protection.

Real-time stack monitoring shall continue to operate.

11.2.8 Type, Quantity and Disposition of Wastes Generated

Table 30: Waste Summary – LLW (Planning Envelope 3, Work Package 2)

Component / Item	Volume (m^3)	Disposition
None	-	Licenced LLW facility
Total Volume LLW	**0**	

Table 31: Waste Summary – CLW (Planning Envelope 3, Work Package 2)

Component / Item	Mass (kg)	Disposition
Shelving, work tables, equipment, chairs and cabinetry that cannot be repurposed	200	Landfill / Metal Recycler
Total Mass CLW	**200**	

11.2.9 Duration

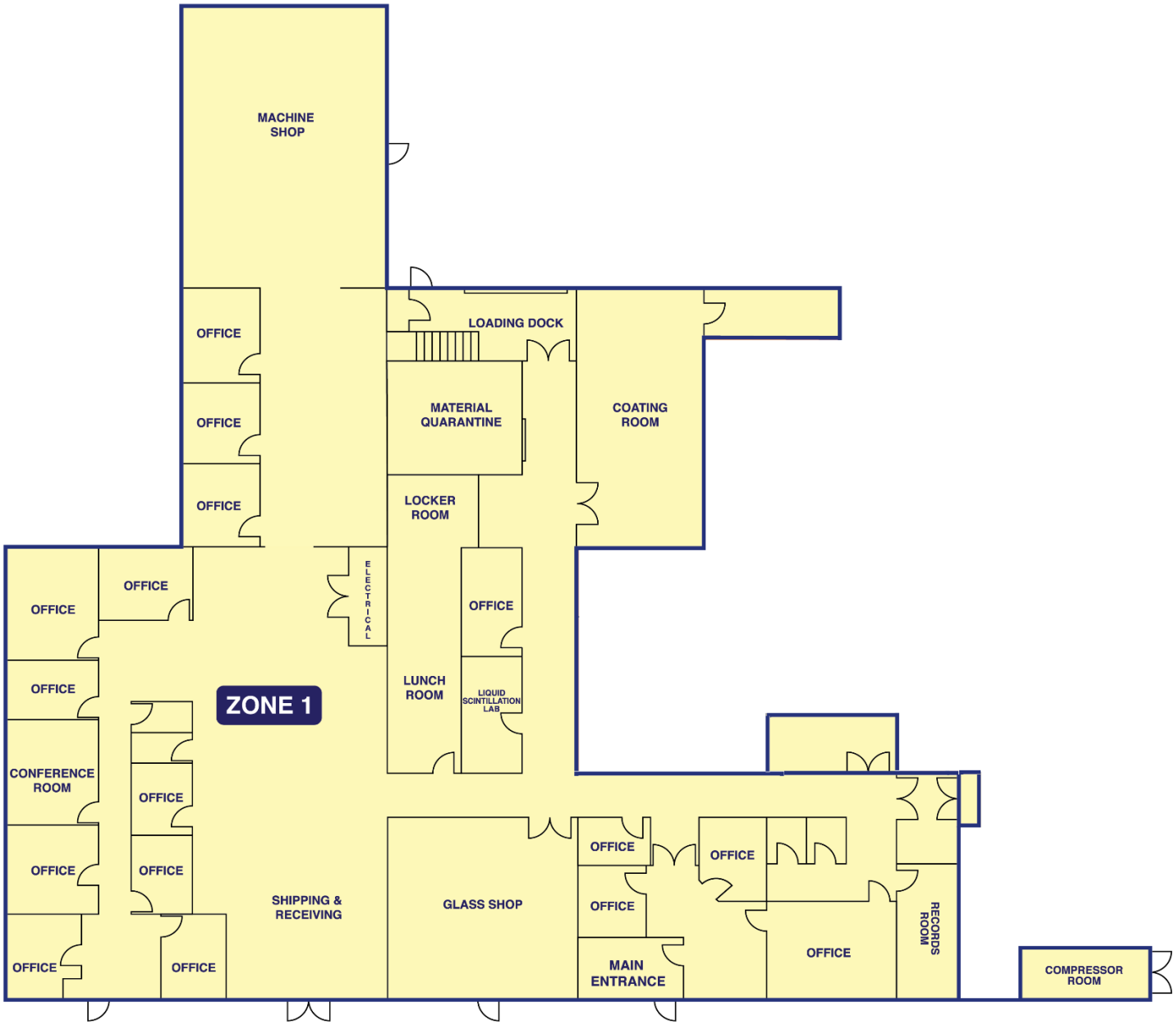
Two (2) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, decontamination and physical removal of all waste and repurposed items.

11.2.10 Estimated Cost

Table 32: Cost Summary Planning Envelope 3, Work Package 2

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0 m^3	31,445	$0
Labour	2 person-days	315	$630
WORK PACKAGE COST			**$630**

12. Planning Envelope 4: Zone 1 Work Area



12.1 Work Package 1: Entire Zone 1 Area

12.1.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
4	1	1	All Zone 1 Areas	1,092	Class 2

The extent of decommissioning activities in this area will consist of radiological clearance surveys of all work stations, furniture, equipment, walls and floor areas.

12.1.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- The potential for tritium contamination in this Zone is extremely low. Any radioactive materials handled in this area are all packaged items ready for shipment.
- Any chemical/hazardous materials, including paint products, will have been transferred to a Hazardous Waste Facility, if required.
- There are no electrical or pressurized systems in this area that require disconnecting or depressurizing to facilitate final clearance surveys.

12.1.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- There will be no radiological or chemical hazards remaining in this area after decommissioning.
- The area will be cleared of all work stations, furniture, shelving and other associated components.
- The area will be vacant after decommissioning.

12.1.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

12.1.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Zone 1 Area will be in a condition that will permit the release of the room from any further regulatory control by the CNSC.

12.1.6 Technical Approach to Decommissioning

Detailed tritium contamination surveys will be conducted on all furniture, equipment, shelving, work stations and all other removable components to ensure that clearance levels are met.

All furniture and cabinetry is expected to be repurposed for other use. Cabinets and equipment are expected to be able to be reused by other businesses after undergoing final clearance surveys.

Once the area is cleared of equipment and furniture a MARSSIM[33] based radiological clearance survey will be completed of the walls and floors to ensure that clearance levels are met.

12.1.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Ongoing contamination assessments shall be carried out in the work areas.

12.1.8 Type, Quantity and Disposition of Wastes Generated

Table 33: Waste Summary – LLW (Planning Envelope 4, Work Package 1)

Component / Item	Volume (m^3)	Disposition
None	-	Licenced LLW facility
Total Volume LLW	**0**	

Table 34: Waste Summary – CLW (Planning Envelope 4, Work Package 1)

Component / Item	Mass (kg)	Disposition
None	-	Landfill / Metal Recycler
Total Mass CLW	**0**	

Note that the absence of CLW in the planning envelope does not mean that there will be no waste or recyclable materials generated during decommissioning activities in Zone 1. Rather, any waste materials are not required to be accounted for as 'clearance-level waste' in accordance with the SRBT Waste Management Program.

The mass of waste and recyclables from Zone 1 is not limited by administrative restrictions in the way that waste is managed in Zone 2 and 3.

12.1.9 Duration

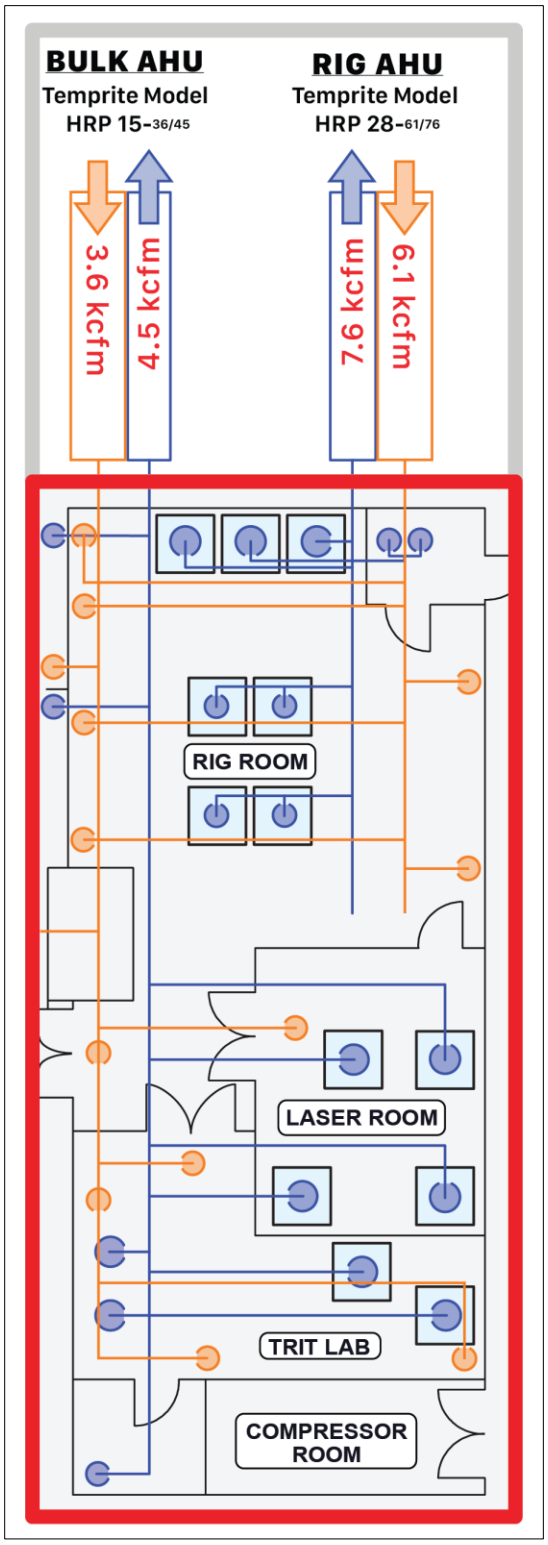
Ten (10) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, and physical removal of all equipment and furniture.

12.1.10 Estimated Cost

Table 35: Cost Summary Planning Envelope 4, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	0 m^3	31,445	$0
Labour	10 person-days	315	$3,150
WORK PACKAGE COST			**$3,150**

13. Planning Envelope 5: Zone 3 Ventilation Systems



13.1 Work Package 1: Zone 3 Ventilation Systems

13.1.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
5	3	1	Zone 3 Ventilation	N/A	Class 1

The Zone 3 Ventilation Systems consist of two separate series of ductwork. The ductwork is a combination of round, flexible metal ductwork and rectangular sheet metal ductwork. All ductwork is located above a false ceiling, which will be removed to facilitate access and removal.

Removal of Zone 3 ductwork will only commence after the completion of the work described in Planning Envelopes 2 and 3.

13.1.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- Residual tritium contamination will be present on the interior surfaces of the ductwork.
- Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.
- There are no electrical or pressurized systems in this area that require disconnecting or depressurizing to facilitate final clearance surveys.
- Working at height safety practices will be considered for this activity.

13.1.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- There will be no radiological or chemical hazards remaining in this area after decommissioning.
- Following removal of the ductwork, the Zone 3 final clearance surveys can be completed.

13.1.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

13.1.5 End State Objective

Upon completion of the decommissioning activities in this work package, the Zone 3 Area will be in a condition that will permit the release of the room from any further regulatory control by the CNSC.

13.1.6 Technical Approach to Decommissioning

Detailed tritium contamination surveys will not be required because there will be no attempt to clear these materials for release or recycling.

Characterization surveys will be completed to determine the information required for waste acceptance at a licensed radioactive waste facility. Surveys will include indirect measurements (swipe) and direct measurements for fixed and removable tritium activity using survey instruments as appropriate.

Once the area is cleared of all ductwork a MARSSIM[33] based radiological clearance survey will be completed of the walls and floors to ensure that clearance levels are met.

13.1.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Ongoing contamination assessments shall be carried out in the work areas.

Continuous tritium-in-air monitoring shall be carried out during the removal activities.

In addition to normal Zone 3 PPE, enhanced levels of protection may be considered depending on radiological conditions measured at the time of removal. This may include respiratory protection measures.

Real-time stack monitoring shall continue to operate. Once this work package has been completed, this system may then be decommissioned in accordance with Planning Envelope 3.

13.1.8 Type, Quantity and Disposition of Wastes Generated

The ventilation ductwork is made of light gauge sheet metal. The exhaust headers and associated runs are rectangular in cross-section, and can readily be volume-minimized by sectioning into flat sheets.

The total duct work to be processed runs over a length of about 8,100 cm, and is expected to be able to be placed in a certified 'B-12' Type A package (total volume = 1.25 m^3) after volume reduction; however, a contingency equivalent to the volume of a Type 'A' drum (0.24 m^3) is included in the planning envelope to ensure conservatism.

Table 36: Waste Summary – LLW (Planning Envelope 5, Work Package 1)

Component / Item	Volume (m^3)	Disposition
Volume-minimized ventilation ductwork	1.49	Licenced LLW facility
Total Volume LLW	**1.49**	

Table 37: Waste Summary – CLW (Planning Envelope 5, Work Package 1)

Component / Item	Mass (kg)	Disposition
None	-	Landfill / Metal Recycler
Total Mass CLW	**0**	

13.1.9 Duration

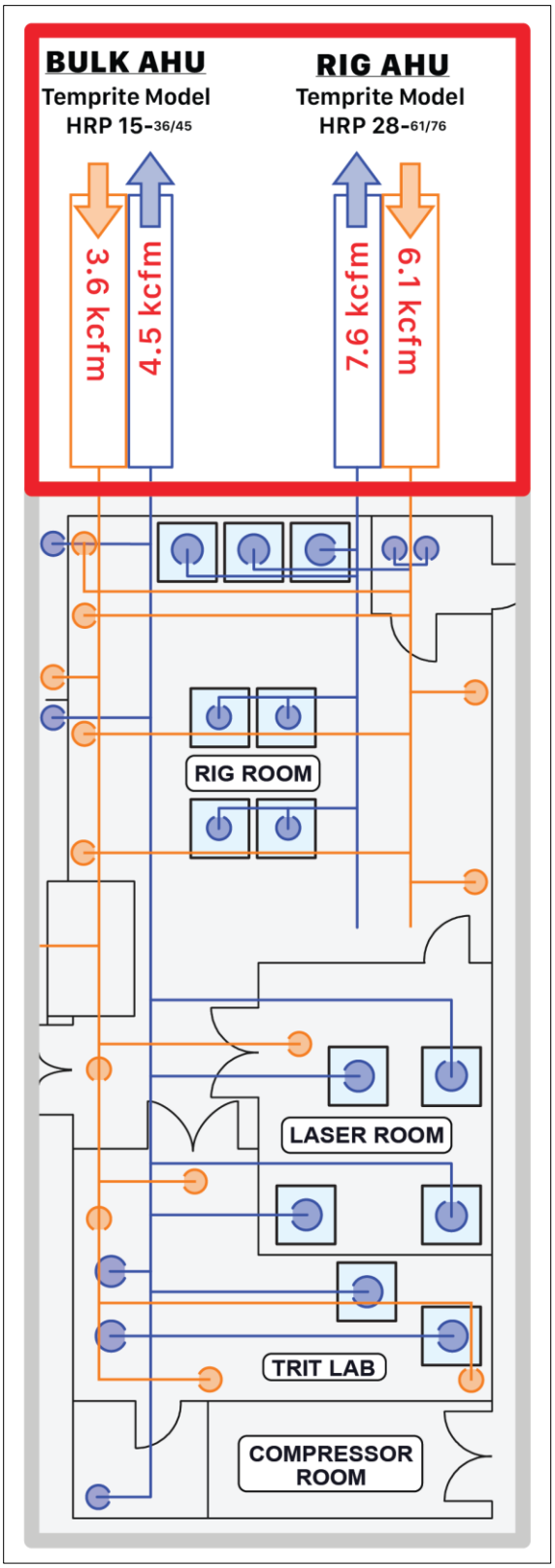
Ten (10) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, volume reduction and packaging of all ductwork.

13.1.10 Estimated Cost

Table 38: Cost Summary Planning Envelope 5, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	1.49 m^3	31,445	$46,854
Labour	10 person-days	315	$3,150
WORK PACKAGE COST			**$50,004**

14. Planning Envelope 6: Air Handling Units and Stacks



14.1 Work Package 1: Air Handling Units and Stacks

14.1.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
6	N/A	1	Air Handling Units	N/A	Class 1

The Bulk Air Handling Unit supplies and exhausts the Tritium Lab, Laser Room, Storage Room and two rooms in Zone 2, while the Rig Air Handling Unit supplies and exhausts the tritium filling rigs in the Rig Room.

These are located outside of the building in the secure fenced-in compound.

14.1.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

- Residual tritium contamination will be present on the interior surfaces of the ductwork.
- Any chemical/hazardous materials will have been transferred to a Hazardous Waste Facility, if required.
- The electrical power supply to the units will be disconnected prior to decommissioning activities.
- Working at height safety practices will be considered for this activity, including training and qualifications for operating the hoisting equipment.

14.1.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

- There will be no radiological or chemical hazards remaining in this area after decommissioning.
- Following removal of the air handling units and stacks, final clearance surveys can be completed.

14.1.4 Strategic Approach to Decommissioning

A ‘Prompt Removal’ strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

14.1.5 End State Objective

Upon completion of the decommissioning activities in this work package, the area will be in a condition that will permit the release of the room from any further regulatory control by the CNSC.

14.1.6 Technical Approach to Decommissioning

Detailed tritium contamination surveys will not be required because there will be no attempt to clear these materials for release or recycling.

Characterization surveys will be completed to determine the information required for waste acceptance at a licensed radioactive waste facility. Surveys will include indirect measurements (swipe) and direct measurements for fixed and removable tritium activity using survey instruments as appropriate.

Volume reduction practices including cutting and compaction will be employed where practicable.

14.1.7 Strategy for Protection of Workers, Public and the Environment

All personnel performing decommissioning activities shall be designated Nuclear Energy Workers. A bioassay program shall be established for the decommissioning contractor personnel.

Ongoing contamination assessments shall be carried out in the work areas, and contamination control practices will be employed during work. Protective equipment and clothing shall be selected based upon hazard assessments during work.

Fire protection practices will be employed during any cutting activities involving spark or open flame / torches.

Hoisting, rigging and cutting work, and any heavy equipment operations will be performed by qualified personnel only.

14.1.8 Type, Quantity and Disposition of Wastes Generated

The two stacks are light gauge sheet metal, each being approximately 6 m in height and 20 cm in diameter.

The Bulk Air Handling Unit has an estimated mass of 2,200 kg, while the Rig Air Handling unit is estimated at 3,000 kg. The units are approximately 4.2 m in length, 1.5 m in width and 2.5 m in height. Engineering lifting lugs are attached to each unit.

The composition of these units, along with the estimated total radiological activity facilitates the disposition of these units at a licensed metal melt facility operated by EnergySolutions. This facility has accepted and processed millions of pounds of radioactive waste generated at licensed facilities in Canada.

Discussions with this service provider have previously confirmed that the air handling units satisfy waste acceptance criteria, and can be accommodated and disposed of via this pathway. The cost of metal melt per kilogram is based on drum melt quotes provided in 2024.

Table 39: Waste Summary – LLW (Planning Envelope 6, Work Package 1)

Component / Item	Mass (kg)	Disposition
Bulk air handling unit	2,200	EnergySolutions Metal Melt
Rig air handling unit	3,000	
Stacks	230	
Total Mass	**5,430**	

Table 40: Waste Summary – CLW (Planning Envelope 6, Work Package 1)

Component / Item	Mass (kg)	Disposition
None	-	Landfill / Metal Recycler
Total Mass CLW	**0**	

14.1.9 Duration

Four (4) person-days of effort are estimated for this work package. This effort includes radiological assessments, dismantling, volume reduction and packaging activities.

14.1.10 Estimated Cost

Table 41: Cost Summary Planning Envelope 6, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Radioactive Waste Disposal	5,430	16	$86,880
Labour	4 person-days	315	$1,260
Crane rental	1	1,154	$1,154
Articulated boom lift rental	1	635	$635
Transportation costs	1	$9,232	$9,232
WORK PACKAGE COST			**$99,161**

15. Planning Envelope 7: Groundwater Monitoring Wells

15.1 Work Package 1: Removal of 29 Groundwater Monitoring Wells

15.1.1 Description of Areas and Components to be Decommissioned

Planning Envelope	Zone	Work Package		Floor Area (m^2)	MARSSIM Classification
7	N/A	1	Groundwater Monitoring Wells	N/A	N/A

There are 29 groundwater monitoring wells located on the grounds surrounding the facility. These wells are used as part of SRBT's Groundwater Monitoring and Protection programs.

These wells will be decommissioned by a qualified third party contractor.

15.1.2 Principal Radiological, Chemical and Physical Conditions During Decommissioning

There are no radioactive, chemical, electrical or other physical hazard associated with the decommissioning of these wells.

15.1.3 Principal Radiological, Chemical and Physical Conditions After Decommissioning

There will be no radiological, chemical or physical hazards in these areas once the wells are decommissioned and removed.

15.1.4 Strategic Approach to Decommissioning

A 'Prompt Removal' strategy will be adopted for the decommissioning of this work package. For detailed rationale see Section 6.2.

15.1.5 End State Objective

Upon completion of the decommissioning activities in this work package, the area will be in a condition that will permit the release of the room from any further regulatory control by the CNSC.

15.1.6 Technical Approach to Decommissioning

The work package will be completed by a qualified well drilling contractor who has experience and equipment to perform this work. Wells have previously been decommissioned (last in 2014) by qualified contractors.

15.1.7 Strategy for Protection of Workers, Public and the Environment

Hoisting, cutting and other equipment used in this work package will be operated by qualified personnel only. Normal industrial safety practices will be followed.

15.1.8 Type, Quantity and Disposition of Wastes Generated

All waste associated with this work package is not expected to be radioactively contaminated. Any wastes generated will be disposed of or recycled after assessment.

15.1.9 Duration

Similar work has been performed previously by a qualified contractor on a per-unit removal basis of $500 per well, as per the previous version of the PDP. Costs presented here have been multiplied by the inflation constant. The time to complete the work is not defined, but it is not expected to take any more than a few days at most.

15.1.10 Estimated Cost

Table 42: Cost Summary Planning Envelope 7, Work Package 1

Activity	Quantity	Unit Cost ($)	Total
Groundwater monitoring well removal	29	577	$16,733
WORK PACKAGE COST			**$16,733**

16. Final Survey

The purpose of the Final Survey is to demonstrate that the decommissioning work is complete; specifically, that the premises and their surroundings are in the desired end state.

The Final Survey will be performed after all decontamination, dismantling and waste management work is complete. The final radiological survey will apply MARSSIM[33] methodology in procedures that will be described in the DDP.

These procedures will meet the requirements of the applicable regulations, standards and guidelines in force at the time at the time of the decommissioning. The results of the Final Survey will be presented in the Decommissioning Report.

17. End State

The SRBT facility will have been retired from service and left in a state where the health and safety of the workers, the public and the environment will not be impacted.

Upon completion of the decommissioning, the facility will be in a condition that will permit the release of the facility from any further regulatory control by the CNSC. Possession of the leased premises will be returned to the owner for future commercial or industrial use or development.

18. Decommissioning Report

A Decommissioning Report will be prepared following completion of the decommissioning work.

The report will include detailed summaries of:

- All decommissioning work that was completed under the DDP, and the outcome of that work,
- The radioactive, hazardous and demolition wastes that were generated and the disposition of those wastes,
- Any incidents, releases or unexpected events that occurred during the course of the decommissioning work; and
- The results of the final survey that was performed and the interpretation of the results.

Any additional information required by the regulations in force at the time of the decommissioning will also be included in the report. This report will form part of the submission to the CNSC for a Licence to Abandon

19. Abandonment

An application for a Licence to Abandon will be completed and submitted to CNSC for review and approval. This application will be supported by the Final Decommissioning Report.

After decommissioning of the facility is complete and a Licence to Abandon has been granted, the premises will be returned to the owner of the building for reuse or redevelopment.

20. Impact Assessment

20.1 Environment

It is expected that there will be no significant impact on the surrounding natural environment due to the decommissioning of the facility.

This is based on previous regulatory environmental assessments which have noted that the environmental effects arising from future decommissioning are not expected to be significant, and on the fact that facility operations have remained unchanged (or improved) since the assessment was completed.

20.2 Socioeconomic

There is expected to be a significant impact on the social and economic environment.

The main elements that will be affected are the local economy through direct loss of employment for individuals in the area, the local and surrounding area's economy through loss of spin-off jobs, and indirect loss of employment due to the loss of operations and employment at the facility.

20.3 Waste

Currently, SRBT facility disposes of non-hazardous waste at the local municipal landfill. The waste disposed of at that site may include such items as cardboard, paper, gloves, cleaning material, and plastic components. No significant impacts are expected to occur from the non-hazardous waste associated with decommissioning.

It is planned that all hazardous wastes will be removed prior to decommissioning. SRBT will dispose of hazardous and radioactive waste at licensed waste management facilities; therefore, no unexpected adverse environmental impacts are expected.

21. Records

SRBT will continue to maintain all relevant management systems records generated during the operational phase of the facility, for the purposes of periodic update of the PDP, and for use in the development of the detailed decommissioning plan. This includes:

- Design descriptions of the custom-built tritium processing equipment, including filling rigs, laser cutting systems, and bulk splitting rig;
- Inventories of radioactive and hazardous materials;
- Results of routine contamination surveys and environmental monitoring programs; and
- Details of any spills of hazardous materials, or releases of radioactive materials which may have occurred over the operating life of the facility.

All safety-related records created during the decommissioning phases of the facility will be retained to support regulatory compliance assessments and reporting, including the final Decommissioning Report in support of the issuance of a Licence to Abandon.

22. Decommissioning Cost Estimate

Table 43 below summarizes the projected base cost to achieve the defined end-state.

Table 43: Unadjusted Cost to Achieve End State

SAFE SHUTDOWN PHASE			
DESCRIPTION OR ACTIVITY	**SUBTOTAL**	**CONTINGENCY**	**TOTAL**
Planning Envelope 1, Work Package 1	$3,000	25%	$3,750
Planning Envelope 1, Work Package 2	$6,000	25%	$7,500
Planning Envelope 1, Work Package 3	$64,390	25%	$80,488
Planning Envelope 1, Work Package 4	$2,500	25%	$3,125
Planning Envelope 1, Work Package 5	$19,225	25%	$24,031
Planning Envelope 1, Work Package 6	$16,275	25%	$20,344
Planning Envelope 1, Work Package 7	$3,424	25%	$4,280
Planning Envelope 1, Work Package 8	$8,720	25%	$10,900
Planning Envelope 1, Work Package 9	$945	25%	$1,181
Running Costs (3 months)	$57,562	10%	$63,318
SAFE SHUTDOWN PHASE COSTS	**$182,041**		**$218,917**
DECOMMISSIONING PHASE			
DESCRIPTION OR ACTIVITY	**SUBTOTAL**	**CONTINGENCY**	**TOTAL**
Planning Envelope 2, Work Package 1	$4,972	25%	$6,215
Planning Envelope 2, Work Package 2	$3,649	25%	$4,561
Planning Envelope 2, Work Package 3	$33,657	25%	$42,071
Planning Envelope 3, Work Package 1	$2,204	25%	$2,755
Planning Envelope 3, Work Package 2	$630	25%	$788
Planning Envelope 4, Work Package 1	$3,150	25%	$3,938
Planning Envelope 5, Work Package 1	$50,004	25%	$62,505
Planning Envelope 6, Work Package 1	$99,161	25%	$123,951
Planning Envelope 7, Work Package 1	$16,733	25%	$20,916
Soil sampling	$3,462	25%	$4,328
Running Costs (3 months)	$57,562	10%	$63,318
TOTAL COSTS DECOMMISSIONING PHASE	**$275,184**		**$335,346**
CNSC REVIEW AND ASSESSMENT FEES			
DESCRIPTION OR ACTIVITY	**SUBTOTAL**	**CONTINGENCY**	**TOTAL**
CNSC Impact Assessment Determination (1 day)	$2,389	25%	$2,986
Review of Decommissioning Licence Application & associated program review (40 days)	$95,560	25%	$119,450
Licensing assessment and decision (20 days)	$47,780	25%	$59,725
Review of Decommissioning Final Report (5 days)	$11,945	25%	$14,931
CNSC review of Abandonment Licence Application and CMD development (4 days)	$9,556	25%	$11,945
TOTAL: CNSC FEES	**$167,230**		**$209,038**
UNADJUSTED COST TO ACHIEVE END STATE	**$763,301**		

Adjustments to this base cost are presented on the following page, as per CNSC staff guidance and feedback[28], to account for inflation and the expected rate of return of the instrument selected by SRBT and approved by the Commission for the purposes of providing a Financial Guarantee for facility decommissioning purposes.

Running Costs

Running costs and anticipated regulatory fees have been adjusted from previous values by applying an inflation factor of 1.154 (estimated Canadian rate of inflation between 2019-2023 – see https://www.bankofcanada.ca/rates/related/inflation-calculator/; value obtained September 2024), and rounded upward to the nearest dollar.

Note that 'running costs' capture those costs associated with the leasing of the facility during the period of decommissioning, as well as all associated building maintenance and upkeep costs, and the costs associated with project management.

Adjustment for future inflationary effects

The SRBT PDP has traditionally applied an inflation factor to the previously derived base cost estimates for each expenditure when calculating the new value during each revision. The factor applied is based on historical data from the Bank of Canada. This means that inflation has always been accounted for in the cost estimates put forward, but not in terms of future inflationary forces.

As the PDP and associated financial guarantee is revised at least once every five years, in order to incorporate this adjustment, the target inflation rate of the total Consumer Price Index (CPI), as established by the Bank of Canada, would be a reasonable rate to apply, given the uncertainty associated with this type of projection. As such, a 2% rate, compounded annually, has been applied to the final cost estimate presented here, resulting in a modified cost estimate of $\$763,301 \times (1.02)^5 = \$763,301 \times 1.1041 = \$842,746$ to account for future inflationary effects.

Future revisions of the plan will thus no longer account for historical inflation rates, since it is now being integrated into the cost estimate in a forward-looking fashion (instead of the previously-applied retroactive fashion).

Adjustment for expected rate of return of financial instrument

SRBT's proposed Financial Guarantee instrument is in the form of a guaranteed investment certificate (GIC) fund. All interest is re-invested into the fund, which is held in escrow, upon maturity and renewal.

The current, specific guaranteed investment rate of return associated with this investment vehicle is 3%, and it is considered to be an investment product that carries very little risk.

Applying this value as the discount rate over five years for the inflation-adjusted cost estimate of \$842,746 (above), the present-day dollar value of the cost estimate (rounded up) is $\$842,746 / (1.03)^5 = \$842,746 / 1.1593 =$ **$726,961**.

23. Funding

CNSC REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities,* provides requirements and guidance to applicants and licensees regarding the establishment and maintenance of funding for the decommissioning of facilities and termination of activities licensed by the CNSC.

As per this document, in order to be acceptable, a funding measure must meet Commission expectations with respect to liquidity, certainty of value, adequacy of value, and continuity.

23.1 Current Funding

SRBT's latest FG was approved by the Commission in a record of decision[26] dated December 8, 2020.

The newly costed plan estimate of $727,327 had earlier become fully funded by transfer into an investment account held in escrow on April 24, 2020.

An Escrow Agreement[34] and a Financial Security and Access Agreement[35] were considered acceptable by CNSC staff[36]. These agreements provide regulatory access to the FG, should the need arise.

As of October 31, 2025, the certified fair market value of the investment account stood at $799,509.35, which represents just under 110% of the required guarantee based on the previous PDP.

For this updated version of the PDP and its associated cost estimate**, the current fair market value of the investment account also represents 110% of the required guarantee; as such, the funds held in escrow within the account remain more than sufficient for the purposes of covering the costs for future decommissioning of the SRBT facility.**

23.2 Proposed Funding

Upon acceptance of the 2026 revision of the PDP, SRBT will update the Escrow Agreement and Financial Security and Access Arrangement in close consultation with CNSC staff, in order to ensure full funding of the FG is available to CNSC staff if required.

In line with accounting for the expected rate of return of the guarantee, SRBT commits that all accrued interest in the existing investment account be held in escrow and shall remain in that account, to be used to address expected inflationary effects over time.

24. References

[1] SRB Technologies (Canada) Inc., “Preliminary Decommissioning Plan”, March 14, 2006.

[2] CNSC Staff letter, Ann Erdman to Stephane Levesque, “CNSC Review of the Preliminary Decommissioning Plan and the Associated Cost Estimate plus Financial Guarantee”, July 6, 2006.

[3] SRB Technologies (Canada) Inc. letter, Stephane Levesque to Ann Erdman, “CNSC Review of the Preliminary Decommissioning Plan and the Associated Cost Estimate plus Financial Guarantee”, January 30, 2007.

[4] CNSC Staff letter, Ann Erdman to Stephane Levesque, “SRB Technologies (Canada) Inc. Revised Preliminary Decommissioning Plan Cost Estimate”, February 23, 2007.

[5] SRB Technologies (Canada) Inc. letter, Stephane Levesque to Ann Erdman, “SRB Technologies (Canada) Inc. Revised Preliminary Decommissioning Plan Cost Estimate plus Financial Guarantee”, June 15, 2007.

[6] CNSC Staff, “Information and Recommendations from Canadian Nuclear Safety Commission Staff”, CMD 07-H145, July 27, 2007.

[7] Canadian Nuclear Safety Commission, “Records of Proceedings, Including Reasons for Decision, Financial Guarantee for the Safe State of Closure for the Class IB Facility Located in Pembroke, Ontario”, October 23, 2007.

[8] SRB Technologies (Canada) Inc. letter, Stephane Levesque to Henry Rabski, “Financial Guarantee for the Full Cost of the Decommissioning and Cost Recovery Fee Arrears”, June 11, 2008.

[9] Canadian Nuclear Safety Commission, “Transcript for Hearing of June 12, 2008”, Page 12 lines 5 to 8, June 26, 2008.

[10] Canadian Nuclear Safety Commission, “Records of Proceedings, Including Reasons for Decision, Application to Resume the Processing and Use of Tritium at the Gaseous Tritium Light Source Facility in Pembroke, Ontario”, June 26, 2008.

[11] SRB Technologies (Canada) Inc., “Preliminary Decommissioning Plan”, June 23, 2013.

[12] CNSC Staff letter, Nadia Petseva to Stephane Levesque, “CNSC Staff’s Review of SRB Technologies (Canada) Inc. Preliminary Decommissioning Plan and Associated Cost Estimate”, September 17, 2013.

[13] SRB Technologies (Canada) Inc. letter, Stephane Levesque to Nadia Petseva, “CNSC Staff’s Review of SRB Technologies (Canada) Inc. Preliminary Decommissioning Plan and Associated Cost Estimate”, November 19, 2013.

[14] CNSC Staff letter, Nadia Petseva to Stephane Levesque, “Review of SRB Technologies (Canada) Inc. (SRB)’s Response to CNSC Comments on Preliminary Decommissioning Plan and Financial Guarantee for SRB Technologies (Canada) Inc.”, January 15, 2014.

[15] SRB Technologies (Canada) Inc., “Preliminary Decommissioning Plan”, June 20, 2014.

[16] CNSC Staff letter, Nadia Petseva to Stephane Levesque, “Review of SRB’s revised Preliminary Decommissioning Plan and Financial Guarantee”, August 22, 2014.

[17] SRB Technologies (Canada) Inc. letter, table, appendices A, B and C and attachments 1, 2 and 3, Stephane Levesque to Robert Buhr, “CNSC Staff’s Review of SRB’s Preliminary Decommissioning Plan and Financial Guarantee, dated June 2014”, September 21, 2014.

[18] CNSC Staff e-mail, Ann Erdman to Stephane Levesque, “CNSC Staff’s review of the SRB PDP and cost estimate comments provided Sept. 21, 2014”, October 27, 2014.

[19] SRB Technologies (Canada) Inc. letter, Stephane Levesque to Mike Rinker, “Contingency Factor for Revised SRBT Financial Guarantee”, October 30, 2014.

[20] CNSC Staff letter, Ann Erdman to Stephane Levesque, “CNSC Response to SRB’s comments regarding the Preliminary Decommission Plan including the Cost Estimate”, November 7, 2014.

[21] CNSC Staff letter, Jennifer Campbell to Stephane Levesque, “Review of SRB’s revised Preliminary Decommissioning Plan and Financial Guarantee”, November 24, 2014.

[22] Letter from S. Levesque (SRBT) to L. Posada (CNSC), *Submission of Revised Preliminary Decommissioning Plan – 2019*, November 29, 2019.

[23] Letter from L. Posada (CNSC) to S. Levesque (SRBT), *CNSC Staff Review of SRB Technologies (Canada) Inc.’s Revised Preliminary Decommissioning Plan – 2019*, February 3, 2020.

[24] Letter from S. Levesque (SRBT) to L. Posada (CNSC*), Draft Escrow Agreement and Financial Security and Access Arrangement, with Proposal to Fund Updated Financial Guarantee*, February 4, 2020.

[25] *Notice of Hearing in Writing (Ref. 2020-H-105),* Published by CNSC on September 8, 2020.

[26] *Record of Decision DEC 20-H105, In the Matter of Application for Acceptance of a Revised Financial Guarantee for SRB Technologies (Canada) Inc.;* date of decision December 8, 2020.

[27] Letter from A. O’Connor (CNSC) to J. MacDonald (SRBT), *Review of SRBT’s Preliminary Decommissioning Plan,* dated April 24, 2025.

[28] Letter from A. O'Connor (CNSC) to J. MacDonald (SRBT), *Review of SRBT's Preliminary Decommissioning Plan,* dated October 8, 2025.

[29] Email from J. MacDonald (SRBT) to A. O'Connor (CNSC), *SRBT PDP/FG Meeting Actions,* dated December 3, 2025.

[30] Census information from Statistics Canada website at https://www12.statcan.gc.ca.

[31] SRBT Environmental Risk Assessment, April 2021. (link)

[32] SRBT Safety Analysis Report, December 2023. (link)

[33] The Multi-Agency Radiation and Site Survey Investigation Manual, "MARSSIM", NUREG 1575, Rev 1, August 2000.

[34] SRB Technologies (Canada) Inc. "Escrow Agreement', Revision 3, February 4, 2020, and digitally signed by R. Velshi (President - CNSC) March 9, 2021.

[35] SRB Technologies (Canada) Inc. "Financial Security and Access Agreement', Revision 3, February 4, 2020, and digitally signed by R. Velshi (President - CNSC) March 9, 2021.

[36] Letter from L. Posada (CNSC) to S. Levesque (SRBT), *CNSC Staff Review of SRB Technologies (Canada) Inc.'s Revised Escrow Agreement and Revised Security Access Agreement,* dated April 3, 2020.

25. Appendices

List of Appendices:

A. Facility Equipment

B. Routine Contamination Assessment Data: 2019 – 2023

Appendix A

Facility Equipment

ZONE 1 EQUIPMENT

The following notable equipment, systems and components are located within Zone 1 areas:

Front Offices

1 - Konica Minolta Bizhub C554e fax/copy/printer

6 - Panasonic Digital KX DT343 telephones

6 - Executive Workstations

5 - Lenovo Computer

1 - Apple MacBook Pro

Records Room

1 -Lenovo Server and Monitor

1 -Panasonic KXTDE100 Phone System

1 -Panasonic KXTVM50 Voice System

Glass Shop

1 - Weightronix Model PC220 balance

1 - Heathway 532 EV glass lathe

2 - Cress Model C122012 DW/942 HLC electric furnaces

1 - PSH stress relief kiln

1 - Lowinger Glasbearbeitingsmaschinenbau glass roller

1 - Herbert Arnold KF30 glass cutter

1 - Pay Lamp Machinery type FD glass extruder

1 - Lenovo Computer

Coating Room

5 - SLEE Type 6NFH Ventilated Work Stations

1 - Uline model H-1649 balance

1 - Corrosive storage cabinet

2 - Dehumidifiers

1 - Fisher Scientific Isotemp Drying Oven

1 - Baxter Tempcon Drying Oven

1 - Lenovo Computer

Shipping

1 - Pelouze weight scale model 4010

1 - Lenovo Computer

1 - Overhoff Model 357 tritium in air monitor

1 - Overhoff Model 200SB portable tritium in air monitor

Back Offices

8 - Lenovo Thinkpad Computers

3 - Apple Computers

1 - Epson model 1640XL scanner

1 - Konica Minolta Bizhub C554e fax/copy/printer

1 - Konica Minolta Bizhub C227 copy/printer

1 - Laser Jet Pro CM1415FNW Color MFP

10 - Panasonic Digital KX-DT343 telephones

1 - 1-DAHLE BS5498 Paper cutter

1 - Fellowes 225CI Shredder

Liquid Scintillation Lab

2 - TriCarb 2910 Liquid Scintillation Counters

3 - Omega flowmeter/totalizer (spares)

2 - Overhoff model 357 tritium in air monitors (spares)

2 - Overhoff Model 200SB portable tritium in air monitors (spares)

1 - Powervar uninterrupted power supply system w/conditioner

1 - Monarch 2000 Electronic Chart Recorder (spare)

1 - Tyne Surface Activity Monitor

2 - RadEye Portable Radiation Survey Meters (PRD and B20)

Various radioisotope laboratory equipment (pipettors, dispensers, etc.)

Lunchroom

1 - Sony Bravia TV

1 - Pyramid Time Trax EZ

2 - Microwaves

1 - Newco Coffee Maker

2 - Danby Designer Refrigerator

1 - Danby Designer Freezer

1 - Quattro AF1000 Air Purification System

Building Ventilation

2 - Make-up Air Supply Units

2 - Area Heating and Air-conditioning Units

2 - Area Air-conditioning Units

4 - Area Heating and Circulation Unit

2 - Air/Heat Exchange Units

4 - Wall-type Air-conditioner Units

Machining Area

1 - First Model LC-1 ½ TM Milling Machine

1 - Nissei FNX280II Injection Molding Machine

1 - Thoreson McCosh TD-90 Pellet Dryer

1 – Mokon Water Chiller

1 - Hyster W30ZR Lift Truck

1 - BJ3500 Forkcrane

1 - Objet500 Connex3 3d Printer

1 - Mantis Elite Microscope

1 - Lenovo Computer

Assortment of Shop Tools (power tools, hand tools, benchtop machines)

Rig Room Ante Room Area

1 - Monarch 2000 Electronic Chart Recorder

Compressor Room

2 - Compressor Units and Accessories

ZONE 2 EQUIPMENT

The following notable equipment, systems and components are located within Zone 2 areas:

Assembly

2 - Branson Ultrasonic Welder

1 - 4’ x 4’ Spray paint hood

1 - Mimaki UJF-series UV printer

2 - Photo Assessment Instruments (Photometer)

2 - National Equipment XP500 Exposure unit

1 - Overhoff model 357 tritium in air monitor

3 - Overhoff Model 200SB portable tritium in air monitors

1 - Lenovo Computer

1 - Kyocera FS1370DN Printer

1 - American Silk-Screening Device (semi-automated)

1 - American Silk-Screening Device (manual)

1 - Custom Walk-In Screen washing hood

1 - 5’ Constant Velocity Class I safety cabinet

Stack monitoring equipment

2 - Overhoff model 357 tritium in air monitor

4 - Overhoff tritium air sample collectors (bubblers)

4 - Omega flowmeter/totalizer

2 - APC uninterrupted power supply systems

ZONE 3 EQUIPMENT

The following notable equipment, systems and components are located within Zone 3 areas:

Rig Room

5 - Operational GTLS filling rigs, including oil-free scroll pumps, stainless-steel tubing and valves

1 - Muffle oven

1 - Pre-bake oven

3 - Vacuum thermal drying ovens / holding chambers

3 - Constant velocity stainless steel safety cabinets / fume hoods

1 - Overhoff model 357 tritium in air monitor

1 - Overhoff Model 200SB portable tritium in air monitor

1 - Overhoff Remote Display Unit

1 - Lenovo Computer

Laser Room

1 - Operational laser cutting systems (‘EIP’ laser system)

1 - Non-operational laser cutting system (‘Culham’ laser system)

1 - 6’ x 3’ stainless steel fume hood

1 - Overhoff model 357 tritium in air monitor

1 - Overhoff Model 200SB portable tritium in air monitor

1 - Ventilated steel cabinet

1 - heavy-duty steel storage cabinet

Tritium Lab

1 - Custom Bulk Splitting rig (including an oil-free scroll pump and stainless-steel tubing and valves)

2 - 4’ Constant velocity Class I safety cabinets (manufactured from particle board)

1 - Overhoff model 357 tritium in air monitor

1 - Overhoff Model 200SB portable tritium in air monitor

1 - Overhoff Remote Display Unit

Store Room

1 - 3’ x 5’ Fire proof Vault

Ventilation Systems

The ventilation systems include the ducts, plenums and Air Handling Units.

Appendix B

Routine Contamination Assessment Data: 2019-2023

The following tables present data summarizing the average tritium contamination levels found on facility surfaces in the five-year period between 2019 and 2023, as assessed by routine contamination monitoring activities as part of the Radiation Safety Program. Detailed data can be found within the Annual Compliance Reports for each calendar year on SRBT's website.

Zone 3

As per the SRBT Radiation Safety Program, the routine contamination monitoring acceptance criteria for Zone 3 areas is 40 Bq/cm^2, averaged over a 100 cm^2 area.

Zone 3				
Quarter	Assessments Performed	Avg. Contamination (Bq/cm^2)	Samples < 40 Bq/cm^2	Samples > 40 Bq/cm^2
Q1 2019	1464	19.02	1367	97
Q2 2019	1488	12.48	1415	73
Q3 2019	1508	17.99	1409	99
Q4 2019	1390	36.05	1280	110
Q1 2020	1464	9.30	1428	36
Q2 2020	1463	8.89	1405	58
Q3 2020	1536	14.23	1469	67
Q4 2020	1416	11.69	1346	70
Q1 2021	1488	10.48	1441	47
Q2 2021	1488	16.69	1388	100
Q3 2021	1464	11.37	1393	71
Q4 2021	1368	12.23	1331	37
Q1 2022	1512	8.39	1482	30
Q2 2022	1464	28.46	1396	68
Q3 2022	1488	23.86	1449	39
Q4 2022	1392	10.03	1355	37
Q1 2023	1512	15.11	1441	71
Q2 2023	1464	14.41	1431	33
Q3 2023	1464	7.08	1432	32
Q4 2023	1416	48.10	1364	52
	Zone 3 Average:	**16.79**		

Zone 2

As per the SRBT Radiation Safety Program, the routine contamination monitoring acceptance criteria for Zone 2 areas is 4 Bq/cm^2, averaged over a 100 cm^2 area.

Zone 2				
Quarter	Assessments Performed	Avg. Contamination (Bq/cm^2)	Samples < 4 Bq/cm^2	Samples > 4 Bq/cm^2
Q1 2019	432	2.05	403	29
Q2 2019	432	1.73	398	34
Q3 2019	456	1.06	435	21
Q4 2019	411	1.94	375	36
Q1 2020	429	0.79	419	10
Q2 2020	444	0.55	430	14
Q3 2020	456	0.60	445	11
Q4 2020	432	2.65	410	22
Q1 2021	444	1.00	435	9
Q2 2021	433	0.49	430	3
Q3 2021	432	0.82	417	15
Q4 2021	420	1.28	404	16
Q1 2022	456	0.64	443	13
Q2 2022	444	0.44	441	3
Q3 2022	432	1.23	419	13
Q4 2022	420	0.53	413	7
Q1 2023	444	0.68	430	14
Q2 2023	432	0.58	425	7
Q3 2023	431	0.50	421	10
Q4 2023	408	1.05	387	21
	Zone 2 Average:	**1.03**		

Zone 1

As per the SRBT Radiation Safety Program, the routine contamination monitoring acceptance criteria for Zone 1 areas is 4 Bq/cm^2, averaged over a 100 cm^2 area.

Zone 1				
Quarter	Assessments Performed	Avg. Contamination (Bq/cm^2)	Samples < 4 Bq/cm^2	Samples > 4 Bq/cm^2
Q1 2019	130	0.44	127	3
Q2 2019	130	1.00	126	4
Q3 2019	130	0.67	125	5
Q4 2019	119	1.96	113	6
Q1 2020	128	0.80	124	4
Q2 2020	156	0.97	146	10
Q3 2020	156	0.58	151	5
Q4 2020	144	0.45	142	2
Q1 2021	156	0.33	153	3
Q2 2021	168	1.14	159	9
Q3 2021	156	0.50	154	2
Q4 2021	144	0.55	140	4
Q1 2022	156	0.43	151	5
Q2 2022	156	0.30	155	1
Q3 2022	156	0.27	154	2
Q4 2022	144	0.65	141	3
Q1 2023	156	0.83	149	7
Q2 2023	156	0.71	149	7
Q3 2023	156	0.28	154	2
Q4 2023	138	0.51	137	1
	Zone 1 Average:	**0.67**		